NBA Accreditation and
Teaching – Learning in Engineering
(NATE)
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Lecture 20
Computing Attainment of COs

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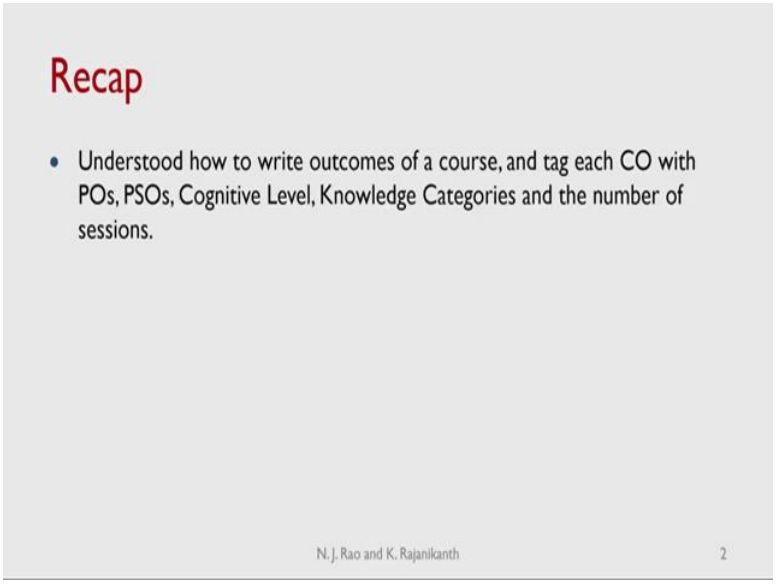

Greetings, welcome to module 1, unit 19, on Attainment of Course Outcomes. In the earlier unit, we understood how to write outcomes of a course, and the tag each course outcome with POs, PSOs, cognitive level, knowledge categories and the number of sessions.

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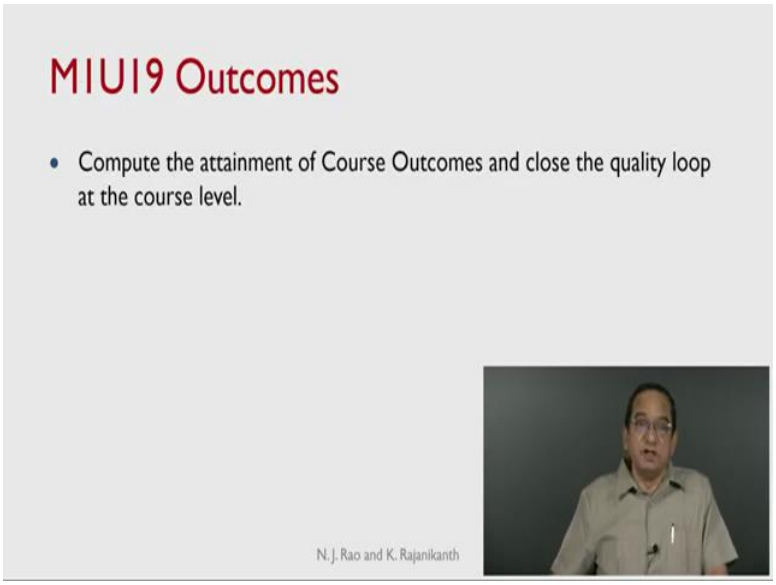

In this unit we will look at the computation of the attainment of course outcomes and the closing the quality loop at the course level. So, the outcome for this unit is, compute the attainment of course outcomes, and close the quality loop at the course level.

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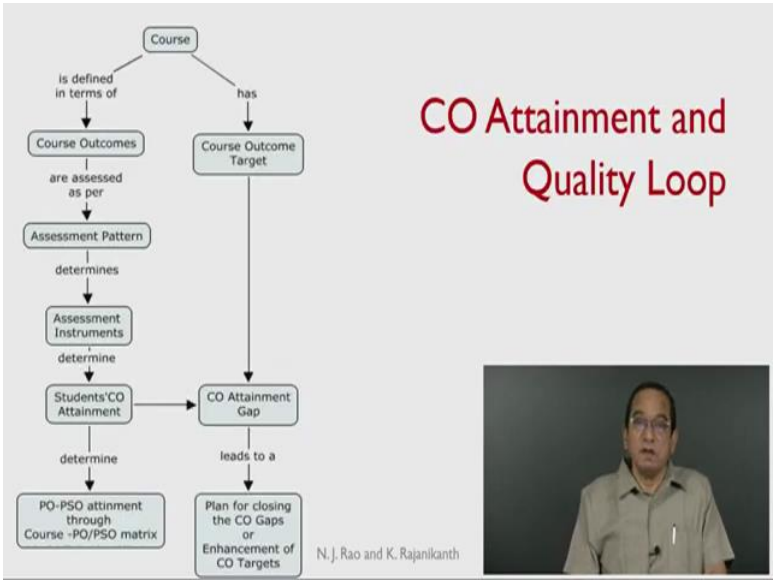

This figure depicts the overall process. We have a course, the course has course outcome target, we set the targets for the attainment of course outcomes. The course is defined in terms of course outcomes. These course outcomes are assessed as per assessment pattern. The assessment pattern determines the assessment instruments. Performance of the students in the assessment instruments determines the attainment of the course outcomes.

We have the attainment of course outcomes, and we have the targets set for the course outcomes. By comparing these two we can determine the CO attainment gap. This gap leads to either a plan for closing the CO gaps or enhancement of CO targets. If the attainments are less than the targets, we need to plan for increasing the attainment level, the next time the course is offered.

In other words, reduce the CO attainment gap. If the attainment levels are greater than or equal to the target levels, we may enhance the targets to be achieved the next time the course is offered. There is also another component in this diagram, the attainment of the course outcomes leads to the attainment of POs and PSOs through course POs, PSOs matrix. We will look at this aspect of attainment of POs and PSOs in the next unit.

In the present unit our focus is on determining the attainment of course outcomes, setting the targets for the course outcomes, determining the attainment gap and based on the gap acting appropriately.

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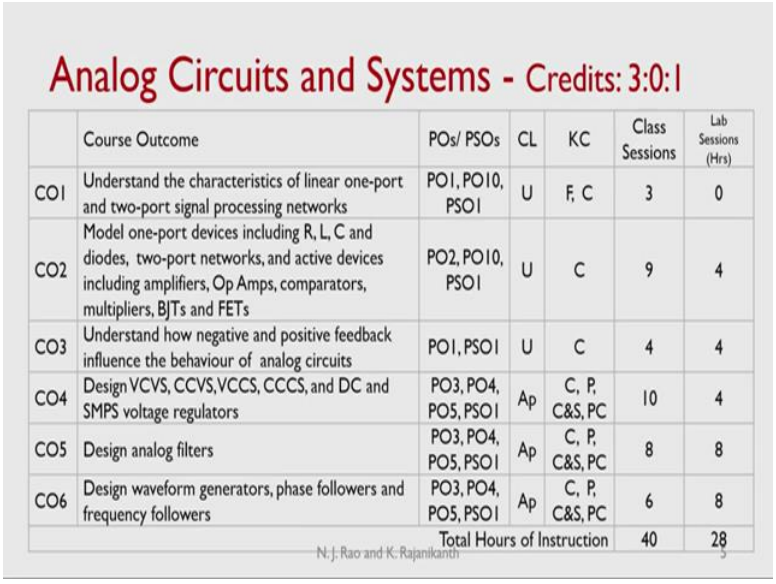

This is the sample course that we will use in this unit, analog circuits and systems. It has a credit structure of 3 colon 1 colon 1 that means 3 hours of regular classroom sessions and 1 credit worth of laboratory session, which means that 2 hours per week of laboratory work. So, we can see that there are 6 course outcomes and totally there are 40 theory sessions and 28 lab sessions.

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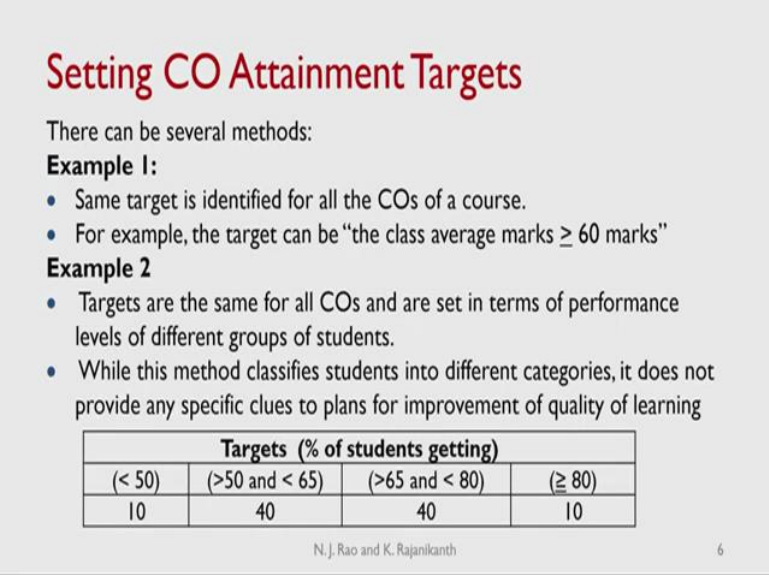

Let us look at the process for setting the CO attainment targets. There can be several methods. Example 1 shows the first method, same target is identified for all the COs of a course, we set the same target for all the COs. For example, the target can be, the class average marks will be greater than or equal to 60 marks.

That means with respect to every CO we expect that the performance of the students is such that the average marks scored by the students would be greater than or equal to 60 percent, this is a fairly simple method of setting the attainment targets.

Example 2 shows a more elaborate method for setting the targets. Targets are same for all the Cos, but now the targets are set in terms of performance levels of different groups of students. We say for example, that the percentage of students getting less than 50 percent on the average would be 10 percent, between 50 percent and 65 percent would be 40 percent, between 65 percent and 80 percent would be again 40 percent.

And the number of students scoring greater than or equal to 80 percent marks would be 10 percent of the total student population. That means this method classifies students into different categories, it does not provide any specific clues to plans for improvement of quality of learning. Thus though this method looks quite elaborate, it does not seem to be very helpful in terms of improvement plans that the instructor has to make.

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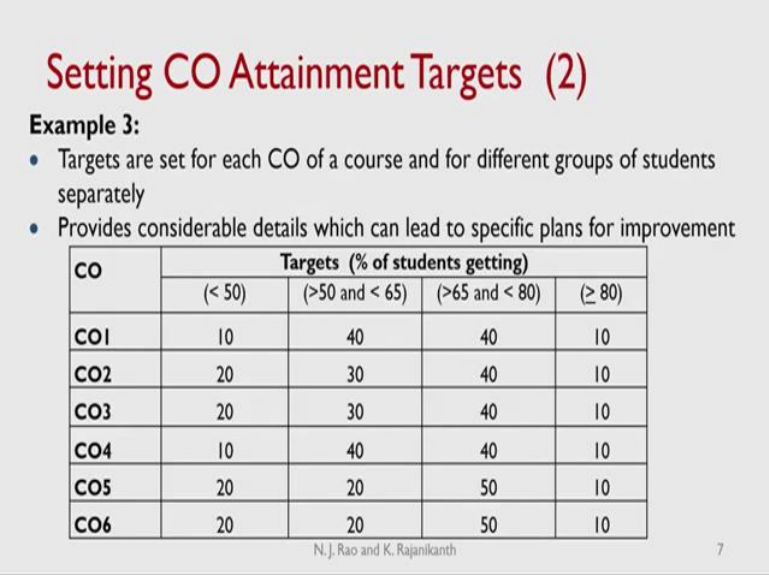

Example 3 shows yet another method for setting the targets. Targets are set for each CO of a course and for different groups of students separately. We can see that the percentage of students scoring less than 50 percent marks is taken as one category, but within that category, the targets are set differently for different COs.

For CO 1, it is only 10 percent but for CO 2 and CO 3, it is 20 percent each, for CO 4 it is again 10 percent, for CO 5, it is 20 percent, for CO 6, it is 20 percent. All these percentages are within the category of the students scoring less than 50 percent marks, similarly for other categories, thus this provides considerable details, which can lead to specific plans for improvement.

But this is fairly elaborate and computation of the attainment values can become quite elaborate, complex and somewhat messy.

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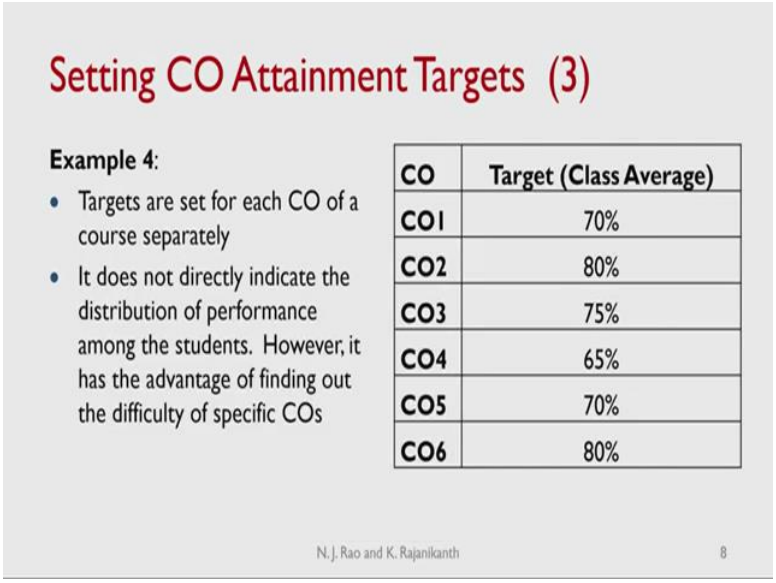

Yet another method is given in example 4. Targets are set for each CO of a course separately, but the target is set as a simple class average percentage. For example, for CO 1, the target is that the class average should be 70 percent, it means greater than or equal to 70 percent. CO 2 the target is 80 percent, for CO 3 the target is 75 percent and so on. This way of setting the targets does not directly indicate the distribution of performance among the students. However it has the advantage of finding out the difficulty of specific COs.

If the attainment of a particular CO is substantially lower than the target, this could indicate that the students are having learning difficulties with respect to that specific CO, which means that the instructor has to pay special attention to increasing the attainment of the CO in the next offering of this course and the student difficulties how to be overcome by specific plans.

Thus this way of setting the target gives specific plans for improving the performance in certain COs based on the performance gaps.

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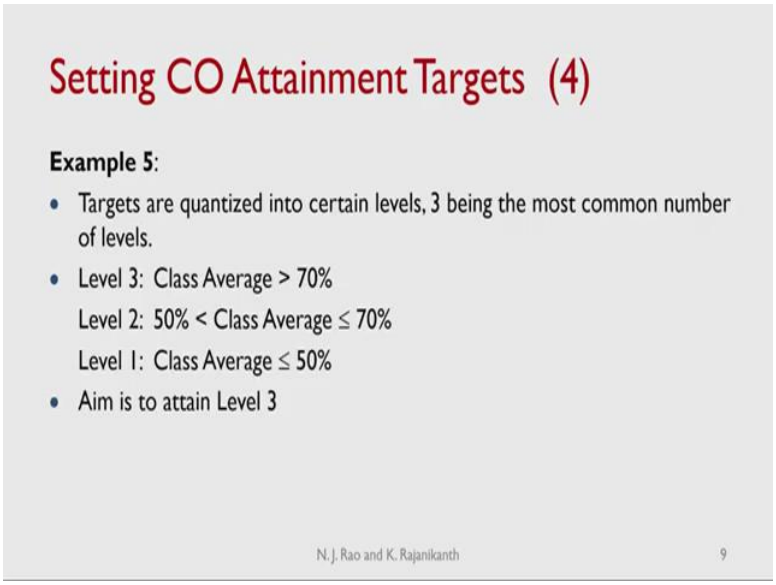

There can be one more method of setting the CO attainment targets. Targets are quantized into certain levels, with 3 being the most common number of levels. That means, instead of specifying a percentage, we specify the targets in terms of levels. Level 3 is characterized by stating that the class average is greater than 70 percent.

Level 2 is characterized by stating that the class average is greater than 50 percent, but less than or equal to 70 percent. And level 1, the lowest level is characterized by the class average be less than or equal to 50 percent. Implicitly the aim is to attain level 3. This is yet another way of setting the CO attainment targets.

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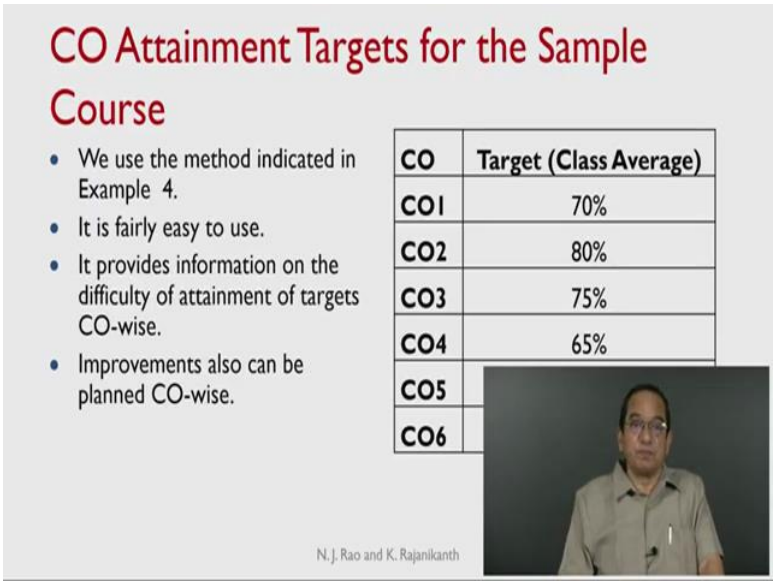

In this unit, we use the method indicated in example 4. That means targets are sets independently for individual COs. So, for example case study, we are setting the target for CO 1 as 70 percent, for CO 2, 80 percent and so on. This method is fairly easy to use. It provides information on the difficulty of attainment of targets CO-wise. Improvements also can be planned CO-wise and computation is fairly simple.

However, institutes are free to adopt a different method for setting the targets for CO attainment. Some Institutes adopt the approach where the targets are quantized into 3 levels, that method is also fine. But what is important is that all the faculty use one single common method for all the courses in all the programs.

Many institutes have generally a cell for internal quality assurance, what is generally called as IQ AC. If the institutes have such an IQ AC, the IQ AC can assume the responsibility for specifying the common standard to adopted to be adopted in all the courses. It is important that one single method is followed across the institute. Two popular methods are the method shown in example 4 here and the method of quantizing that targets.

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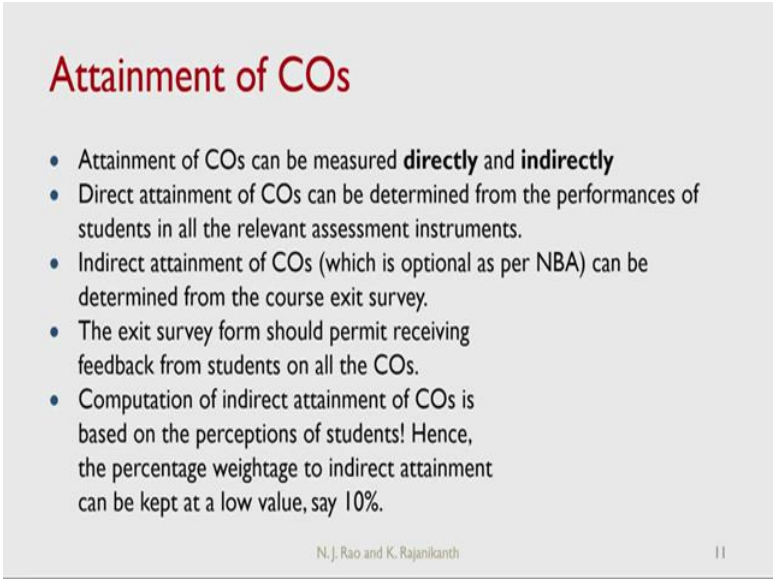

The attainment of COs can be computed directly and indirectly. Direct attainment of COs can be determined from the performances of students in all the relevant assessment instruments. We call it direct attainment, because it is determined directly from the performances of the students, in continuous internal revelation as well as semester end examination. This method of determining the attainment from the performance of the students is called direct attainment.

Indirect attainment of COs can be determined from the course exit survey. The exit survey form should evidently permit receiving feedback from students on all the COs. Computation of the indirect attainment of COs is based on the perception of the students. Primarily it is the perception of the students, which is used to determine the attainment levels, thus this is called indirect method and the percentage weightage to indirect attainment generally is kept at a low value of say 10 percent.

The method of computing the CO attainment using the course exist surveys is optional as per NBA. The department can use this method and have a weightage of 10 percent for this method or it can ignore this method and determine the CO attainment based only on the performance of the students. In other words, use only direct attainment. In this unit, we are using both direct and indirect computation of the attainment of the COs.

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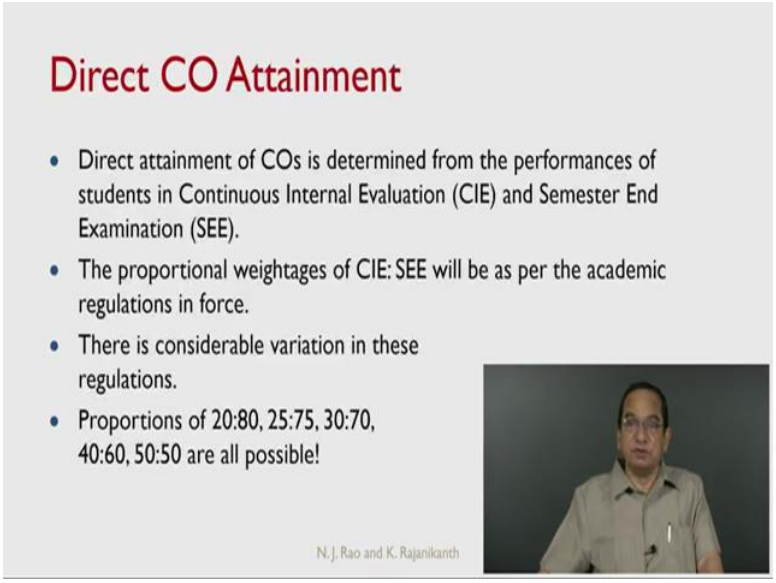

Now, let us look at the direct CO attainment. Direct attainment of CO is determined from the performances of the students in continuous internal evaluation and semester end examination. The proportional weightages of CIE to SEE will be as per the academic regulations in force. There is considerable variation in these regulations, depending upon whether it is a tier 1 institute, our tier 2 institute, there can be variation.

There can be variation within tier 1 institutes there can be variation within tier 1 institutes as well as tier 2 institutes. Proportions of 20 to 80, 25-75, 30-70, 40-60, 50-50 are all possible, it depends upon the academic regulations being followed by the institute.

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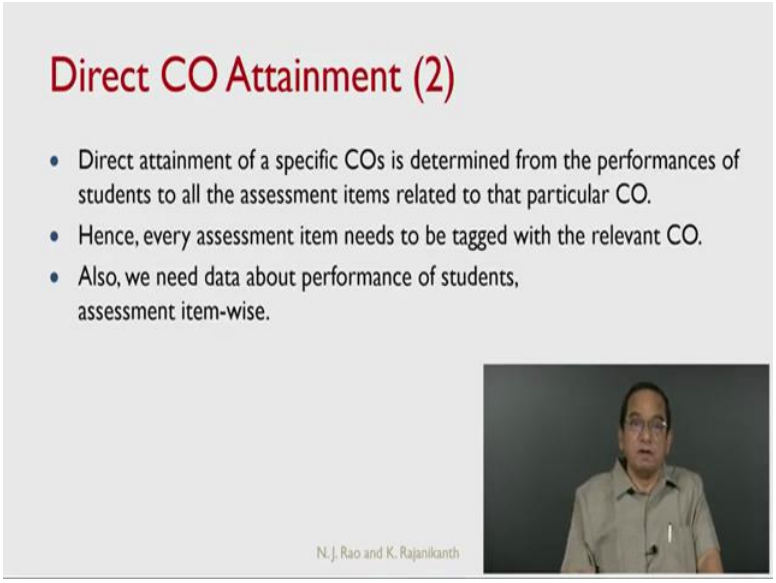

Direct attainment of a specific CO is determined from the performances of the students to all assessment items related to that particular CO. In order to do a computation in this method, we need to have every assessment item tagged with the relevant CO. To determine the attainment of a particular CO, we need to know, which are all the questions which are related to that particular CO and what is the performance of the students with respect to those specific questions.

So we need to know which questions are related to a particular CO and we also need data about the performance the students in those specific assessment items. So, both these items are important in order to determine the attainment of a CO in a direct way. Every assessment item needs to be tagged with the relevant CO, we need the data about performances of students, assessment item-wise.

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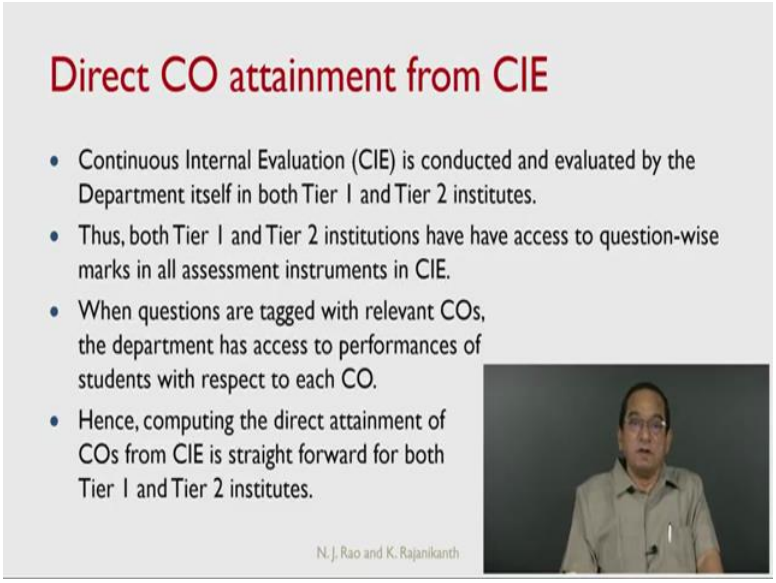

Let us look at direct CO attainment from continuous internal evaluation. CIE is conducted and evaluated by the department itself in both tier 1 and tier 2 institutes. Thus both tier 1 and tier 2 institutions have access to question-wise marks in all assessment instruments in CIE. Because the assessment is done by the department itself, it can tag all the questions and it can collect the responses of the students question-wise.

It will have access to question-wise marks in all assessment instruments in CIE. When questions are tagged with relevant COs, the department has access to performance of the students with respect to each CO. Hence, computing the direct attainment of COs from CIE is straightforward for both tier 1 and tier 2 institutes. All the required data is easily available and the department can compute the direct CO attainment from CIE in an extremely straightforward fashion.

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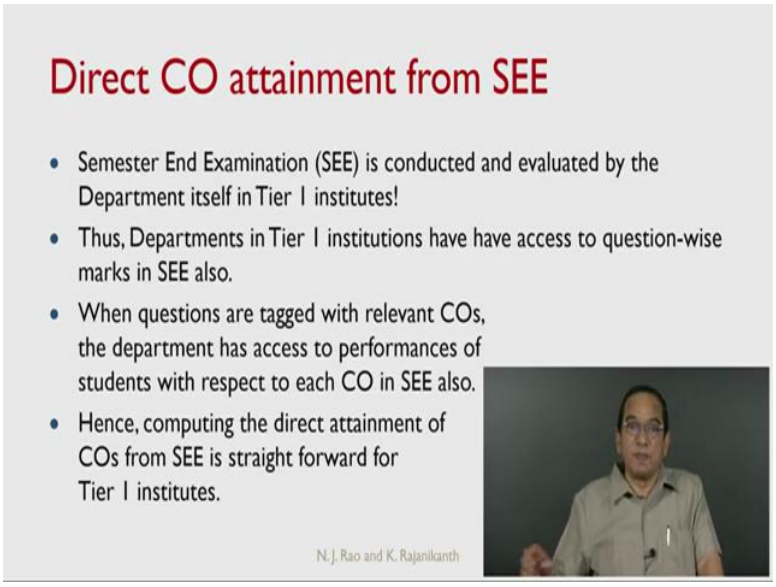

When it comes to direct CO attainment from SEE there are certain issues. Semester end examination is conducted and evaluated by the department itself in tier 1 institutes. However, in tier 2 institutes the SEE is conducted and evaluated by the affiliating university, in tier 1 institutes the semester end examination is the responsibility of the institute itself, thus departments in tier 1 institutions have access to question-wise marks in SEE also.

We are making this claim assuming that the office of the controller of examinations is able to provide such data, in other words, the questions in SEE are tagged with the COs and the responses are tabulated question-wise, the controller of examinations should provide such data to the departments. Assuming that such a process exists, the departments in tier 1 institutions have access to question wise marks in SEE also.

When questions are tagged with relevant COs, the department has access to performances of the students with respect to each CO. Hence, computing the direct attainment of COs from SEE is straightforward for tier 1 institutions.

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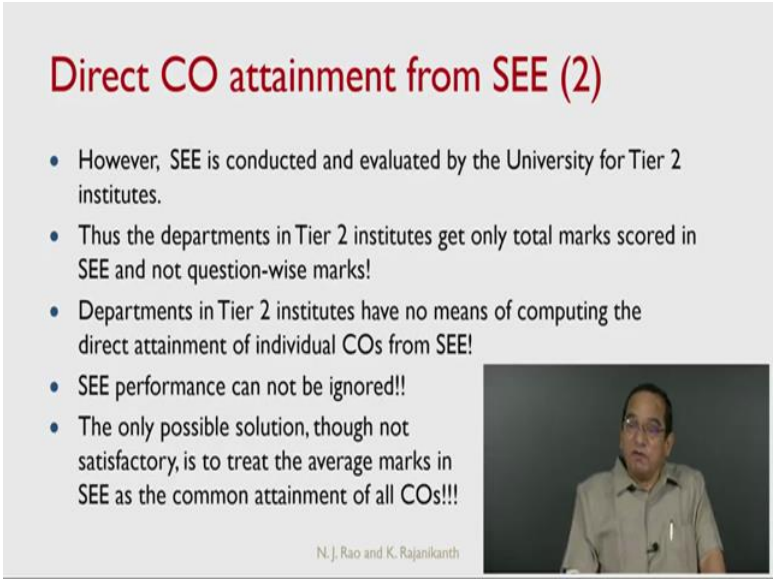

However, as we noted, SEE is conducted and evaluated by the university for tier 2 institutes, thus the departments in tier 2 institutes get only total marks scored in a SEE and not question wise marks. The total marks scored by a student are made available to the department, thus the department will not have access to question wise marks and some cases it may so happen that even this information is not available to the department.

There are certain universities where the CIE performance is combined with the SEE performance and the final grade obtained by the student is only communicated to the department, thus the department will have access only to the final grade scored by the student, he does not have even direct access to the total marks scored in the SEE also.

In such cases, the department can work backwards and determine what could be the percentage of marks scored in the semester end examination. However, question wise marks, it is almost impossible for a department to get when it is in a tire 1 tire 2 institute. Departments in tier 2 institutes have no means of computing the direct attainment of individual COs from SEE, because the relevant data is not available with them.

But the SEE performance cannot be ignored either, the department has no mechanism for computing the direct attainment of individual COs, at the same time, it cannot ignore the SEE performance. The only possible solution, though not satisfactory, is to treat the average marks in a SEE as the common attainment of all COs. One single score, the total score of the student is treated as the attainment with respect to each CO.

Evidently, this is not a satisfactory solution, but that does not appear at present to be any alternative to this unsatisfactory solution.

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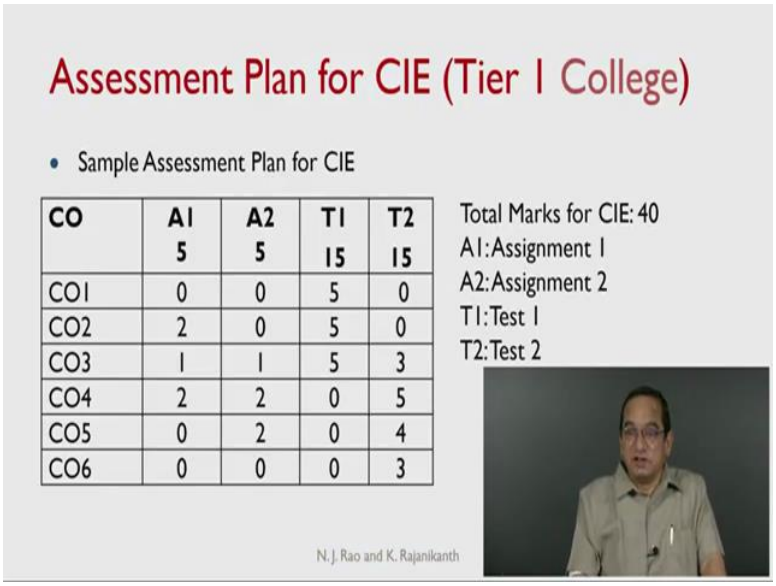

Let us look at one example calculation to see how this process works. This is the assessment plan for CIE in a tier 1 institute, a total of 40 marks are allocated for the CIE. The CIE comprises of 4 assessment instruments, 2 assignments and 2 test, the assignments are 5 marks each and the test are for 15 marks each. CO 1 is to be addressed in test 1 only, CO 2 is addressed in assignment 1 and test 1, similarly, CO3 is addressed in assignment 1, assignment 2, test 1 as well as test 2.

CO 4 is addressed in a assignment 1, assignment 2 and test 2. CO 5 is addressed in assignment 2 and test 2, CO 6 is addressed in test 2. This kind of a plan needs to be made upfront and the total number of marks allocated are also mentioned here, for CO 1, the number of questions related to that particular CO amount to a total of 5 marks, for the CO 2 we can see that in assignment 1 there are 2 marks allocated, in test 1 there are 5 marks allocated.

So totally there are 7 marks allocated to CO 2, for CO 3 the total marks allocated are 1 plus 1 plus 5 plus 3, that means it is 10 marks. For CO 4 it is 9 marks, for CO 5 it is 2 plus 4, 6 marks and for CO 6 it is 3 marks, thus we know the total marks allocated to each CO. The number of questions can be different, but the total marks we can see from the assessment plan.

Now we need to determine, what is the average performance of the students in all these assessment instruments? That would give us an indication of the direct attainment of COs from the CIE.

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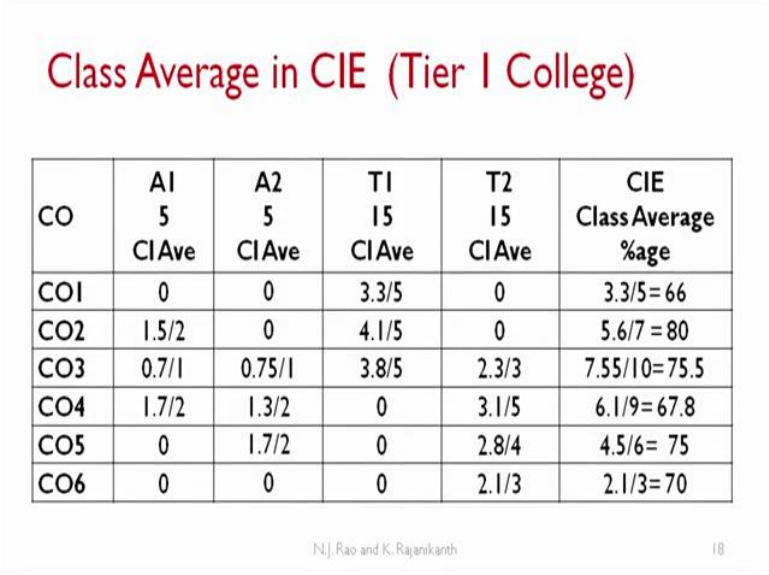

So, this shows the class average for the same example, for CO 1 out of the 5 marks the average performance of the students in the class amounts to, 3.3 marks. So, we can say that the CO attainment is 3.3 out of 5 which is equal to 66 percentage, which is shown in the last column. All the questions related to CO 1 amount to 5 marks and the responses of the students to these questions are evaluated and their average performance turns out to be 3.3 marks.

So, they have scored on the average 3.3 marks out of 5 marks, so the class average percentage is 3.3 out of 5 which is 66, so we take this 66 percentage as the CO attainment in the CIE. Similarly, for CO-2, CO 3, CO 4, CO 5 and CO 6 we will do the calculations. For example, let us look at CO 3, 1 mark is there in assignment 1, the average performances is 0.7. In assignment 2 again there is a 1 mark question and the average performance is 0.75.

In test 1, it is 3.8 out of 5, in test 2 it is 2.3 out of 3. So, as a total if we consider 7.55 marks out of 10 marks, which is 75.5 percentage.

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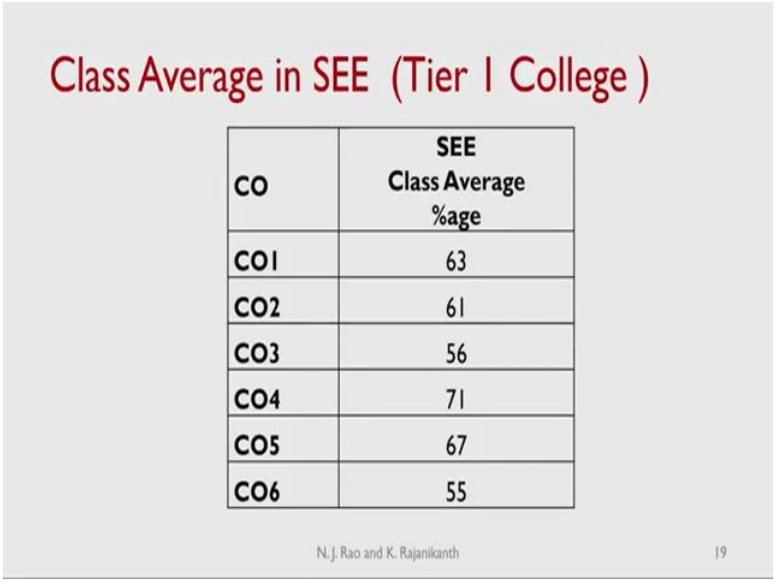

Now, for the same tier 1 college, let us look at the performance in the semester end examinations, because it is a tier 1 institute, it has access to all the relevant data and it can determine the performance of the students CO-wise. So, we get for CO 1, the class average is 63 percent, for CO 2 it is 61 percent and so on. Notice that, because it is a tier 1 institute, we are able to compute the class average CO-wise. So, we get the attainment from SEE for each CO.

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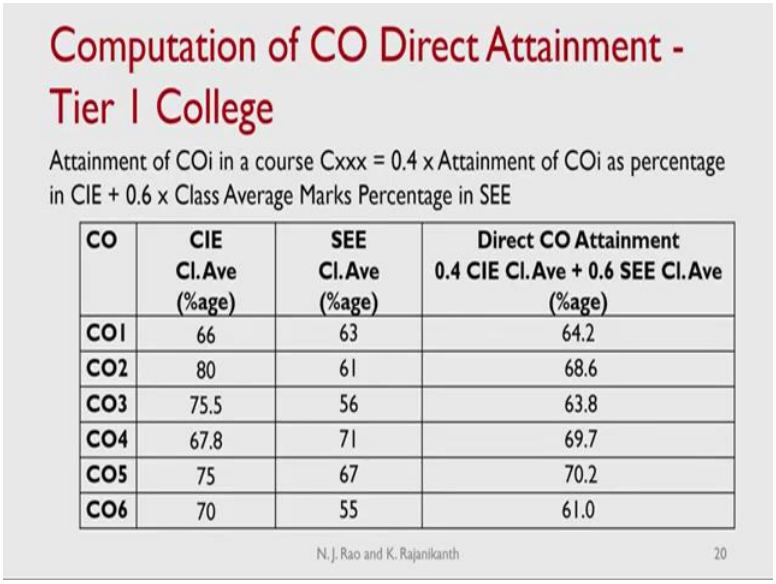

So, the computation of the direct attainment of a CO for a tier 1 college would be to combine the class average in the CIE, with the class average in the SEE, the proportion in which they are combined would depend, as I mentioned earlier on the academic regulations enforced at

that time. In this example, we are assuming that the relative weightages are 40 percent and 60 percent.

That means the attainment of the particular CO is equal to 0.4 into attainment of that CO in CIE plus 0.6 into the attainment of that CO in the SEE, which is nothing but the class average in the CIE multiplied with 0.4 plus the class average in the SEE multiplied 0.6.There can be other ratios then the competition will vary accordingly. For example, for CO 1, we have seen that the class average in CIE is 66 percent, the class average in SEE is 63 percent.

So 0.4 into 66 plus 0.6 into 63 that will be equal to 64.2. So, that is taken as the direct CO attainment, similarly for other COs.

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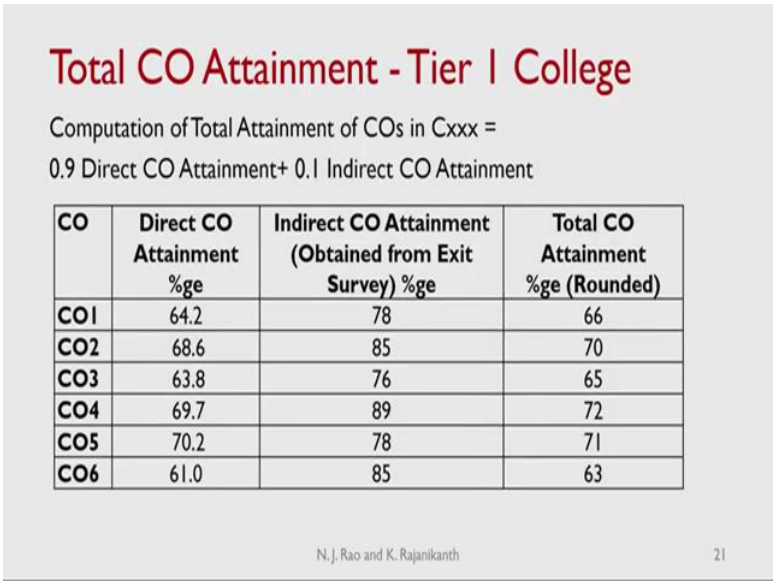

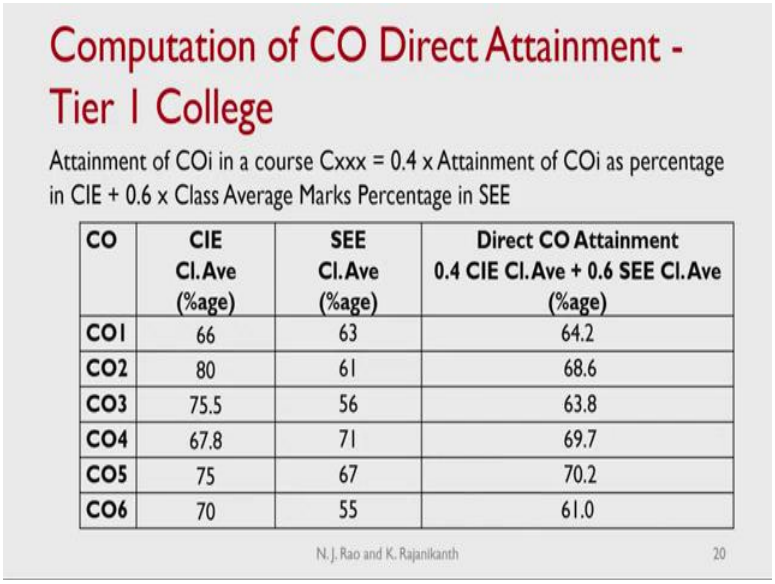

Then the total attainment of a CO is computed by combining the direct attainment with the indirect attainment in appropriate percentages. In most of the institutes the weightage given to the indirect attainment is no more than 10 percent, we already mentioned that the indirect CO attainment is based on the perceptions of the students and thus it is given a low weightage.

In this example, we are assuming that the indirect CO attainment has 10 percent weightage and the direct CO attainment has 90 percent weightage. So, the total attainment of the CO is computed as 0.9 into direct CO attainment value plus 0.1 into indirect CO attainment value. This computation is shown in the following table. For example, for CO 1, we have seen in this table that the direct attainment value is 64.2, so, we use that 64.2 value here and we

assume that from an exit survey, the CO attainment values have been determined for all the COs and for CO 1 it is 78 percent.

So, from all the assessment instruments in the CIE and SEE put together the direct CO attainment is 64.2 and the indirect CO attainment is 78. Combining these two 0.9 into 64.2 plus 0.1 into 78 gives us the total CO attainments as rounded value of 66 percentage. So, it looks a little bit complex, but it is fairly straightforward. Determine the direct CO attainment from CIE, determine the direct CO attainment from SEE, combine these two in appropriate weightage to get total direct attainment.

Combine that with indirect attainment in appropriate proportion to get the total CO attainment that is how the calculations are done. And this obviously can be done by a tool, if a tool is available or this can be easily done in some kind of a spreadsheet like excel.

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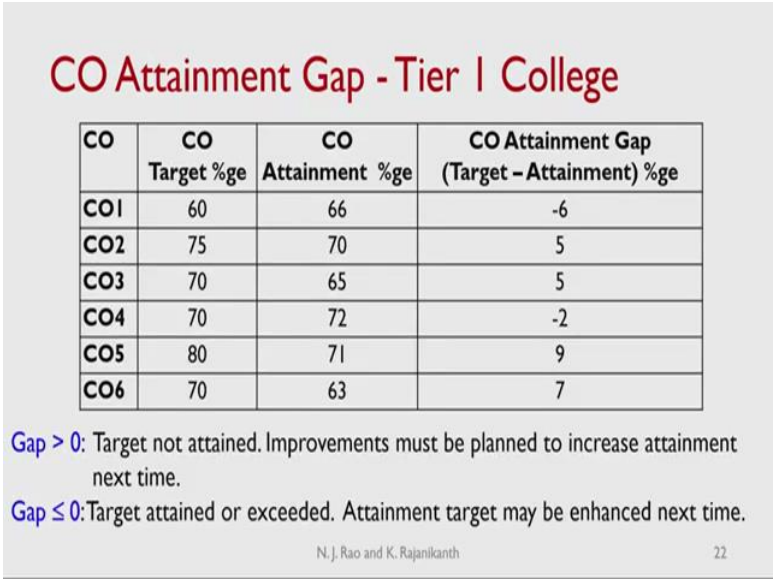

Now, the final step is to determine the attainment gap. For each CO we have set a target, now we have computed the attainment, so we can determine the gaps. For CO 1, the target that we set was 60 percent, the attainment is 66 percent that means the attainment is more than the target. So, the gap is negative target but minus attainment if you take this is minus 6 percent, which means that when the gap is less than or equal to 0, target is attained or exceeded.

For CO-2 the target is 75 percent but attainment is only 70 percent that means, still there is a gap of 5 percent. The attainment of this CO has to be better the next time the course is offered to reduce the attainment gap. Similarly, for CO 3 the gap is 5 percent, for CO 4 it is minus 2

and so on. From this table we can see that, we have been able to attain CO 1 as well as CO 4, in both cases the attainment value is greater than the target.

In the remaining cases the attainment is lagging behind the target and the maximum gap exists with respect to CO 5. The target was 80 percent, but the attainment was only 71 percent. So, if the gap is greater than 0, the target is not attained, improvements must be planned to increase the attainment, the next time the course is offered. If the gap is less than or equal to 0, target is attained or exceeded, so, attainment target may be enhanced next time.

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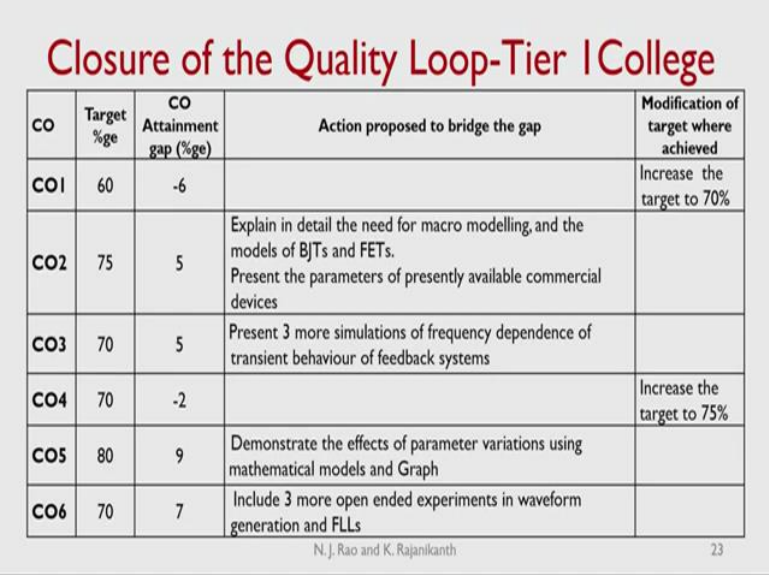

The final step would be to close the quality loop. For each CO, we know the target, we know the attainment gap. If the attainment gap is negative, it means that the attainment is greater than or equal to target, so we can increase the target for the next offering of the course. So for CO 1, the gap is minus 6 percent, the attainment is greater than the target, so the action taken is to increase the target to 70 percent.

For CO 2, there is a gap of 5 percent that means that we must make specific plans for improving the attainment of CO 2 next time the course is offered. So, the improvement plans proposed by the instructor or explained in detail the need for macro modeling and the models of BJTs and FETs. Another plan is present the parameters of presently available commercial devices. Similarly, for all other COs wherever the gap is positive, actions are proposed to bridge the gap, wherever the gap is negative, the target is increased.

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Assessment Plan for CIE - Tier 2 College

- Sample Assessment Plan for CIE

CO	A1 5	T1 10	T2 10
CO1	0	4	1
CO2	2	3	1
CO3	1	3	3
CO4	2	0	2
CO5	0	0	2
CO6	0	0	1

Total Marks for CIE: 25
A1:Assignment 1
T1:Test 1
T2:Test 2

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Class Average in CIE (Tier 2 College)

CO	A1 5 Cl Ave	T1 10 Cl Ave	T2 10 Cl Ave	CIE Class Average (Rounded) %age
CO1	0	2.3/4	0.6/1	2.9/5= 58
CO2	1.5/2	2.1/3	0.8/1	4.4/6 = 73
CO3	0.7/1	2.3/3	2.3/3	5.3/7= 76
CO4	1.7/2	0	1.2/2	2.9/4= 73
CO5	0	0	1.1/2	1.1/2= 55
CO6	0	0	0.7/1	0.7/1= 70

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A similar calculation we can see for tier 2 college. This process is quite similar to what we have done for tier 1 college, except that the SEE data is used differently, because in a tire 2 institute we will not be able to get question-wise marks of the students. So, sample assessment plan for CIE is quite similar.

The total marks for CIE, 25, 1 assignment and 2 test. And the class averages in the institute are computed as we did with tier 1 college and the percentages are shown in the last column.

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Computation of CO Direct Attainment - Tier 2 College

Attainment of COi in a course Cxxx =

0.25x Attainment of COi as percentage in CIE + 0.75x Class Average Marks Percentage in SEE

CO	CIE Cl.Ave (%age)	SEE Cl.Ave (%age) (Same value is assumed for all COs)	Direct CO Attainment 0.25 CIE Cl.Ave + 0.75 SEE Cl.Ave (%age)
CO1	58	63	61.75
CO2	73	63	65.50
CO3	76	63	66.25
CO4	73	63	65.50
CO5	55	63	61.00
CO6	70	63	64.75

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Total CO Attainment - Tier 2 College

Computation of Attainment of COs in Cxxx =

0.9 x Direct CO Attainment+ 0.1 x Indirect CO Attainment

CO	Direct CO Attainment %ge	Indirect CO Attainment (Obtained from Exit Survey) %ge	Total CO Attainment (Rounded) %ge
CO1	61.75	78	63
CO2	65.50	85	67
CO3	66.25	76	67
CO4	65.50	89	68
CO5	61.00	78	63
CO6	64.75	85	67

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Then, we have to combine the class average in the CIE with the class average in SEE. This is where the competition in a tire 2 institute differs from the computation in a tire 1 institute. We can see in the column under SEE, that the same number is appearing, these actually the average performance of the students in the SEE that means it is across all the Cos.

But because we do not have question-wise data, we are assuming that this value is same for all the COs, this is not a satisfactory solution, but at present, there does not appear to be any alternative. So, we use the same value of 63 for all the COs, rest of the calculation is quite similar to what we have done for tier 1 college. Here the ratios are different, it is 25 is to 75, between CIE and SEE.

So, 0.25 into attainment in CIE plus 0.75 into the attainment in SEE, use the direct CO attainment value shown in the last column, that in turn is combined with the indirect CO attainment value obtained from the exit survey and that gives us the total CO attainment as a rounded percentage shown in the last column. This enter processes is quite similar to what we followed in tier 1 college.

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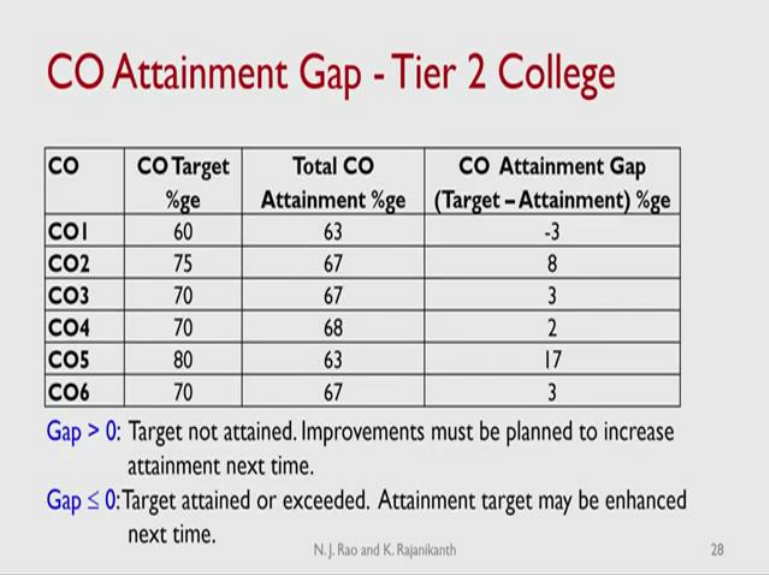

Then we have to do again an attainment gap determination. The last column shows the gap only in the case of CO-1, the attainment exceeded the target and there are gaps with respect to all the other Cos. With respect to CO 5, we can see that there is a substantial gap, target is 80 percent but attainment is only 63 percent, so the gap is fairly substantial 17 percent this is an indication that we have to pay greater attention to CO 5 next time the course is offered.

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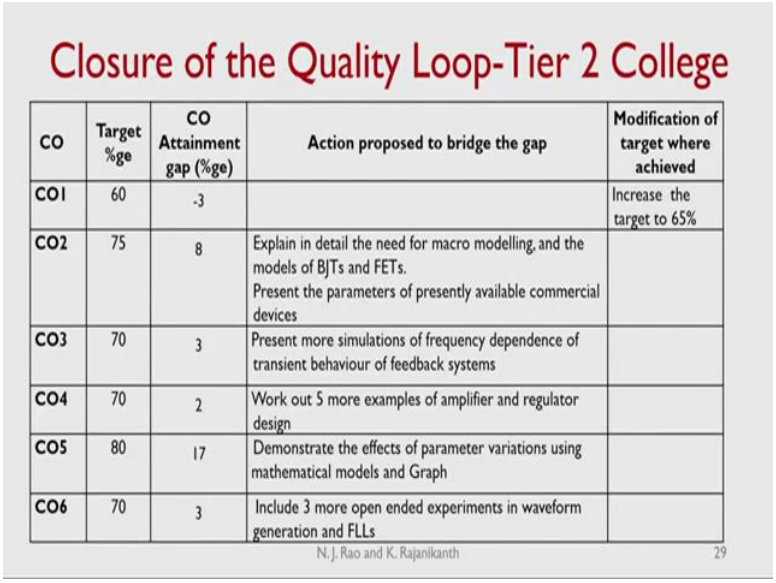

Closure of the quality loop, similar as in the case of tier 1, when the target was attained the target is revised, in the case of CO 1, it becomes 65 percent. With respect to all other COs actions are proposed to bridge the gap.

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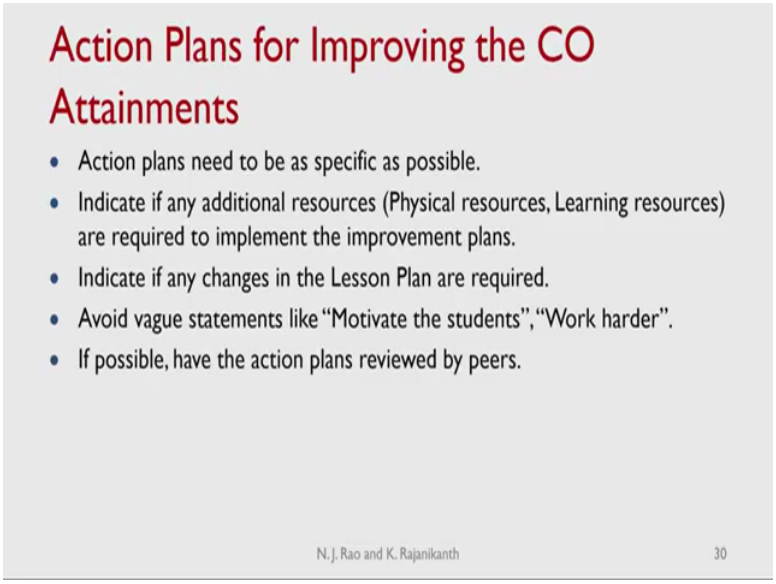

With respect to planning the activities for improving the CO attainments certain observations are necessary. Action plans need to be as specific as possible. Avoid fuzzy phrases like, motivate the students better, work harder, these really are not translatable into any specific concrete actions. Avoid statements which are of this nature, avoid fuzzy vague statements. Make the plans as specific as possible.

Indicate if any additional resources are required to implement the improvement plans. The additional resources can be physical resources, or learning resources in the form E-resources. Physical resources can be additional equipment to be purchased or additional facilities to be created. It is also a good idea to indicate the approximate cost of such resources if they are not freely available.

So indicate any additional resources required and indicate if any changes in the lesson plan are required. If we are spending more time on a particular CO that means that the total time available for addressing the remaining COs is coming down. So it may be necessary to revisit the lesson plan, indicate where such changes would be required. If possible, have the action plans reviewed by peers. It is always good to have a peer review of the action plans.

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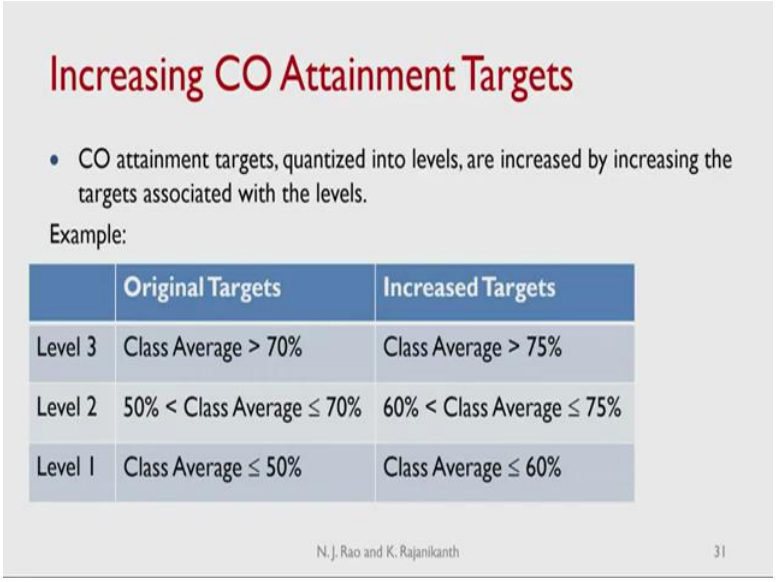

Increasing the CO attainment targets, when they are quantized can be slightly different. If the target is specified as an absolute percentage, increasing the target would simply mean increasing the number. If the original target was 70 percent, increasing the target would be for example, raising it to 75 percent. But when it is quantized, we increase the target by making the bones tighter, increasing the targets associated with the levels.

For example, level 3 might have been characterized originally as class average being greater than 70 percent. When we want to increase the target we will make the bones tighter. Class average should be now greater than 75 percent if the attainment is to be considered as at level 3. Level 2, earlier the range was 50 percent to 70 percent, now we make it as 60 percent to 75 percent.

Earlier level 1 was class average is less than or equal to 50 percent, now, the level 1 is class average is less than or equal to 60 percent. For example, if the class average is 55 percent according to the original target it would have been considered as achievement at level 2, but now, it would be considered as attainment at level 1 only. So, that is how we can increase the targets when the levels are quantized.

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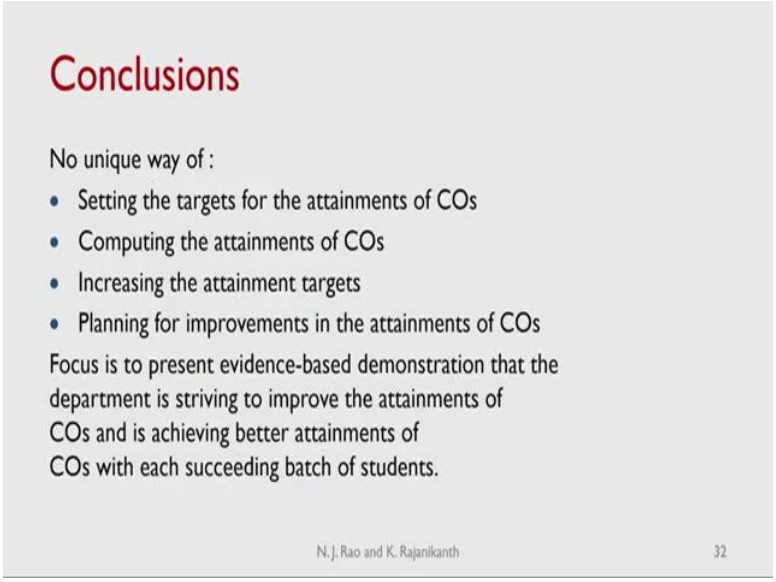

By way of conclusion, we can first notice that there is no unique way of setting the targets for the attainment of COs. We have discussed 5 different methods, there can be many more methods for setting the targets for the attainment of COs. What is important is that one single method is followed across the institute, there is no unique way of computing the attainment of COs. There is no unique way of increasing the attainment targets.

If the target has been achieved, by what amount the target should be increased? If we have set a target of 60 percent and the actual attainment is 65 percent, what is the level to which the target should be revised? There is no unique way. In fact, it is quite possible to retain the same target level with the justification that we would like to observe if this level can be attained by the next batch also and if that happens, we would like to increase the target.

We can give a justification like that and retain the same target level, thus there is no unique way of increasing the attainment targets. Even when we want to upgrade the target, what is the extent by which it should be raised? There is no unique answer to that. Again, there is no unique way of planning for improvements in the attainment of COs, which means that in all

these processes, the initiative of the faculty involved, the resources available with the department and the consensus arrived by the faculty play an important role.

In the entire process of OBE faculty play a crucial role, the instructors how to decide how to set the targets, how to determine the attainments, how to increase the attainment targets, how to plan for improvement. Ofcourse it is true that with respect to setting the targets and computing the attainments the process to be followed has to be uniform across the institute.

But for increasing the target levels as well as for planning for improvement, faculty has to creatively think and arrive at the proper answers. Focus anyway is to present evidence based demonstration that the department is striving to improve the attainments of the COs and is achieving better attainments of COs with each succeeding batch of students that means the department is on a growth trajectory.

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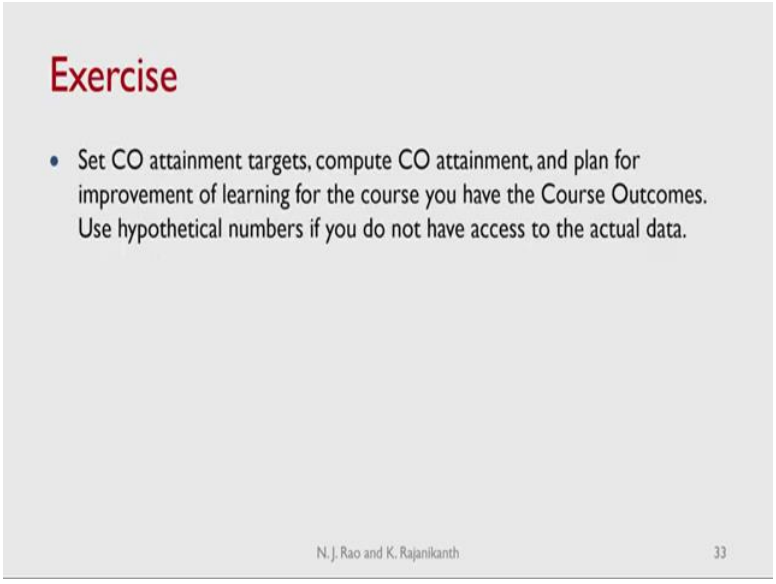

In exercise, set CO attainment targets, compute CO attainment and plan for improvement of learning for the course, you have the course outcomes. Use hypothetical numbers if you do not have access to the actual data of the performance of the students.

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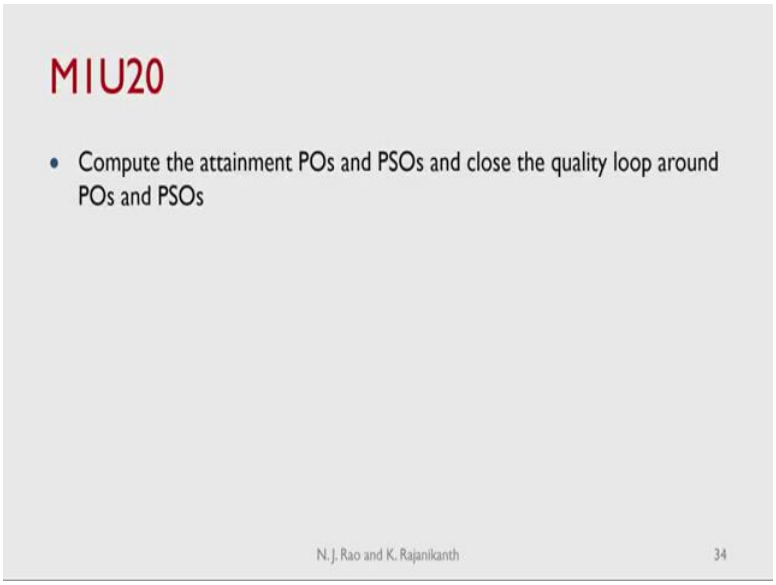

In the next unit we will look at computing the attainment of POs and PSOs and closing the quality loop around POs and PSOs, that is closing the quality loop at the program level. Thank you, will meet with unit 20. Thank you.