

**Effective Engineering "Teaching" in Practice**  
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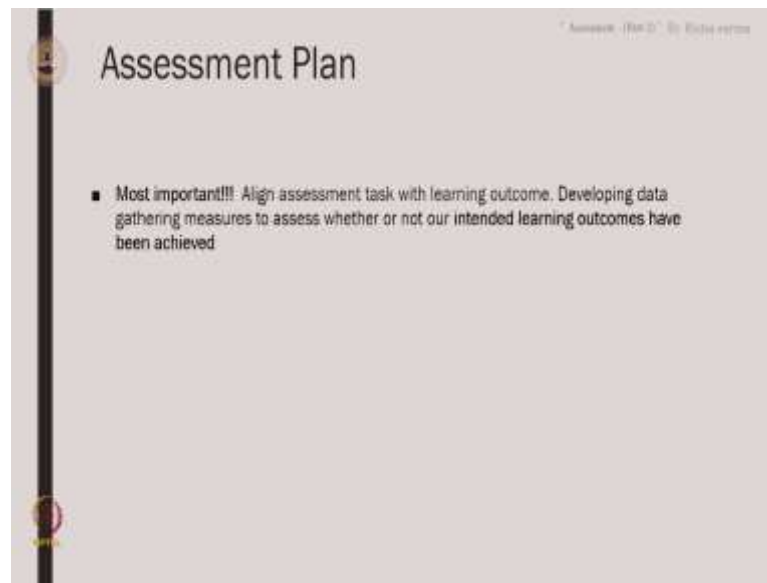
**Lecture - 10b**  
**Assessment - (Part - 2)**

So taking forward from here, so far we have covered what are the different types of assessment, be it a formative assessment and the summative assessment. And once you know how many formative assessment are you going to conduct during your course, you can start working towards the course assessment plan.

So, what is course assessment plan? As a teacher we spend lot of time in designing and developing our lectures and other learning activities. We need to ask this question to ourselves, how many hours do we really invest in designing exams and other assessment activities? So far whatever we have spoken about, it is important to realize that when we talk about assessment, it is very important from students' perspective. Because based on their marks and their grades, they go into a different job or for higher education. And of all the reasons which we mentioned earlier of why do we assess assessment becomes a quite an important aspect in higher education teaching and learning.

Hence it is equally important for us to spend time designing our assessment plan. So, what all characteristics of a good assessment plan should look like. Most importantly and I would like to highlight this every now and then, that the assessment task should be in alignment with the learning outcome, which means it should be in alignment with the action verb which has been used in the learning outcome.

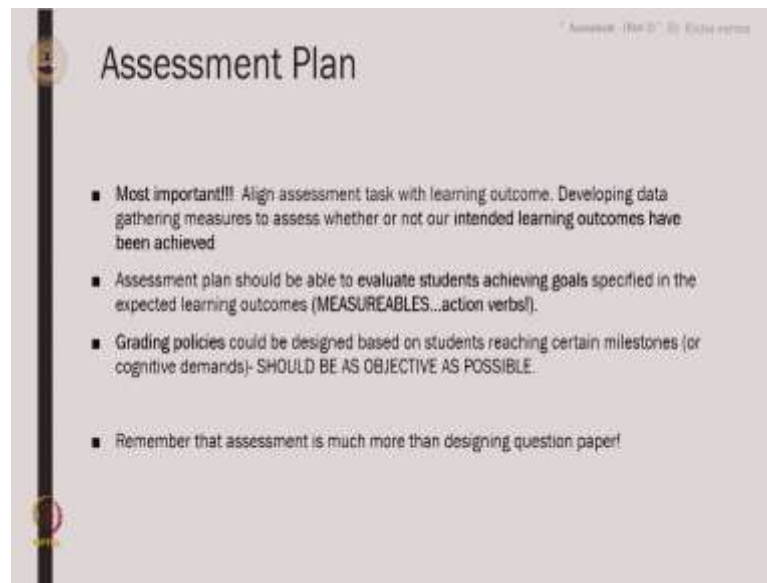
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Once the assessment task is designed based on this learning outcome, we could gather data which can be then used to look if the actual intended learning outcome has been addressed or not. Hence assessment plan should be able to evaluate students achieving goals in a specified expected learning outcome or the measurable action verb which we have used in our learning outcome.

Assessment plan should also cover about grading policies which would tell us how are we going to ensure that student achieve A plus grade or B grade or C grade, those criteria and those grading policy should all be incorporated within the assessment plan and when we make this assessment plan we have to ensure that this should be as objective as possible.

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Hence once again I would like to highlight that the assessment is much more than just designing question paper, it requires proper planning, it requires designing the assessment task, using various types of assessment tasks for the entire course, but ensuring rather the most important aspect is that it is in alignment with the learning outcome which has been written for the course.

I would also like to highlight what are the framework for the assessment plan. What we see here on the slide on the left hand side when you start working on the assessment plan, as I said the first thing you need to do is write down the learning outcome of the course. You can write the learning outcome of the course on the left hand column which is written as LO 1, 2, 3 and 4.

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What is the framework for an assessment plan?

Learning Outcome	Delivery	Assessment	Decisions (faculty/students)
Phase 1: L01			
Phase 2: L02			
Phase 3: L03			
Phase 4: L04			
...			

One needs to think now how I am going to deliver this particular learning outcome. So, which means what is going to be my teaching learning activity, whether is it going to be a didactic lecture or is it going to be a tutorial or a hands on experience which a students would get to experience within the class.

Based on the learning outcome and the teaching learning activity, we need to design our assessment which should be in alignment with the action verb and then the decision about how are we going to incorporate the feedback, reflections or the scoring depending on whether it is a formative assessment or a summative assessment. Even though I have shown you an example of how your assessment plan or framework should look like, there is no real standard framework. You can design an assessment plan based on your course and putting that in your context, but the key features of your assessment plan are the learning outcome, the teaching learning activity or the mode of delivery and what type of assessment you are going to conduct is it a formative, summative and how are we going to provide decisions to both student as well as to the faculty member.

This is another example once you start look making your assessment plan, you can start writing your learning outcome one two and you know as may depending on how many learning outcomes you have for the course. You can start writing what you are going to assess and how you are going to conduct or provide feedback in a timely manner. Once again you need not have a separate learning assessment task for each learning outcome,

you can combine two or three learning outcome and conduct one particular type of assessment.

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Another Example (CMU: Eberly centre for teaching excellence)

LD	Type of assessment	Measurement
Remember Students will be able to: recall recognize	Objective Test items that require students to recall or recognize information: ✓ Fill-in the Blank ✓ Multiple Choice items with question stems such as: "what is a ...", or "which of the following is the definition of)" ✓ Labeling diagrams	Accuracy - correct vs number of errors.
Apply Students will be able to: execute implement	Problem sets, performances, labs, Prototyping, Simulations	Accuracy scores, Check lists, Rubrics.

This particular example which I have here is from Eberly centre for teaching excellence and I do like this assessment plan because what you see on the left hand side are the learning outcome which clearly specifies the action verb used. Just as an example if you see your learning outcome says remember, it is much lower on the Bloom's taxonomy and the type of assessment which can be conducted to keep in alignment with the learning outcome are things like fill in the blanks, multiple choice items and the way one could measure this is its rather more objective way of measuring by giving correct versus number of errors and here the process is much more objective.

Looking at the second learning outcome which is apply, here if I give an assessment type which is like fill in the blank, we are really not allowing students to apply their knowledge what they have gained with the teaching learning activity which was conducted. An appropriate type of assessment would be giving them a problem sets or labs where you know they could apply their knowledge which they have learned in the class and the way we could measure this is by giving them scores, giving them checklists depending on what type of assessment we have chosen as well as designing the rubrics which means because this type of assessment tasks, it is hard to give them scores very in know objective way. As I mentioned earlier with all the assessment we need to make the

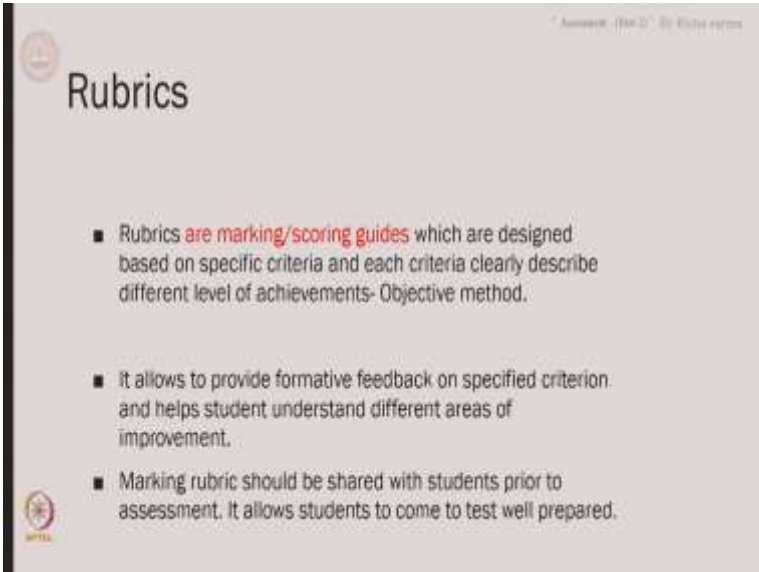
assessment process free of bias and that is where the role of rubrics come where rubrics provide us an objective marking guide.

Just taking this forward, there other examples within that learning outcome which is analyze or create and you could choose different types of assessment tasks like case studies for analyze or write a critique or critical appraisal which is in alignment with the type of the action verb used within the learning outcome. And as you would notice on the right hand column all of these ones, the measurements are required to use rubrics because we want to make this process as objective as possible.

The next thing which you want to do is design a marking rubric guide. Marking rubric guide is objective way to mark the assessments where your students' performance will be marked in an objective way. So, as I mentioned these are scoring guides. There is no standard format, but there are some key components regarding how would you design rubrics.

Rubrics are mainly designed based on specific criteria. Specific marking criteria based on the type of assessment task which you have chosen for your course. What it does is, it allows you to provide a formative feedback on every specific criteria and students get to see where they have performed well and on which criteria they need to improve in future.

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## Rubrics

- Rubrics are marking/scoring guides which are designed based on specific criteria and each criteria clearly describe different level of achievements. Objective method.
- It allows to provide formative feedback on specified criterion and helps student understand different areas of improvement.
- Marking rubric should be shared with students prior to assessment. It allows students to come to test well prepared.

Just to take you back to the example which I started this session with, where a TLC member evaluated your lecture, in that particular process the one thing which was lacking was the TLC member never specified any marking criteria or the criteria on which your lecture was going to be evaluated. While designing a rubric, what it does is it takes account of each of those criteria specifically and when you share these rubrics with your students prior to their assessment during their preparation time, students come better prepared for the assessment because now they know on what all criteria they are going to be evaluated for this particular assessment.

So, a good robust rubric gives clarity to student as what is expected and what level of achievement they can aim for for a particular assessment. Improve their learning through detailed objective feedback, which once again means that once you have given them feedback on each specific criteria they have more clarity on which aspect of the assessment they have would performed well and which particular criteria they need to improve. It is a time-saving task for teachers even though initially this might take some time to design a robust rubric where you are going to set specific criterias, different levels and a right description for each of those criteria.

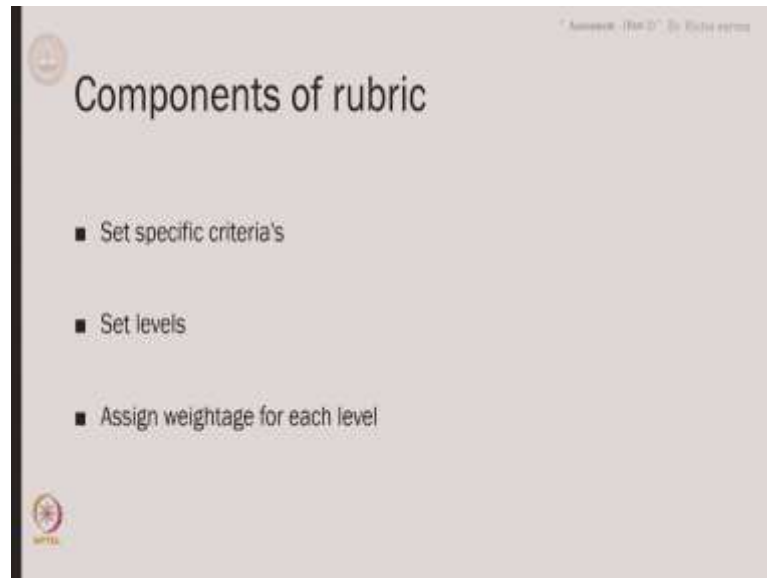
But once your rubric is ready to go and it's reached a level where it is really objective, what you would find is it will really save your time in marking especially in number of students if you are looking around 60 or 100. And if you think about giving individual feedback to these students on each of these criteria becomes or rather takes lot of time. Hence it is a time saving task.

The other thing you would notice is, once you are marked on a particular rubric to one single cohort and you use the same rubric for next cohort, your marking will become more and more consistent and that is a good way of comparing how the students have been performing in a particular course as well as how your teaching practice has been from one cohort to the other.

The last thing on this rubric you which you really want to know is a potential for giving timely and effective feedback. I have highlighted this earlier as well that formative assessment feedback is the key, but that feedback needs to be given on a timely manner. And once you start using this rubric as I said, it is a time saving task and it is an effective

way of giving feedback to students, you will find that students would appreciate this process much better than getting feedback without using a rubric.

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So, how do we design this rubric? The most important or rather the three components of rubric are first you need to set specific criteria. Specific marking criteria which could be what are the different criteria for a written assignment, what are the criteria for oral presentation on which you are going to mark your students. Once your criteria are set you need to set different levels of achievement.

Ideally I would not encourage you to set more than 3 or 5 levels because if you choose like 8 or 10 levels, you will find it very hard to have an objective description for each of those levels. So, once your criteria are set and your levels are set ideally I would prefer 3 or 5 levels, your next thing to do is assign weightage for each level.

At this point, I would also like to highlight that you can choose to have all the criterias as equal weightage or depending on where you would like students to have more focus on you can have different weightage for different criteria. I have shared this link so that you could go on this link and look at various rubric examples. This is by Carnegie Mellon University and they have a wide range of rubric examples ranging from a written assignment to oral presentation to a group presentation. They might not be in the engineering field, they are lot from arts background or history, but I would encourage you to go through those examples to look at how rubrics are designed.



(Refer Slide Time: 14:56)

Assessment - (Part 2) By: Rishi Kishore

Criteria	Level of Achievement		
	Sophisticated (3 points each)	Competent (2 points each)	Not Yet Competent (1 point each)
<b>Research</b>			
Quality (e.g. use of varied sources, evaluated and validated sources, accurate information)	Information is accurate; resources are legitimate; resources are varied when appropriate	Information is mostly accurate with only a few minor errors; one resource may be questionable; resources good but not varied enough	Information is unreliable and/or inaccurate; resources are not valid
Broad spectrum of information (e.g. on political, economic, social, historical and geographical dimensions)	Includes all five dimensions	Includes four of the five dimensions	Includes three or less dimensions
<b>Content of Presentation</b>			
Substantive use of information (e.g. explanations on political, economic, social, historical and geographical dimensions are complete and helpful; make connections, inferences, draw conclusions, noted convergence and divergence among resources)	Explanations of dimensions are complete and helpful and indicate how the dimensions interact with each other; draw conclusions, make connections and inferences	Explanations are complete and helpful but include little or no interaction among dimensions or explanations aren't quite as complete or helpful but there is an indication of interaction among dimensions; draw some conclusions and make some inferences but miss obvious ones	Incomplete and/or not helpful explanations with little or no indication of interaction among dimensions; present others' information without analysis (e.g. drawing conclusions, making comparisons, connections and inferences)
Effective slides (e.g. coherent, logical progression, well organized, include main points not details, "tell a story")	Slides clearly aid the speaker in telling a coherent story	For the most part slides are helpful in telling the story with only a few glaring problems	Slides interfere with the story

I have chosen one of this which is an oral presentation for history students as an example and I am going through each of these criteria and levels to give you a fair idea on how a rubric is designed and what are the key components of the rubric.

So, if we look at on the left hand side of this slide you would find there are criteria. The criteria it is totally up to you what are the criteria you are going to use for marking. This particular faculty person has this is an oral presentation, they have used research as a criteria, content presentation as the second criteria and once I move to the next slide I will show you what other criteria they have set.

The next thing to highlight is here they have chosen three different levels, they have used the term sophisticated for the highest level, competent for the mid range and not yet competent for the lowest level. You can use different terminologies like for the highest you could use excellent for the mid range you could use average and not yet competent you could also call it poor. For each of these levels they have assigned one point for when you are on the lowest level, two points if you get in the middle or the competent level and three points for the sophisticated or the highest level.

As I pointed earlier, that you could choose to give equal weightage to each of these criteria or you can choose that for research if the sophisticated is three points, the content of presentation could very well be six points which is twice the weight age of it and that

is totally up to you based on what criteria and what weightage you would like to assign for a particular assessment.

So, once we have set the criteria and the levels, the hardest bit is actually to write the descriptions in each of these levels. The descriptions here are, so for research let us look at what are they looking in terms of research. For research they are looking in terms of quality and broad spectrum of information. So, in terms of quality, they are looking whether the information is accurate, resources are legitimate and resources are varied when appropriate. So, if a student in their oral presentation could provide all of this, they get three points.

So, if the student provides the information which is mostly accurate. So, what I would like to highlight here, the difference between these sophisticated level and competent level is clearly described here by the use of the word mostly accurate, then the information is accurate, which means that the person if they have provided all the information accurately, they are going to get 3 points, but if some of it is missing, but most of it is accurate you are going to get two points.

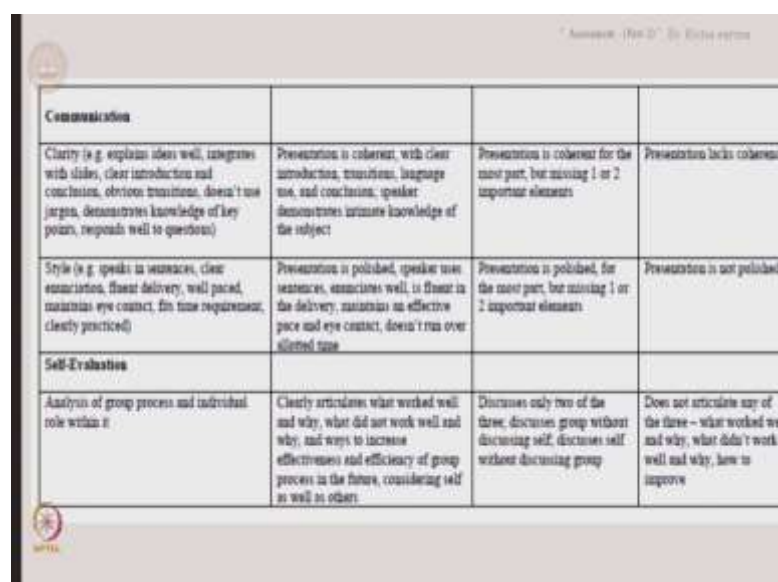
With only few minor errors, one resource may be questionable once again all the resources are not legitimate, one resource could be questionable and resources good, but not varied enough. The last one, the information is unreliable and or are inaccurate resources are not valid. Within the criteria of research, apart from quality they have also clearly highlighted that the information which they provide should cover a broad spectrum of information and very clearly they have specified that should cover from political background, economic, social and historical and geographical dimension. And if the student has included all 5 dimensions, they get the highest 3 points. If they have included only 4 of the 5 dimension they have get 2 points and they have included 3 or less then they get 1 point.

So, the key thing to get from what I have explained so far is that you need to describe each of these criteria, each of these parameters very clearly. So, suppose if there are two examiners marking this oral presentation, they will go through this information or the description which you have provided in this column, this column and this column and mark it in an objective way rather than marking the students based on subjective bias.

And this is exactly what the purpose of rubric is where you want to make the marking as objective as possible.

The next criteria is content of presentation. Once again the faculty member has clearly described content of presentation by using substantive use of information and also looked at effective slides as a separate within that content presentation. You can go through each of this description in your own time and you have to pick on the appropriate word or description to differentiate one level from the other to make this process as objective as possible.

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Communication			
Clarity (e.g. explain ideas well, integrate with slides, clear introduction and conclusion, obvious transitions, doesn't use jargon, demonstrates knowledge of key points, responds well to questions)	Presentation is coherent, with clear introduction, transitions, language use, and conclusion; speaker demonstrates intimate knowledge of the subject	Presentation is coherent for the most part, but missing 1 or 2 important elements	Presentation lacks coherence
Style (e.g. speaks in sentences, clear enunciation, fluent delivery, well paced, maintains eye contact, fits time requirement, clearly practiced)	Presentation is polished, speaker uses sentences, enunciates well, is fluent in the delivery, maintains an effective pace and eye contact, doesn't run over allotted time	Presentation is polished, for the most part, but missing 1 or 2 important elements	Presentation is not polished
Self-Evaluation			
Analysis of group process and individual role within it	Clearly articulates what worked well and why, what did not work well and why, and ways to increase effectiveness and efficiency of group process in the future, considering self as well as others	Discusses only two of the three, discusses group without discussing self, discusses self without discussing group	Does not articulate any of the three – what worked well and why, what didn't work well and why, how to improve

As I said, apart from content presentation and research, the faculty member has used other criteria, communication and self-evaluation because it is an oral presentation communication is an important criteria when you are marking these presentations.

Within communication, once again if you look at the description, it is about clarity as well as the style. Now, what does the author mean by clarity, once again there is a detailed description. And if you look at the highest level the sophisticated level which is 3 point, the middle one is 2 point and the last one is 1 point, you would find that the for the highest one the presentation is coherent with clear introduction, transitions, language use, and conclusion; speaker demonstrates intimate knowledge of the subject whereas, for the middle level, the presentation is coherent for the most part, but missing one or two important elements.

So, here once again if you have two or three examiners marking these oral presentations, the clear description will make this marking more objective. And the benefit which students will see is that if you have marked on communication a student a level two whereas, for if I go back to the previous slide you have marked student a sophisticated for research, as well as sophisticated for content of presentation. The moment you share these marking rubric guide with students they clearly know where do they stand and why they have lost marks and going back to the initial example which I started this session with if your evaluator would have given you clear criteria based on the content of presentation, your preparation for the class, as well as the communication, you would know where you have lost your marks and where things need to improve, and this is exactly what is the benefit of the rubric which brings me to the end of this session.

And before I end, I would like to summarize we started this session with defining and explaining different types of assessment, mainly the formative assessment and the summative assessment. We then went through the principle of constructive alignment which highlights that the assessment tasks need to be aligned with the learning outcomes and the teaching learning activity needs to be in alignment with the learning outcome and that assessment task. We then moved on to the assessment plan which is how do you have assessment plan for the entire course before the semester starts, and your assessment plan should clearly highlight the intervals at which you are going to conduct assessment, what type of assessment is it going to be formative, summative, but once again the key thing is are the assessment tasks designed to address a particular learning outcome.

And the last thing which I have covered in this session is how do you design rubrics and the three important components of designing rubrics is setting clear criteria, setting levels and assigning weightage to each of these criteria and levels. Assigning levels and weightage is much easier task, but writing descriptions to make this rubric as objective as possible will take some time and I would encourage all of you to start writing these descriptions and compare it to some examples which you would go through in the website which I have suggested.

Thank you all for your time and it is important that we engage students in our assessment talk because as pointed by Ben Franklin tell me and I will forget, teach me and I will remember, involve me and I will learn.

Thank you all for your time.