

Effective Teaching : A Course or Fresh Teachers in Engineering

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1. Necessity

In addition to academic qualification, one needs a qualification in education (e.g. B.Ed. or D.Ed.) in order to qualify for being a school teacher. However, no such qualification in engineering education is specified as a pre-requisite qualification for becoming a teacher in engineering college and polytechnic. Academic qualification only is considered to be sufficient to become a teacher in engineering.

This leads to a situation often encountered in an engineering college. A fresh I Class BE graduate is recruited as a teacher, and is assigned to take a course. The poor fellow is totally ignorant of what teaching is about and how to teach effectively. As a result, he/she usually makes a mess of the course. Students are unable to follow his/her lectures; they fail en-masse in the particular subject in university examination. The fresh teacher is blamed for the poor results. He/she naturally gets frustrated.

With a view to remedying this situation, the author has designed a training program for fresh teachers in engineering. Effective teaching is an important component of this teacher training program. This component is discussed below.

2. Meaning of Effective Teaching

Teaching done in such a way that it stimulates interest and leads to in-depth learning

by the students is called effective

Effective teaching is characterized by the following:

1. Careful planning of both the subject to be taught and also of the lecture to be delivered.
2. Meticulous preparation of the lecture to be delivered.
3. Delivery of lecture is in an effective and even dramatic manner, making intelligent use of audio visual aids.
4. Stimulating and sustenance of student interest in and encouraging in depth learning of the subject being taught.
5. Transparent unbiased and fair assessment and grading of the course.
6. Establishment of a good rapport with students both in and outside the class.

3. The 2-D Model of Effective Teaching

With a view to gauge the effectiveness of teaching, a 2-D (two dimensional) model for teaching has been proposed by Davis [1].

In this 2-D model, the two dimensions are defined as:

Dimension D-I : Intellectual Excitement

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Dimension D-II: Interpersonal Rapport

Each dimension is divided into 3 parts: High, Moderate and low as described below:

D-I : Intellectual Excitementa) **High** : Extremely clear and exciting

- i) All content is extremely well organized and presented
- ii) Relationships among specific concepts, and applications to new situations are stressed
- iii) Content is presented with high energy and a strong sense of drama.
- iv) Teacher appears to love the subject

b) **Moderate** : Reasonably clear and exciting

- i) Facts and theories are presented clearly within an organized framework.
- ii) material presented in an interesting manner
- iii) Moderate level of energy.
- iv) Teachers seems to be moderately enthusiastic and involved in teaching.

c) **Low**: Vague and Dull

- i) Some topics are organized and presented well. But most of the topics are vague and confusing.
- ii) Most material is presented with little energy and enthusiasm.
- iii) Teacher seems to hate teaching and be bored with it.

D-II: Interpersonal Rapporta) **High**: Extremely warm and open, High Study Centered; Predictable

- i) Teacher seems to have strong interest in the students, and is sensitive to the way we feel about the material and for its presentation.

- ii) Teacher acknowledges students feeling about class assignments.

- iii) Teacher encourages students to ask questions, and express personal view points.

- iv) Teacher encourages students to be creative and independent in dealing with the material, and to formulate their own views.

b) **Moderate**: Relatively warm, approachable, and democratic; predictable.

- i) Teacher is friendly and personable to students, but makes no efforts to get to know them.
- ii) Teacher announces policies, and is prepared to discuss student reaction if they complain .

- iii) Teacher responds to students' questions, and comments politely and without irritation.

- iv) Teacher is relatively consistent and predictable in behavior with students; gives ample notice before announcing requirements or changes in schedule.

c) **Low**: cold, distant, highly controlling, may also be unpredictable.

- i) Teacher shows little interest in students; knows few of their names, and may fail to recognize many of them outside the class.

- ii) Teacher is occasionally sarcastic and openly disdainful of students, their level of performance in the course, or their non-academic interests.

- iii) Teacher appears irritated when students ask questions and drop by, even during office hours.

- iv) Teacher simply announces policies and requirements, and seems angry when

questioned.

- v) Teacher may be inconsistent or unpredictable, e.g. smiling while insulting students, by giving backhand compliments, or by announcing assignments or requirements at the last minute.

When tabulated in one form of a table, the 2-D Model appears as a 3x3 matrix, with each square identified as a cell. This yields nine cells shown in Table 1 :

Cell 1 : Inadequates

Cell 2: Marginals

Cell 3 : Adequates

Cell 4 : Socratics

Cell 5 : Competents

Cell 6 : Intellectual Authorities

Cell 7: Masterful facilitators

Cell 8: Masterful Lecturers

Cell 9: Geniuses

A fresh graduate, taking the first course, is in cell 1 to 3. He/She has to make a concerted effort to reach cell 4 or 5. Reaching the level of cell 6 or 7 may take 4 to 5 years of diligent effort. Cell 8 is very difficult to reach. Only 1 in 500 may be able to reach it. Cell 9 is extremely rare; there may be just one or two at this level in a decade in the whole country.

4. Action Plan for Effective Teaching

Having understood the meaning and model of effective teaching, we are now ready to consider how to do effective teaching. This stage consists of the following stages;

- a. Planning the course and each lecture there in
- b. Preparing for the lecture

- c. Delivering the lecture.

Let us consider these stages one by one

4.1 Planning the course and lecture

The first point to note while planning the course is to place it in the overall curriculum and show clearly its linkages to other courses.

This helps students to appreciate where he/she is and where does he/she go after the course.

The second step in planning is to divide the course into the required number of major topics. Place the topics in an outline of the course and show inter connections among topics.

Mention clearly the number of lectures devoted to each topics, the home assignments to be given and even a class test, if required, to be conducted.

Third step in planning the course is to determine what to teach. This question arises because it is not possible to cover the entire syllabus of the course in the class. Consequently, you have to decide what to teach.

The syllabus of any subject is made up of three parts as shown in Fig. 1.

1. **Must Know** : Basic concepts, Fundamental theories, examples.
2. **Should Know** : supplementary knowledge comprising extensions of Basic concepts, Advanced concepts, Practical Applications.
3. **Could Know** : Certain "frills", interesting case studies, etc.

Of these parts, "Must know" part should be covered thoroughly. "should know" part also needs to be covered adequately. "Could know" part also may be covered if time permits. It could otherwise be left for self study House Assignments could also cover this part.

Table : 2-D Model of Effective College Teaching

Dimension D-I	Dimension D-II		
Intellectual Excitement	Interpersonal Rapport		
	Low: Cold, Distant, Highly controlling, unpredictable	Moderate: Relatively warm, approachable and demoratic; predicable	High: Warm, Open, predictable, and highly student centered
High : Extremely clear and exciting	Cell 6 : Intellectual Authorities out standing forsome students but not for others	Cell 8: Masterful Lecturers Especially skilled at large introducing classes	Cell 9 : Geniuses Excellent for any student and situation
Moderate : Reasonably clear and interesting	Cell 3 : Adequates minimally adequate for many students in lecture classes	Cell 5: Competents Effective for most students and classes	Cell 7: Masterful Facilitators Especially skilled at smaller, more advanced classes
Low: Vague and dull	Cell 1: Inadequates Unable to present or motivate students	Cell 2: Marginals Unable to present material wed, but liked by a few students	Cell 4: Sacratrics Outstanding for some students and situation but not for most

While teaching, it is advisable to proceed from the known to the unknown, concrete abstract, particular to general, observations to theories. Sometimes it may be necessary to go from the whole to the part and then back to whole again.

Stress Central Themes and General Points that tie up other parts. Concentrate on those points which the students find difficult to understand. Dwell on points that lead to insight and in-depth understanding:

4.2 Preparing for a Lecture:

“The world is a stage” said Shakespeare.

This is very true of a lecture in a class. The teacher is the actor who acts out the drama of the lecture on the stage, with students as spectators.

Actors know that, however good their acting, the drama cannot be impressive if the script is not upto the mark. Similarly you should realize that your drama of the lecture will not be effective if your script, viz. preparation for the lecture is not thorough enough.

Hence meticulous care is a **must** while preparing for the lecture. On an average, four to five hours of preparation is required per hour of

lecture. More than half the time is needed for you to thoroughly understand the topics to be taught in the lecture. The reason is: your presentation cannot be clear unless your own concepts are clear.

The remaining time is spent on how to present so that students understand the topics easily and well. In other words in giving dramatic touches in order to make your presentation effective.

You may also devote thought to what audio visual aids to use and when in order to make your presentation highly instructive and impressive.

4.3 Delivering the Lecture Effectively

With due preparation you enter the class to act out the drama of lecturing. Here are some tips that could make your drama impressive:

1. Communication skills: Speak clearly and at correct pace with correct accent, avoiding the provincial accent and idiom. Speak loudly enough to be heard even on the last benches.
 2. Do not be monotonous. Vary the pitch, volume and pace from time to time so as to hold attention of your students.
 3. Do not look at the black board, or ceiling or ground while lecturing. Look at your students. Observe students reactions, and modify your lecture accordingly by introducing 'on-the-fly' modifications.
 4. Take a brief pause at appropriate points in your lecture either to emphasize a point or for the impact of an important message or illustration to sink in the minds of students.
 5. Make the topic come alive in the class by narrating difficulties encountered, frantic efforts to overcome them, and the thrill and ecstasy felt when the solution ultimately struck you as a bolt from the blue.
6. Do not stand like a statue during the lecture. Move around a little, but not so much as to distract your students.
 7. Use gestures and deliberate movement to heighten the drama, but use these sparingly.
 8. Let your students know how much you enjoy teaching, because students will enjoy learning the subject if you enjoy teaching it.
 9. Encourage your students to ask questions, and answer them well. If you do not know the answer on-the-spot, give it the next time, but do not leave it unanswered.
 10. Make use of illustrations and audio-visual aids in order to explain points. But do not be carried away so that you lose focus on your teaching. Remember well that audio-visual aids are a means to an end, and not the end itself.
 11. Modern learning courseware in the form of CD's, DVD's, etc. can be adopted if you are in an engineering college, especially in mofusil area and your infrastructure facilities are not up to the mark.

5. Building Rapport with students

This is an important aspect of effective, teaching. However, it would be appropriate to know your student, and how to deal with them before suggesting ways and means of getting along with them.

5.1 Classification of students

Marn [], the eminent authority on education and the author of several papers and books, has classified students in a class into specific classes as given below:

1. *Compliant Type*: Obedient, teacher oriented, average to good standing, comply with whatever the teacher says.
2. *Anxious Dependents*: Obedient, but mediocre; lack self confidence; erratic and worried about making the grade.
3. *Independent Type*: Intelligent, ambitious, fare well in exams and test on their own steam. Will not oppose you unless they fear that you threaten their ambition.
4. *Heros*: Showy, attention hogs, out to impress you and others; show great promise, but hardly live by it.
5. *Snipers*: Similar to heros, but hostile in nature; back benchers, gossip mongers, mischief makers.
6. *Weak*: below average; find the subject overwhelming; need guidance rather than admonishing.
7. *The Gifted*: High achievers, ambitions; need nurturing, can turn out outstanding achievement.

5.2 Methods of dealing with the students

1. All students except those in class 4 and 5 will not create any trouble in the class if you are reasonably good.
2. Pay special attention and provide guidance to students in class 2 and 6 so as to help them overcome their fears and make the grade.
3. Those in classes 3 and 7 also need special attention. Encourage them to transcend the syllabus and go to advance topics or build models. The gifted students could be given small research projects.
4. Heros may be assigned tough course projects or assignments. Pull them up if they fail to make the grade; put them in

their place.

5. Snipers need to be caught red-handed and expelled from the class. Report their names to college authorities for action.

5.3 How to Build up good rapport.

1. Identify each student by his name. It flatters them and they start respecting you. They also avoid mischief making for fear of being identified.
2. Come to the class five minutes early, and chat informally with them, before starting your formal lecture. This helps in building rapport.
3. Encourage students to ask question, both inside and outside the classroom.
4. Announce hours when you will be available for consultation. Make sure you are available during those hours.
5. Praise students for their prizes and rearwards won or for achievements in academic, co-curricular, sports and cultural fields, and encourage them to do even better.
6. Encourage students to read journals, latest books in the library; to give seminar talks and do course projects.

6. General Advice

1. Be fair, firm and friendly while dealing with students. Favoritism or prejudice is to be avoided meticulously.
2. Do not announce any rule or regulation that you cannot enforce. Students respect and even fear you if you do what you say.
3. Do not humiliate a student in the class or in public. Call him to your office and give him/her the dressing down needed.
4. Do not indulge in emotional involvement, romance and or sexual relationship with

especially a girl student. *This is absolutely forbidden.* It is against ethical norms of the teaching profession. Young and unmarried faculty members have to particularly beware of any sex scandal, it can ruin your career.

7. Why strive for Excellence in Teaching?

At the end of this exercise, the fresh teacher is likely to ask the question "Why take all this trouble to be effective in teaching? The answer to this question is philosophical. It says, "you take all this trouble to get the satisfaction of a job, well done".

The second question that arises is "What do I get out of it?" The answer to this question is also philosophical. The answer is: "The returns of good teaching are not tangible (in terms of money, goods, etc); the returns are intangibles. The return is the respect and adoration you get from your students. The author has experienced it first hand, both in India and in USA. The satisfaction you get when your students show respect to you and the regard they have for you is something which cannot be expressed in words, it has got to be experienced. No amount of money can buy you this satisfaction. It has to be earned the hard way by striving for excellence in teaching.

Imparting knowledge is the noblest profession you can be in, as Bhagwad Gita says; "*Nahi Jnanen Sadasham Pavitramha Vidyate*" (there is nothing more sacred than knowledge in this world).

While imparting knowledge you will often realize the saying, "work is worship". When you approach teaching work in this light, you will realize that, in workship, you can give to god nothing less than the best in you. This sets you in quest of "how to do effective teaching".

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