NBA Accreditation and Teaching- Learning in Engineering
Professor N.J. Rao
Department of Electronics System Engineering
Indian Institute of Science, Bengaluru
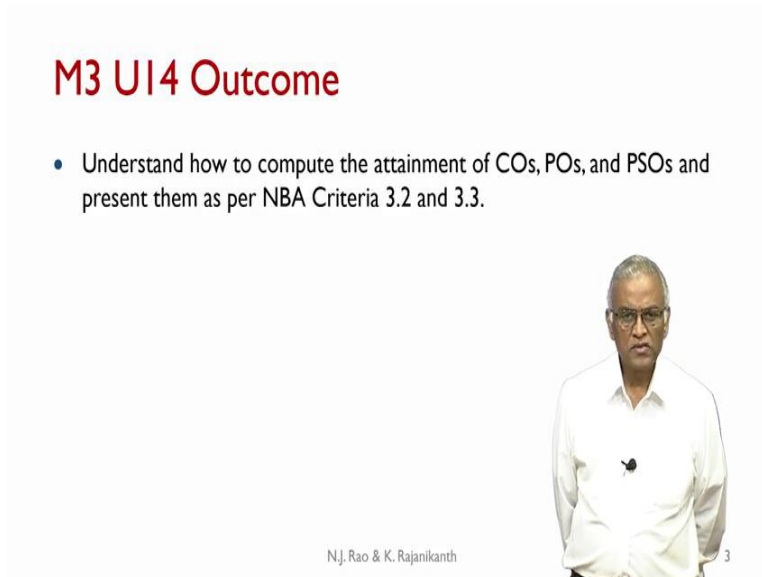**Lecture 54**
Course Outcomes and Program Outcomes 2

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Greetings and welcome to NATE module 3 unit 14 related to NBA criterion 3. NBA criterion 3 is also related to course outcomes and program outcomes. In the earlier unit, we understood the

role and method of preparing COs, CO-PO matrices and CO-PSO matrices for courses and present them as required by NBA. Here, these are also sometimes known as CO PO matrices are known as articulation matrices as well.

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M3 U14 Outcome

- Understand how to compute the attainment of COs, POs, and PSOs and present them as per NBA Criteria 3.2 and 3.3.

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And in this unit, we will continue with the rest of the criterion 3 and try to understand how to compute the attainment of Cos, POs and PSOs and again present them as per the requirements of National Board of Accreditation or the way you need to present in SAR. And we will be looking at criteria 3.2 and 3.3 of NBA.
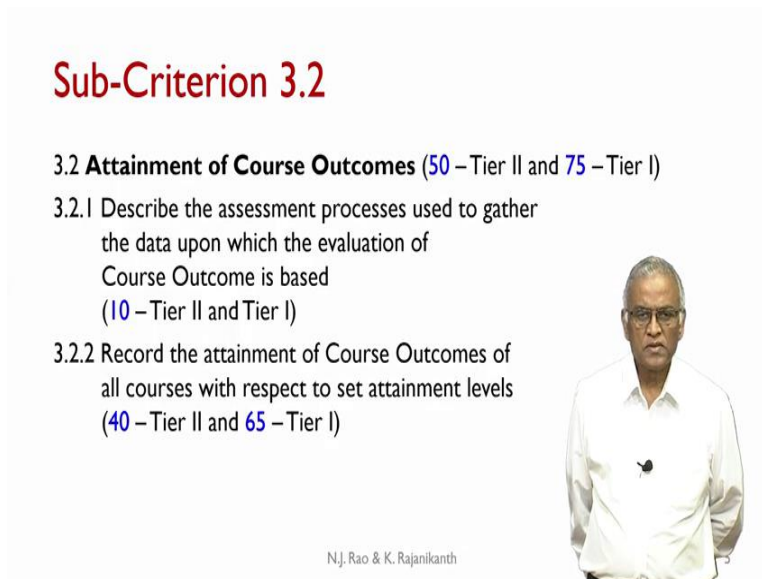
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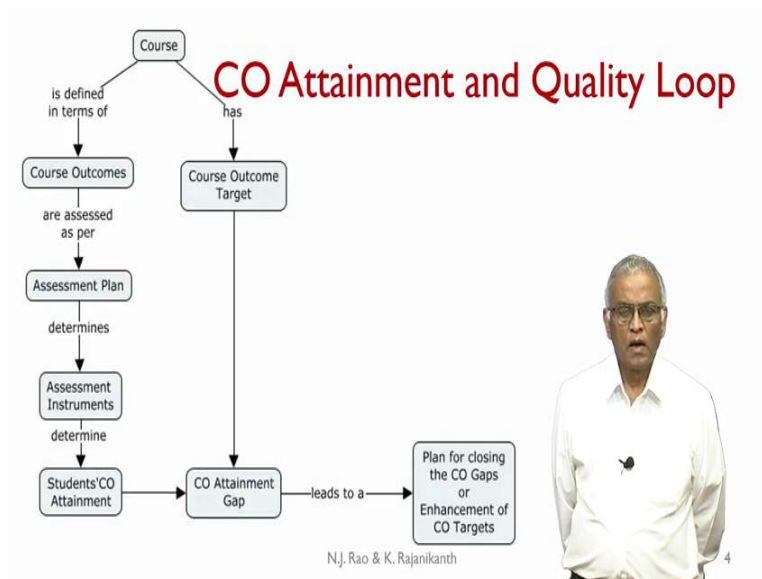
While we presented this earlier, let us look at CO attainment and quality loop. If this presence the way the articulation matrices and the way we compute the attainment gap, set the targets all these relations are captured in this particular diagram. And if you look at the course, first has course outcome targets.

These targets can also be set in several ways, which you have elaborated in module one. And it can be one target for CO or you can have target for each course outcome. That means, if there are eight course outcomes, there will be eight targets for that. And the course is defined in terms of course outcomes and the course outcomes are assessed as per assessment plan, and assessment plan determines the assessment instruments and assessments instrument determine the students.

CO attainment and the CO attainment is compared with the target that is set and you compute the CO attainment gap and that leads to it should lead to plan for closing the CO gaps, attainment gaps or enhancement of CO targets. So, broadly this represents the closing the quality loop at the course level.

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Sub-Criterion 3.2

3.2 Attainment of Course Outcomes (50 – Tier II and 75 – Tier I)

3.2.1 Describe the assessment processes used to gather the data upon which the evaluation of Course Outcome is based (10 – Tier II and Tier I)

3.2.2 Record the attainment of Course Outcomes of all courses with respect to set attainment levels (40 – Tier II and 65 – Tier I)

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Now, the same thing is also required as per the sub criterion 3.3.2 as well as sub criterion 3.3. Now, let us look at 3.2 says, attainment of course outcomes. Here, there are 50 marks for tier 2 and 75 marks for tier 1 institutions. And this again is further subdivided into what you may call sub sub criterion 3.2.1 in which you are required to describe the assessment processes used to gather the data upon which the evaluation of course outcome is based.

We will presently look at the detail and 3.2.2 record the attainment of course outcomes of all courses with respect to set attainment levels. The marks as you can see are different, in 3.2.1 you have 10 marks for both tier 2 and tier 1 institutions. And with respect to 3.2.2, you have 40 marks for tier 2 and 65 for tier 1.

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Now, coming to 3.2.1 you have to describe the assessment processes used and the guidelines with further in that, you have to first list, list the assessment processes just list that alone will carry 2 marks. And the second part, the you have to describe the quality and relevance of assessment processes and tools used, that means the department has to explain why a certain assessment processes are chosen and on what basis do you think they will they will determine the quality and relevance of assessment.

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So, they are the two parts of those guidelines. And let us look at the first one, list of assessment processes. First of all, in the case of tier 2 institution, assessment process are mostly decided by the university, and there is not much choice left to the tier 2 institutions but in some cases, the as a part of continuous internal evaluation, there can be some choice to the tier 2 institution, it depends on the university. Whereas, tier 1 institutions it decide themselves.

That means, all the elements the distribution of marks across internal evaluation and semester and examination, they are all decided by the institution itself. And some examples of these assessment processes are elements of CIE. That means, you are trying to say what are the elements of CIE continuous internal evaluation.

These will include how many tests you are going to conduct? How many assignments you are going to have? How many quizzes you are likely to have? You are only listing that. Similarly, more elements of SEE, mostly it will contain one end semester exam, but in some tier 1 institutions, you can add additional things like you can add a seminar, you can have a mini project, the performance of the mini project can be added to a SEE, but that is a choice of the tier 1 institution.

Whereas, tier 2 institution that is decided by the university itself and then you have an assessment plan. As we mentioned in module 1, assessment plan will present what weightage you give to each one of the elements in CIE and SEE that is assessment plan. You may have some more elements, some more elements like this, but it depends on the specific institution, but these are only some examples, which form the list of assessment processes.

So by merely giving the list of assessment process, mostly you can get these two marks. Now, then second one is, the quality in relevance of assessment processes and tools used. So, what should you write in this? Explanation of the choice of assessment process in terms of their relevance, why did you choose? And why do you consider they are relevant? Explanation of why the department considers the tools chosen determine the quality of assessment.

For example, if all your instruments are let us say, all your assessment belongs to the remember and understand category type of questions, it is difficult to justify that the particular choice that you made, the process that you chose actually determines the quality of assessment, it is difficult to justify. So, when you are writing this explanation, you have to make sure that all the relevant cognitive levels are addressed.

That is the purpose of this sub criterion 3.2.1 and then how well the assessment processes and tools address COs at relevant cognitive levels. If you can add an explanation to that, the relevant cognitive levels, then you are actually explaining the quality and relevance of the assessment process. So, you can score more marks out of the date. And quality of assessment plan, the number, variety and frequency of assessment instruments should all be mentioned in these explanation.

It does not mean that you have to have these four independent documents there, but these are the elements that need to be included in the document. So make sure these things are addressed in the document that you prepare for 3.2.1 B and generally, broad guidelines can be formulated at the institute level. Here, in a tier 2 institution also, you cannot write completely independently for each department.

So, at the institution level, people sit, should sit together and try to come to a set of broad guidelines with regard to preparing the document for this.

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Sub-Criterion 3.2.1 - Exhibits/Context to be Observed/Assessed

A.& B. Evidence for appropriate assessment processes including data collection, verification, analysis, decision making.

- Analysis of tagging items for cognitive levels and their weightages in CIE and SEE instruments of sample courses for all semesters.
- Sample student responses across all levels and the quality of evaluation.
- Committee evaluates these documents subjectively

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Now, what are the exhibits or the context to be observed and how do they assess? The it should it consists of analysing of tagging the items for cognitive levels and their weightages in CIE and SEE instruments of some sample courses for all semesters that you take one sample course from each semester and show with respect to one sample course, and how you have tagged the items with regard to cognitive levels.

And the weightage that you gave to each one of the, let us say CO and one can also collect, one should also present sample student responses across all levels and the quality of evaluation. One of the good ways to do is collect student responses at the lowest level people who got minimum marks, people who got some average level marks and people who got highest level marks, you collect two samples of the student responses and include it in a file.

And that will form and also not only the responses, actually the teacher is evaluating them. How are you giving your marks, if they are all collected they constituted a good data regarding the assessment as such CO assessment and the committee will evaluate these documents subjectively and give marks out of the 8 actually.

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Sub-Criterion 3.2.2

Record the attainment of Course Outcomes of all courses with respect to set attainment levels (40 – Tier II and 65 – Tier I)

Guidelines

A. Verify the attainment levels as per the benchmark set for all courses

Exhibits/Context to be Observed/Assessed:

A. Methodology to define set levels and its compliance; data collection, verification, analysis and decision making; details for one course per year of study to be verified

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Now, coming to sub criterion 3.2.2 that is related to recording the attainment of course outcomes of all courses with respect to set of attainment set assignment levels, what we call set attainment levels are nothing but the what we called as targets. And here, you have 40 marks for tier 2 institution and 65 marks for tier 1 institution. And the guidelines for this is verify the attainment levels as per the benchmark set for all courses.

Now, let us look at this how we can verify this. Now, you have to compute the attainment levels of COs of all courses, though you need to only include samples only in the SAR document, but this competitions must be done for all courses for in all semesters as per the stated assessment processes, which we have listed in 3.2.1 that means, you are following what was mentioned earlier in 3.2.1 and actually implementing in the context of 3.2.2.

And you also need to compute the attainment gaps of all COs of all courses and also present the plan for closing the attainment gaps or enhancing the targets with explanations and this process has been explained in detail in module 1. So, you, but that is our example, but if you are following slightly different process, you must implement all that and create the plan for closing the loop and in the SAR, it is good to include one example to illustrate the about three processes and that would greatly help that would communicate satisfactorily to the visiting committee.

And you, a little subjective part can be eliminated because the college can decide what is the process they want to follow for computing the CO attainment, all that we are showing is at the college level we have decided and then we have implemented we are showing a sample. What is the committee will do is, will say whether you followed the process you have declared that is what they will inspect for some sample courses.

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Sub-Criterion 3.2.2 - Exhibits/Context to be Observed/Assessed

A. Methodology to define set levels and its compliance; data collection, verification, analysis and decision making; details for one course per year of study to be verified

- The visiting committee will assess, with regard to data collection, verification, analysis and decision making, one course per year of the program as per the process defined by the Department and awards marks out of 40 for Tier II institution and out of 65 for Tier I institution.
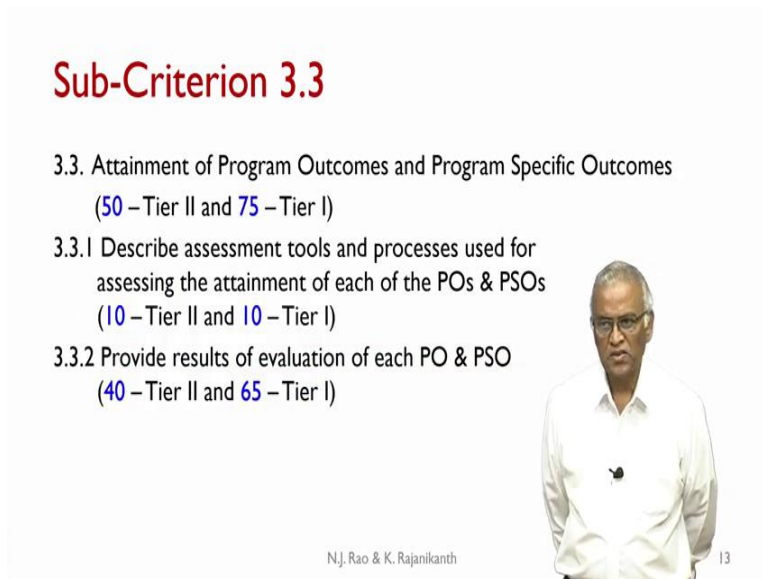
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So, what will the visiting committee will do? It will assess with regard to data collection, verification, analysis and decision making and you do this they will do this for one course per year of the program as per the process defined by the department and awards marks out of 40 for tier 2 institution and out of 65 for tier 1 institution.

Mind you this fairly, 40 and 65 are fairly large numbers. So, one has to be careful and actually work closely with the committee to make sure that there are no misunderstandings because everyone will have their own. What do you call processes in their mind and if the department the process chosen by the department is different from that, they are likely to have some kind of reservations or doubts.

So, that part as a part of 3.2.1 you have to make it very clear to the visiting committee. So, that there are no misunderstandings.

Now, we come to sub criterion 3.3, 3.3 is attainment of program outcomes and program specific outcomes. So, we move to the next level and here 50 marks are given to tier 2 institution, whereas tier 1 gets 75 marks. So, the responsibility is much higher in tier 1 institution and this consists of two sub sub criteria. First one is 3.3.1 describe assessment tools and processes used for assessing the attainment of each of the POs and PSOs, it is very similar to 3.2.

There the focus is on at a computational of CO attainments, here the focus is on computation of PO-PSO attainment. So, you go through the same process first describe the process, explain the quality of the process chosen, and then actually do the computation as per 3.3.2. So, that it is it follows a similar process. Here for 3.3.1, we give 10 marks for tier 2 institution and 10 for tier 1. Whereas, 3.3.2 will give 40 marks for tier 2 and 65 for tier 1.

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PO/PSO Attainment and Quality Loop

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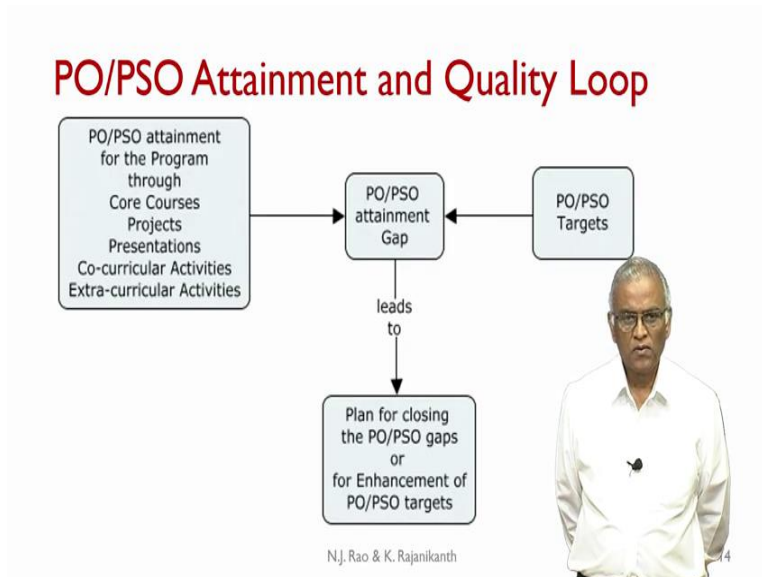
Now, once again, the relationship among all this can be shown through this kind of concept map, which is somewhat very similar to similar to what we have shown with respect to CO attainment. Now, how are POs and PSOs are retained? They are not directly attain, they are attained through core courses projects. See here, the core courses, projects presentations co curricular activities and extracurricular activities.

So, they are attained only through these activities. So, they will decide as to what extent POs and PSOs s are attained. Whereas, then you set up a select your target for each PO and PSO and then the gap between the two that should lead to plan for closing the PO-PSO gaps or enhancement of the PO-PSO targets if we have set them lower. So, similar diagram as that for CO will also hold good for this.

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Now generally, computing PO-PSO attainment one has to understand the background a little more clearly because it is not directly addressed. Whereas, CO it is very clear, easy to understand in each course, you are the teacher as well as the student is directly relating to the COs that have been that have been presented.
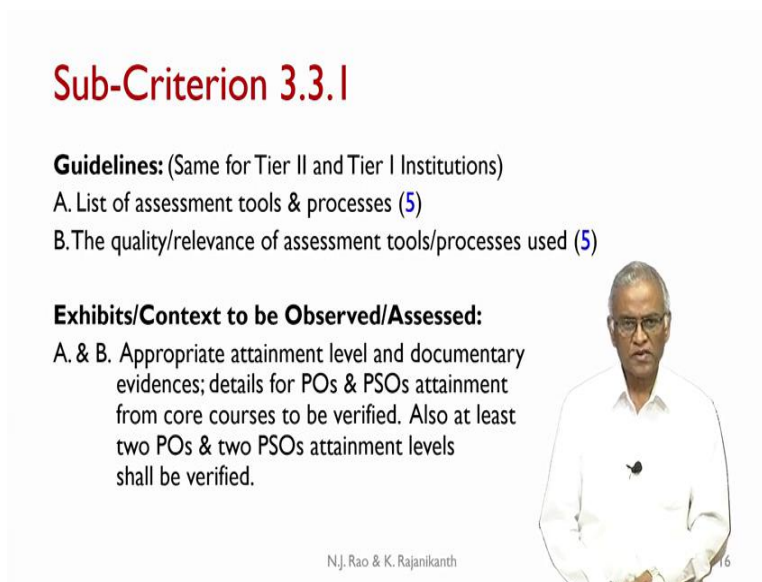
Now here, but why do we want to compute indirectly the PO-PSO attainment? The main purpose of computing PO-PSO attainment is to enable us to plan for continuous improvement. Now, as you can see, there are 12 POs of which 5 are discipline oriented and 7 are professional oriented and when we are designing a program it is possible that they have can be have some, some skew in the way we are we chose our courses the way we are conducting.

So, you have to make sure that all the POs that we have that are given by NBA are satisfactorily addressed. If not, if they are not satisfactorily addressed, that means, there is certain amount of skew that means your program itself has not been designed and conducted in a balanced way. So, the when we compute PO-PSO attainment, you based on that you can take a relook at your even your curriculum design. The PO- PSO attainment should be computed from direct and indirect methods, direct method is directly you take the marks up the performance of the students in courses and translate them following a very, well defined process.

But in all this you cannot say any process that you choose is very precise and it will exactly tell you to what extent it has been attained. So, to that extent, at the PO level, we also look at some indirect methods, indirect methods we have explained. They include some surveys of surveys from your alumni industry and so on will presently a list what those surveys are and then computing PO-PSO attainment from COs will depend on the student performance and the manner of determining the mapping strength.

As we explained earlier, each CO will address a subset of the 12 POs, there may be only one CO addressing one PO. In that case, you cannot say the course addresses that particular PO very substantially. So, you have to talk about determining the mapping strength for determining the mapping strength, we have given one objective method, but sometimes people also do it subjectively, but you have to identify some mapping strength and we are presented one method of computing PO-PSO attainment in the module 1 of this course and here the method of computation cannot be done at individual level the process for computation should be decided at the institute level and followed by all departments.

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Sub-Criterion 3.3.1

Guidelines: (Same for Tier II and Tier I Institutions)
A. List of assessment tools & processes (5)
B. The quality/relevance of assessment tools/processes used (5)

Exhibits/Context to be Observed/Assessed:
A. & B. Appropriate attainment level and documentary evidences; details for POs & PSOs attainment from core courses to be verified. Also at least two POs & two PSOs attainment levels shall be verified.

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Now, come to the guidelines of this what do you have, once again as we said list the assessment tools and processes 5 marks and the quality and relevance of assessment tools used that is 5 marks.

Let us look at a list of assessment tools and processes. Assessment tools is first of all, what is the periodicity that you are computing? Do you do it every year, do you do it every semester and attainment of COs that is that is one of the elements that you start with and do you also do the surveys. These surveys will include as recent alumni survey, industry survey, and sometimes you can also survey from the fine outgoing students and so on.

A survey of any of the stakeholders with respect to this and then if the co-curricular and extra-curricular activities, where you are systematically using some rubrics and all students are participating, then the results of evaluation of these activities can also form. It can also be one of the assessment tools for this.

And assessment processes, if you look at, they include method of identifying the POs and PSOs addressed by COs of a course, on what basis are you? Are you saying a CO addresses a PO, you just cannot look at the list and say, I am addressing this PO, you, everyone must follow a method. We have presented one method in our earlier module, but a college can define its own method of identifying the POs and method of determining the strength to which PO-PSO is addressed that also we presented one objective method, method of setting the targets for POs and PSOs.

Now, are you normalizing the attainment to, to a value of 1 or 3 that is your choice and with respect to that, do you want to put similar targets for all POs because as you can see, all POs are not similar in nature and then they are not addressed by all courses either. So, you have to make a choice whether to what varying levels do you want to set targets for POs. Then percentage weightage to indirect assessment of POs, are you given 20 percentage weightage, 10 percentage weightage are still higher percentage weightage to indirect assessment you have to decide and you have to give an explanation.

Method of computing PO-PSO attainments simple formula that you use and plan for reducing the PO-PSO attainment gaps and for enhanced we know the targets were necessary. See what you have to keep in mind, you are a PO is addressed by several courses. So, to the extent under each

course, we have already created a what we wrote some kind of a plan for reducing the CO attainment gap, but now, when we come to PO it is not one course it is several courses.

So, one of these one of the best methods is to pull all the plans for reducing the CO attainment gaps of all the related courses to that PO and pull them and from that pull you come with a conclusion or you come you decide what plan do you want to create the to reduce the gap in PO attainment, that is the method that you can follow.

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Sub-Criterion 3.3.1 – Guidelines (3)

B. The quality/relevance of assessment tools/processes used (5)
- Explanation of the choice of PO/PSO assessment processes in terms of their relevance.
- Explanation of why the Department considers the tools chosen determine the quality of PO/PSO assessment.
- Illustration with an example

The choice of processes should be common across all the Departments of an Institution
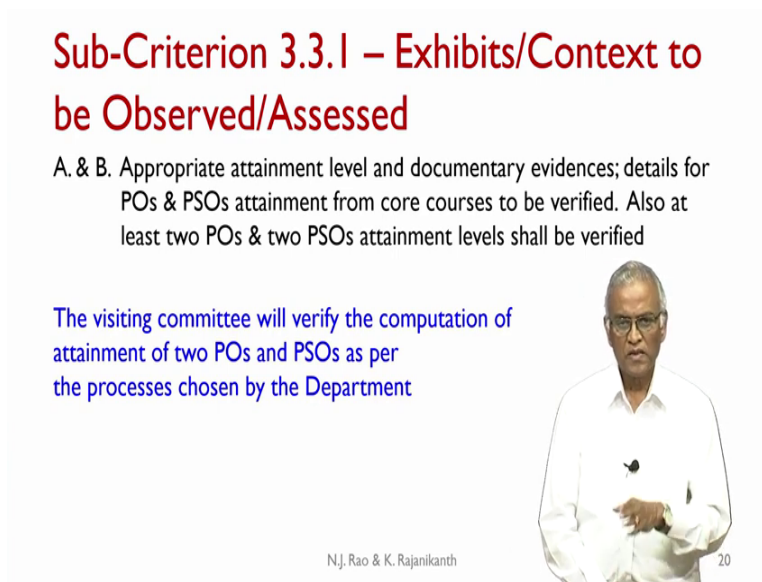
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And now, with regard to be the quality relevance of assessment documents tools in process used, so you have to give an explanation like in the case of CO, the choice of PO-PSO attainment process in terms of their relevance and also the tools that are chosen. Why do you think that decide the quality of PO-PSO. And again, you can illustrate with at least one example, when you write this document related to be, you ended up with one illustration by giving an example with respect to one PO, how you are doing the calculations.

But, whatever process that you choose, it should be common across all the departments of an institution. That is what as you can see, the nature of education is such that there has to be certain level of autonomy at teachers at learning level, and yet you need to follow certain type of common process in an institution. That is why it is a kind of balance between the two. But if I choose completely different process for each course, then it is very difficult to kind of pull them

together. So the faculty will have to come to a common agreement across all departments, what is the what are the processes you are going to use.
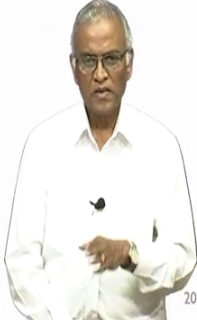
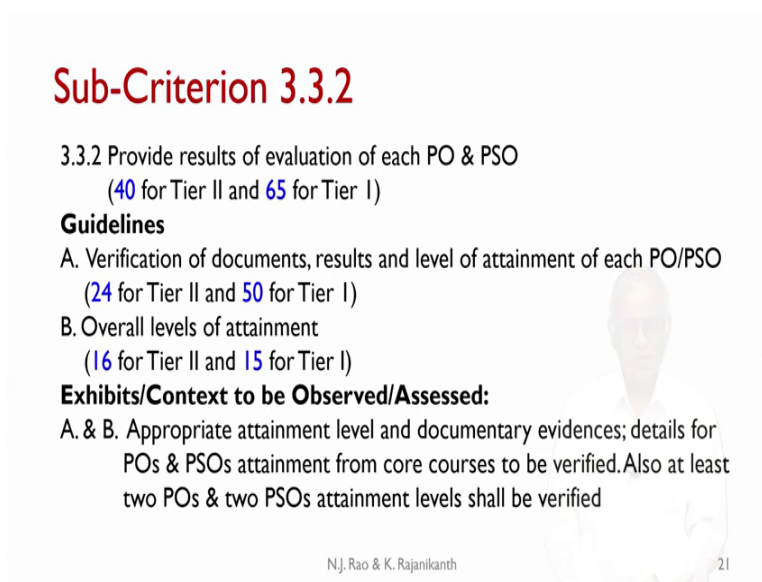(Refer Slide Time: 28:34)

And in terms of assessment of 3.3.1, the visiting committee will verify the computation of attainment of two POs and PS and two PSOs as per the process chosen by the department. So, they will arbitrarily can take two POs and two PSOs and look at the computation of that and based on that, they will award the marks for this sub criterion 3.3.1.

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Now coming to 3.3.2, this is where the final attainment of POs and PSOs are computed. That is what 3.3.2 is 40 marks for tier 2 and 65 for tier 1. And guidelines include verification of documents results and level of attainment of each PO and PSO, 24 for tier 1 and 50 for tier, sorry 24 for tier 2, 50 for tier 1 and be overall levels of attainment that is its second part of that 16 for tier 2, and 15 for tier 1.

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Sub-Criterion 3.3.2 – Guidelines

A. Verification of documents, results and level of attainment of each PO/PSO
   (24 for Tier II and 50 for Tier I)

Documents that would be verified by the visiting committee

- Method of computing attainment of POs and PSOs.
- Attainment of PO/PSOs by each course/core activity.
- Computing the level of attainment of POs and PSOs at the program level for two batches.

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Now, verification documents what do we include in this document that would be verified by the visiting committee will include method of computing the attainment of POs and PSOs attainments of POs and PSOs by each course our core activity, core activity could be project seminars and so on.

And computing the level of attainment of POs and PSOs at the program level for two batches because POs and PSOs have to be looked at batch level, that means you are collecting the data over four years of the program or over the eight semesters you have to integrate the data over that, and at that level, how you are computing, how you have computed and in this process, you have to include the attainment of POs as done POs by all courses and all core activities.

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And then the department itself will have to do an analysis of the overall levels of attainments of POs and that means you are now looking at, you have a big matrix, what we call the program PO-PSO articulation matrices. And this each matrix will consist of the list of courses which can be maybe 35 40, 35 40 rows, and then you have 12 POs and looking at the overall matrix and the kind of attainment that has been done, let us say if you have normalize to one, then you will have numbers less than one filling various cells in that where it is not relevant, you will put a dash.

Now by looking at this, the department should be able to analyse about the entire the quality of learning to what extent a qualitatively they have to explain to what extent they feel they have achieved or where they are they need to further improve. And if the year on year attainments are reducing for some reason, because you are now computing over two batches, the if there is a reduction in the PO attainments, you have to give an explanation for that.

But the many colleges are likely to give standard explanation saying that what can we do it is the quality of the incoming students and that kind of explanation will not be accepted as a proper one by the visiting committee. So, our request to you is not to use this as the basis for explaining why the there is reduction in the attainment of POs.

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And so, what will the visiting committee do? Visiting committee will inspect all the documentation related to competition of attainment of POs and PSOs, the committee will verify the calculation related to computation of two selected levels and two PSOs.

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That ends the consideration of criterion 3.3. And in the next one, we try to understand the indicators for student performance and professional activities. Thank you very much