

## Improving teaching: What the best/distinguished faculty members say at IITK

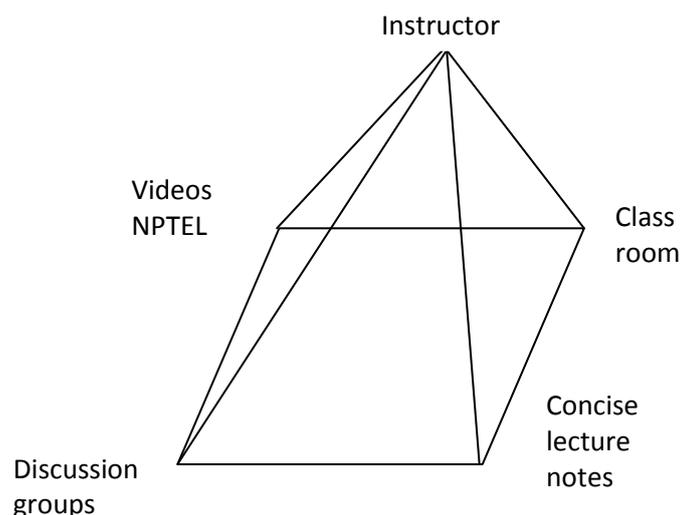
Dear colleague,

The main aim of this exercise is to arrive at a strategy to improve ‘teaching-learning-motivation’ in both large and small classes. Roughly speaking, the large classes could have 60+ students.

As you are aware, a few years ago, the teaching practice took a different turn when the student strength increased (almost doubled). Since then we have been confronted with large classes in which we began to teach a mixed bag of students with widely different academic capabilities.

To understand the problem better and find its possible solution, we contacted seventeen (17) teachers, including several best/distinguished teachers present on campus and some who have expressed keen interest in improving teaching/learning at IITK. The discussion lasted over 45-60 minutes in each case. Attempt was made to focus the discussion on the following points:

- Level of lecture, layering to suit all category of students.
- Teaching ‘core’ of core concepts
- Notes supplied in advance, asking students to bring it to class
- How to find out: feedback at more regular intervals than just at end.
- Blogs-to oversee discussion, monitoring by instructor
- Group assignments: employing student mentors (paid)
- Videos: giving out after lecture, available 24x7
- Language: how to ensure that English is understood.
- Conducting tutorials: relevance of tutorials
- Active learning: how to implement
- Extra time devoted by teacher: any credit
- Approaching weaker students or bringing them out to learn and discuss: is a problem: how to improve this.
- What should be the content of Power Point presentation: a lecture note, not just points or flashy figures/pictures.



Other institutions abroad have also tried to address the related issues. For example, a write-up on the best practices for teaching first year undergraduates at CMU can be seen at:

<http://www.cmu.edu/teaching/resources/PublicationsArchives/InternalReports/BestPractices-1stYears.pdf>

There is not much difference in what the best teachers say at IITK or what the best teachers say at CMU, but for a small difference in the nature of problem that we tackle. It turns out that in order to cope with mixed bag of students coming through JEE, the standard of lecture itself has often been lowered at IITK. Almost all the instructors now try to address students at the middle or lower middle level. But this has not solved the problems faced by academically poor students. The challenge posed to brighter students has also come down. The flip side is that good grades come easy for brighter students, perhaps at the expense of academically poorer students (in our current grading system). So we are losing on two counts: (a) helping or supporting the academically poor students and (b) preparing the brighter students.

The summary of responses from teachers at IITK is given below (see Part A) followed by the individual reflections/views of each faculty member (see Part B).

The views and suggestions are also available on the blog:

[www.iitkteaching.wordpress.com](http://www.iitkteaching.wordpress.com)

## **Part A: Summary of views/reflections of seventeen faculty members**

According to the teachers at IITK it would help immensely if:

- Concise lecture notes are given to students (either before the class, in the class, or after the lecture). It would be best if the students have the concise lecture notes during the lecture so that they can follow it systematically. Lectures would then become better organized, from the instructor point of view, and also allow the student to follow, focus and to connect with the instructor (from the student point of view).
- While lecturing, the connectivity of concepts as well as connectivity of material discussed in the previous and next class will keep the attention of students and allow them to learn better.
- Focusing on the basic concepts (core of the core course) while teaching especially in core courses with the idea to devote more time/focus on them because they form the basis of future courses as well.
- Working out some simple problems in class as part of the lecture helps to clarify the concepts better.
- Making access to course material (including text book as well as other reference materials) as easy as possible, so that the students can track it and follow it.
- ‘Course cohorts’, i.e. the instructors teaching the same courses, can form a group to help and consult each other so as to design the course objective and improve upon the teaching material/course notes each time the course is offered. This process of consultation would also reduce the variability from one instructor to another and allow continuity in the “the basic minimum knowledge” that students are supposed to have from the course.
- Greater emphasis is needed on “peer learning” wherein students learn from each other both inside and outside the classroom. For enhancing peer learning we need to create an “Academic resource centre” where student tutors (paid or unpaid) are made available as a policy to help academically poor students.
- Honours courses (parallel to normal courses) may be created for brighter students who want to take up the challenge of doing tougher or challenging assignments.
- Continuous evaluation (once every two weeks) through frequent short quizzes (5-10 min) helps to identify weaker students. Once identified, they may be tagged with “peer learning”. Using student power to train students is a way of tapping into the resource of increased student population.

- The method of handling tutorials needs great changes. It should not be a place for just solving on board some worked out problems, but should be converted to some type of ‘flipped class room’ where learning and participation in groups is encouraged.

The feedback has brought to light the fact that several IITK faculty from different departments have tried these methods of improving teaching/learning and found excellent results in recent past. For example, in one such approach, the lecture material and video of the lecture is made available in advance and the students are asked to go through the same before coming to class. In the class, the effort is essentially to build up on the lecture material through discussion and through problem solving. Semester after semester, a good feedback has been received for this approach and the students simply love it.

We need to carry out more experiments in a systematic manner to improve “Teaching-learning-motivation”, both in small and large classes. It is necessary to evaluate if we should shift to a learning-centered culture in terms of teaching philosophy and practice. This is a proven method across the globe.

The faculty members are welcome to send in their views. Those who want to volunteer in carrying out such experiments (or have some ideas of their own) are welcome to respond personally to this e-mail. This would for sure be one of your greatest contributions to bringing about important changes in our method of teaching/learning/motivation and add to the reputation of IITK for excellence in teaching.

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## **Part B: Individual reflections/views of seventeen faculty members**

### **1. Professor, Chemistry**

- a. Teach mainly the ‘core concepts’ of the core course, clarifying the concepts, and the connection between concepts. Exam is to be taken only on what is taught.
- b. The parts of the course not covered can be learnt by the student himself.
- c. Do not carry any paper to the class. Spend time in preparation to derive things on board without any help.
- d. Explain the concepts clearly for first thirty minutes or so and in the remaining time, to enhance student interest, talk about its relevance, applications, latest developments.
- e. I favour giving concise notes (not completely detailed) on the lecture delivered, but after the class is over, also I may agree to put the lecture note on website.
- f. Pace of lecture is important.
- g. In a whole course, present approximately 15 concepts.
- h. I do not favour of complete videotaping of lectures and putting it on website later. This is a matter of my personal liking.
- i. I am not against preparing separate videos (outside the class room) on some difficult topics, or on problem solving, but only the concept part. So that the student can see them when he wishes. Lectures, per say, are only for the class room so that the student is drawn to the class room.

## **2. Professor, Physics**

- a. I aim to teach at middle or lower middle level.
- b. In tutorials, I work out fewer problems. I devote time to clarifying doubts in first 25 minutes and then work out two or three problems.
- c. English language is a problem for some students. I have just started experimenting with preparation of special videos in Hindi. Later the same may be dubbed in different languages too.
- d. I am contemplating to carry out an experiment in which I will put all lectures on Web. The students will be asked to listen to lecture before coming to the class (a new experiment suggested by Dr. Prabhakar Rao).
- e. I did create groups on Facebook but not many students participated. I did not pursue this route vigorously though.

## **3. Professor, Maths**

- a. The students bring concise lecture notes (prepared by me, given in advance) to the class. These are not detailed notes, only concise notes. Practice problems are also given in the notes. Some problems are only partially worked out, though with hints. If a student works out these problems himself then it is best for him.
- b. Weaker students hesitate to ask other students. Only some come to instructor directly.
- c. I agree that interaction through blog or Facebook may help to improve the situation for weaker students. Also in the tutorial, if students are asked to solve problems in groups then the weaker students may learn more.
- d. Some problems of small or large classes are essentially the same but in a large class they get magnified. Hence a more careful approach is needed.
- e. Approaching weaker students or bringing them out to learn and discuss and learn is a problem.

## **4. Professor, HSS**

- a. HSS courses are not seen as contributing to their career be it in research, administration, core companies or consultancy. The first thing, therefore, instructors must focus on is to try to invoke interest in the subject in students by showing its relevance in their own life and society. Once they develop interest more students would attend lectures and try to follow the lectures. Since HSS courses are not so mathematical, there is no need to hit at middle level (difficulty level).
- b. Yes, in a large class we are unable to take care or even know how the bottom group students are faring and whether they are following the subject, till an exam is taken. Language and reading books in English are a problem for some students, specially those who did not have a formal education in English in school days.
- c. I regret why the tutorial have been removed from HSS courses. To compensate for this the instructors can, however, devote time outside lecture hours. In that case there should be mechanism set up to record the time that a genuinely interested teacher spends with students in the interest of effective teaching. This may be true for engineering courses as well. In such a case the research publications of instructor may suffer. Also, what is more important for such an instructor: the students welfare or his own research papers - knowing well that he would be promoted on the basis of number of publications predominantly. The organization culture needs change to incentivise good teaching at par with research.

- d. I am in favour of the concise lecture notes being given in advance, whether the class size is small or large. I did try for a while but discontinued thinking that it adversely affects attendance in class. After this discussion I am inclined to try again.
- e. I am also in favour of the video of lectures being given on website, even though I might feel conscious of being videoed for some initial lectures. I can then make improvements in my own lecture style by viewing my own videos. It will ultimately increase my sense of commitment to the lectures. Also any misbehaviour by instructor or lack of interest can be correlated with student responses received. Yes, the students can compare the lecture given on the same topic by different faculty. But this will be a positive thing. Lectures will become more structured.
- f. I agree that in a core course the 'Core concepts' of the core course can be focused upon. In this attempt some topics may remain uncovered. But only some, say a minimum of 12 concepts must be covered out of 15. Else it will lead to anarchy, and some instructors may disproportionately devote more time to some topics because they are more enthusiastic about them. If we see the students' interest, it would amount to not meeting their requirements honestly.
- g. A special section should be included in students' feedback as to how much time the instructor devoted outside the lecture hours to the students of his/her class.
- h. A few students' discussion groups should be formed such that questions and responses between students and between students and instructors can be monitored by the instructor.
- i. It may be a good idea to generate weekly feedback from students, especially if the class size is large.

## 5. Professor, CSE

- a. Peer learning: I give assignments and quizzes in group, so that the students solve problems together.
- b. The problem of hierarchy of responding person is there. When the answers come from students or even TA's, students tend not to trust it so much.
- c. It is a problem to identify weak students or bring them out to fore and address their problems. Weak students are shy and do not want to be identified.
- d. In a mix of PG+ UG courses, the problems is with level of background in mathematics: those from outside IIT's do not have sufficient background.
- e. Students have problem admitting that they do not know a particular thing: for example what is the significance of Eigen value or some such simple concept which he ought to know. Abroad, the students have no shame in saying that they do not know and will therefore find out or learn, but in India it becomes an ego or prestige problem. Students think that they are being judged all the time. They want to put up a pretence of knowing.
- f. In my opinion the videos of lectures are not a means of active learning, and perhaps time taking too. If they are used, they should be accompanied by active learning, which requires engagement of students through problem solving, writing, discussing material.

- g. Large tutorials are not helping at all. Tutors simply go and solve problems on board. It is better then to give out the all the solutions. Maximum size of tutorials should be 30 and emphasis should be on students solving the problem. Therefore, solve fewer number of problems in tutorials and focus more on discussion part.

## **6. Professor, HSS**

- a. HSS subjects have a different focus and approach because they are often qualitative. Class strength in most courses can go up to 140, though in a course like COM200 student subscription is around 500. In the Remedial English course, for instance, we emphasize the basic concepts of sentence formation, and grammatical correctness. The idea is to enable the students to write in a coherent and effective manner. The lecture is pitched at a level to ensure that students with middling level of competence are able to comprehend the material presented.
- b. It is important to make eye contact with students and make the course as interactive as possible.
- c. Sometimes groups are formed for discussing topics of social relevance. But often students who don't have much prior exposure to English remain quiet and are unable to contribute to the discussion. Making them open up and share their views is a real challenge to me as a teacher. Interestingly, once the deficient students start trusting their fellow participants in the Group, they shed their inhibitions and start speaking.
- d. The students are encouraged to learn. They have to be treated with courtesy and consideration, no matter how poor their responses are or how indifferent they act. What matters, in the final analysis, is if I have succeeded in making them break out of their reserve.
- e. The course contents and teaching content is layered so that there is something for both the bright student and also the ordinary one. That way, both classes of students are challenged and that brings about a certain team spirit to the class.
- f. I have no particular opinion on (either in favor or against) loading the videos of lectures on the web.

## **7. Professor, EE**

- a. One does good teaching and devotes extra time needed for it because he/she likes it.
- b. The EE department core courses usually hold a mini quiz in tutorial for about 5 to 10 minutes. Typically this is an easy question that tests a simple concept discussed the earlier week. These quizzes are usually graded by TAs and the score sheet is also an attendance record for the tutorials. In the ESC 201 core course I taught, the attendance was between 90 and 95% of the possible 'student x tutorial sessions' for the whole semester. Usually at the start of the semester, I go over these scores to see how is absent or who is not doing that well and send them an email to their roll number. It helps to get to know the students and also gives some feedback on how they are doing. However, with the progress of the semester, I often find it difficult to continue this exercise as the pace of activity picks up. So this might not be the optimal method to get feedback, unless one is really consistent.
- c. I am in favor of teaching "core" of the core. Teach less no. of topics but teach the basics very well.
- d. I am ambivalent about how much of course material to provide directly to the student – rather than them having to take notes or collect it from the text book or

reference books. This is because I tend to believe that “that which is easily got has little value.” However, my colleague Prof. Mazhari believes that providing any help will help the students, especially the weaker students. He might have a valid point - at least borne out from the results of some of his novel experiments. One very useful thing done by Prof. Mazhari is the recording of lecture sound with moving cursor on the ppt. It does not take as much of memory as a live video. Students can also review the material by going back and forth when they are watching the slides so that they can make sure they understand the points clearly. I myself learnt from his lectures and as a new instructor know where to focus more during teaching.

- e. It might be a good idea to try putting lecture books on the web, provided one can prepare them in advance. In this, the instructor has to take out relevant materials from different textbooks and compile the information relevant for the class. It may help the student to bring it to the class while the lecture is being delivered. It may hold his/her attention more, while teaching in a structured manner covering the core concepts well.
- f. Finally, anything will work only if effort is put by students to learning. In US universities, students are more serious because they pay for it. And one can see that this leads in many cases to better quality of classes.
- g. In tutorials attempt fewer problems. Explain more and if possible make students work out different steps – put pen on paper.
- h. Blogs and discussion groups are a good idea to increase student participation. The instructor can oversee the on-going discussion.
- i. One needs to go in greater depth in departmental UG course and PG courses. This has to be ensured to increase the quality of the degree programs.

## **8. Professor, EE**

- a. I agree with teaching core of the core, at middle level. I supplement lecture with practical examples of application in real life and ask students to see applications for themselves. The course content is very optimistic (has many more topics than one can actually teach)!
- b. My lecture is my textbook. I advise my students not to miss any lecture. Attendance has never been an issue in my classes. Also, I do not wish to impose any restriction on attending classes. Because attending classes of the teachers who do not each well is a nightmare, a punishment. I distinctly remember this from my undergraduate days.
- c. The pupil-student relationship has undergone a sea change. The JEE pattern has created a mental block of not thinking deeply enough.
- d. M.Tech. students are far more motivated and interested in learning. It is a rewarding experience to teach and train them.
- e. Giving concise notes of lecture to be delivered (before or after the class) may help.
- f. My opinion on posting the video of lectures delivered is divided.
- g. I did try out discussion on ‘blog’ but response was very poor, hence discontinued.
- h. Perhaps on-line tutorials may help. As such the tutorials have lost their meaning.
- i. Group assignments were given but they did not help much.

## 9. Professor, MSE

- a. I agree with teaching core of the core, but I end pitching my lectures at a level where better students would be challenged.
- b. With wide variation of preparedness of the students in a class, the level at which lectures are being pitched is going down. It is better to raise the level, and then supply the video lectures to the students, to take care of the low to middle of the class. In any case, what is the harm in providing video recording? It is for the students to decide, what is better to attend the class or to watch the video or both. There could be ways to ensure that video's have been watched.
- c. I do often give lecture notes, even photocopies of the material that I prepared before delivering the lecture.
- d. At times, I have structured/ designed the assignments or exams to be solved in stepwise manner, before proceeding to the next step. In such cases, the student is asked to show that a particular value will be so much. This way if a student does not get a question right, he/she could still proceed to the next part using the correct values from the previous questions.
- e. In declared consultation hours, in which the students could come and discuss: very few turned up. Perhaps an organized on-line discussion hour in which the students can pose questions and difficulties anonymously, will work better. It needs to be tried. This could be done for the tutorial part. Instructor can over see, respond, also students can respond to each other without knowing the other person.
- f. I am in favour of the at least some courses course being offered at two different levels: Honours and Normal. The content would be the same in both, but the level of pitching the class would be different. The grades could be the same, but the course must have the distinguishing character mentioned clearly, appearing in the grade sheet.

## 10. Professor, Maths

- a. For large classes held in L-7, it is important that electronic boards be put up on sides, for example, so that students can easily read the material written on the board being used by the instructor. Then instructor is not forced to write in big letters, and that too in a small space. There should be dropdown boards too for more space.
- b. I prepare my lectures in advance and do all the derivation on board without the help of any paper. However when large expressions are involved (in mathematical statistics) then I do write it on a piece of paper.
- c. There is difference in level of students. Those who get interested come to me for more clarification. It is important to keep students interested. However, some students at back are sitting and doing something else. I usually ignore them but if some one disturbs the others I do take action, in a suggestive way.
- d. I do believe in teaching 'core' of core as the course contents are very ambitious.
- e. It is perhaps better to replace three lectures with one lecture and two tutorials> In this way student participation in learning can be increased
- f. It is a problem to know if the bottom ranking students are getting what they want.
- g. I am not in favour of video of lectures being put on web. They take away the novelty.
- h. The present model of teaching large classes is inadequate. There is non-uniformity within the instructors.

## 11. Professor, CSE

- a. A concerted effort is needed to experiment with improving the quality of instruction, treating it as a science, at institute level.

- b. Lectures can be made available on line but with a difference: Students should be asked to read in advance and what is presented in class is jacking up the knowledge presented in the video of lectures. This is to enthuse the student to learn by attending the class.
- c. The concept of 'flipped class' room can be applied: more learning in groups. This will require more resources. The number of lectures can be reduced and replaced by tutorials.
- d. If the slides have lecture material in them (not just points) then it is useful and the response of students to this has been good consistently.
- e. 'Course cohorts' also make use of the slides with or without changes. It is useful for the instructors to have cohorts to make improvements.
- f. In ESO 101 the instructor identified the good students (who have prior experience of programming) and gave them option to do individual projects under different faculty members/mentors/research students. In return, they were exempted from coming to labs. This worked very well and there was a good response from students. However all have to give the same exam. In this way we can cater to better students in a large class.
- g. Dr. Karkare tried an experiment in which the activity of student while solving the problems on line was logged in to see where the difficulty was being faced. More experiments have to be done on these lines.
- h. At IIT Delhi, they tried to get student feedback through class representative in the middle of semester.
- i. Working in groups does increase student participation. We employed mentors (paid student mentors-paid from CSE Deptt. funds) to do this work and response was very good. Gradually more and more students joined the group. The learning ambience is very friendly and enthusing in groups.

## **12. Professor, Physics**

- a. I obtain feedback and knowing progress through very short quizzes (10 min, altogether 6 in a course)
- b. I agree to teaching core of core
- c. In the lab part, I ask the students to read in advance and know the application part.
- d. It is important that we expect from the student that he learns: we express this by asking him to read, find out, come back and ask. Learning should be a fun, but this has been decreasing over years. Reading assignments should be given. It equally is important that that the students develop the habit of reading by themselves and learn new aspects. This habit has to be inculcated. Instructor should be constantly inquisitive and demanding that they must read.
- e. Quality of instruction has gone down. It is gradually on decreasing further. This needs to be pushed up by creating a suitable learning environment.
- f. The access to course material should as easy as possible, be it videos, lecture notes, solved problems etc.
- g. Instructor should be transparent: tell exactly from where he is teaching and what is to be covered in the next class.
- h. Learning groups, blogs, Facebook, anonymous questions, any thing that helps should be used, depending upon what is best for the given situation.
- i. Better students may be given tougher assignments.
- j. We must carry on with UG education and not just PG education (like IISc). Good teaching is a path to good research too.

### 13. Professor, HSS

- a. We need to have a comprehensive online learning management system that allows instructors not only to post lectures, assignments, solutions, etc., but also have forums for discussion / question-answer, where interaction may also be encouraged amongst students who may answer each other's questions. This online site may also be used to post references, both online and otherwise.
- b. To decrease class size a parallel running system is needed in which class size is reduced. Already a large class is divided into two or more groups. If there are multiple sections, then some sections can be for honours courses. Students could then choose register for one group/section or other, depending upon their individual abilities: Honours courses and normal courses, even if the grades are same. A mechanism has to be worked out.
- c. Senate has already approved that tutorial class size should not more than 30. We need to take help of student tutors to have smaller tutorial classes. Tutors are to be drawn from dual degree students and PG classes.
- d. A deeper study focus is needed in Departmental courses with fewer number of students. Separate projects can be given to brighter students to improve their scope of learning.
- e. Power point presentations, if they are created to be given to students as lecture notes, should contain lecture details (lecture book parts), not just points or flashy figures.
- f. Videos of lectures for courses that are discussion / project based may not be as successful. But in information based courses the videos of lectures could be useful.
- g. Student mentors may be used for groups or students requiring special help. The contact between instructors and counselling services has decreased. It is better that an "Academic Resource Centre", perhaps under CDTE, is opened to manage these centres. In universities abroad such enters work effectively. The tutors or mentors are selected by this centre and distributed to student groups or courses, as per the requirements indicated by the instructor. A kind of 'writing centre' has already been proposed in the ARC communication committee report which has been accepted by the senate.
- h. Lecture notes (the instructors' own, or even using various online resources, including available online courses, may be made available to students BEFORE the topics are covered in class so that in class, main points may be stressed without going into all the details, and also, the in-class lecture acts as a revision / reinforcement rather than first introduction to a topic. To ensure that students come to class after doing such required reading, quizzes may be used. Such quizzes should be "Instantaneous response quizzes", perhaps computer based or OMR sheets so that feedback can be easily obtained by instructor. Prof. Dheeraj Sanghee has Perhaps tried one of these options.
- i. Group assignments are welcome.
- j. Whatever improvement we make, we must ensure that the time to be spent instructor is within a limit otherwise it will affect their research work, which will, in turn affect their projects and promotions too.

#### **14. Professor, HSS**

- a. The disadvantages of large classes (vis a vis small classes) can not be overcome. Large classes can be managed but not justified. A losing compromise has to be made.
- b. I provide a separate time for discussion to those students who need it.
- c. Attendance is not a problem even in a large class.
- d. Within 15 days of the start of course, I take a quiz and separate out weaker students (about lowest 30%). These students are handled separately by encouraging them to perform better. I hold separate quizzes for them of lower standards and encourage them to perform. Each time if they perform better, then is a greater reward to them (say 5% more marks if they perform better).
- e. Course help material is divided into (a) cook book and (b) classic book. Cook books are of lower standard meant for poorer standards. I give separate 1 hr lecture to them if needed to explain things, in addition to normal lectures. Gradually poor boys come up, though not up to the same level. At least their interest in course continues.
- f. Exams are common for both the groups.
- g. I do speak slowly so that the students can understand spoken English. In large class I do use microphone so that I am clearly audible.

#### **15. Professor, EE**

- a. Attendance is usually 60-70%. I do not insist on attendance. Video lectures from other instructors/institutes are available on Web so better students can easily learn from them and they need not come to class if they wish, specially the good students.
- b. I teach from a standard book and attempt to explain the subject as given in the Textbook. In every lecture I do repeat what is done in previous classes at the beginning of the class and explain to them the continuity of concepts, as how one thing leads to other. For this reason they prefer to attend classes. I repeatedly remind them about the continuity and connectivity of different lectures.
- c. The elective and departmental courses in 3<sup>rd</sup> and 4<sup>th</sup> year draw heavily upon 1<sup>st</sup> year and second year courses. Students have to be made aware that if they did not devote time in 1<sup>st</sup> and 2<sup>nd</sup> year then they have missed the bus, at least in EE> I do now know about other Deptts.
- d. I do feel Some motivational lectures are needed to explain to students the above point. I am prepared to give such lectures.
- e. I do encourage students to send mail to me if they have not understood any concept. I get a lot of emails. If there is a good question or doubt then I forward the reply to the entire class.

#### **16. Professor, HSS**

- a) In a lecture I devote some time to higher level students and some to lower level students, nearly 50% of lecture is aimed for all. From first two assignments, based on raw responses, I am able to assess and find out poorer students. In a small class I am able to identify the students by their name, or I call out the names from the assignments. This is not possible in a large class.
- b) In large classes (say 400 students), as such, there is no way to identify or group students according to their abilities. However in tutorials, the tutors may be able to do so. But to the best of my knowledge no such effort is made in paying special attention to students based on their ability. Care is taken to select the able tutors by the Department. I do agree that something like 'Academic Resource Center' can be

created to assigned suitable mentors. It would be a good idea. These mentors can be paid too. Presently, the counseling service does attach mentors to students, but perhaps for a different reason.

- c) The link between counseling service and instructors is not that apparent or strong now.
- d) I do respond to emails from students if they enquire or ask for a clarification. If the question is a good one then I circulate (a bunch of questions and answers) to the whole class.
- e) I am not in favour of video of lectures to be put on Web. If for a course a video in NPTEL (or for that matter MIT OCW) is available then the students can look at it. But I never follow a published video on Web in my class or even refer to it. Videos are not a means of active learning specially for HSS courses. They may be useful for technical courses though.
- f) I am in favour of giving lecture outline in advance: the outline is exemplified in the class. The students must come to class. The attendance is approximately 60-70%, usually, decreasing towards end semester.
- g) I am in favor of reducing two lectures and one tutorial to one lecture and two tutorials, provided the tutors are good. The learning in well organized tutorials could be more.
- h) I do cover all planned topics. But it does happen that towards the end I rush through a few topics.
- i) Over the years, I have gradually simplified my spoken English so that all students can understand me. Language is a problem with some. But I am surprised that even poor students, over the years, make it up so well. It is a pleasure to meet such students later in life when they come and meet me.
- j) Group assignments are good for mixed groups (of weak and good students). Both learn from each other. Making groups is possible only in a small class. I do not give more difficult assignments to good students.
- k) The teachers have to manage time so that they can also write papers and do active research. Good teaching cannot be an excuse for not doing enough research, when it comes to promotions.
- l) The motivational talks should better be given by the students to the students. The current trend, unfortunately, is not good (actually spoiled by students themselves.). The senior students (peers) misguide the juniors right from their first few days on campus. It is sad. The atmosphere of learning has been corrupted by the peers for their fellow junior students.
- m) There is a growing trend and an undercurrent of not caring for learning.

#### 17. Professor, CE

- a. A large class may be considered consisting of 60+ students. A large class should be reduced to about 60 students by dividing students into parallel groups. This would increase the teaching load on Faculty. However, this should not be a cause of worry as the teaching load at IITK is much less than at other IITs and the Faculty strength has also increased. Smaller classes will reduce the shortcomings of holding large classes in terms of attention to students, providing extra help and guidance to weaker students.
- b. As regards the attendance issue, a model has been suggested by Prof. Sudhir Jain (Director IIT Gandhingar) in his lecture a few weeks ago. If the student fails to attend a specified minimum number of classes before first midsem, then he gets in to self learning mode. He does so at his own risk of clearing the end semester exam. No

assignments and quizzes will be evaluated/graded for him. The end sem exam will be the only evaluation point for him.

- c. The drive to learn has decreased in students. They are told by seniors to focus more on extracurricular activities. Wrong guidance by peers has changed the scenario altogether and students have lost interest in studies. It has become a serious social problem to reckon with.
- d. On the part of faculty also there is less coordination amongst faculty members even if they teach the same course. No course files are maintained to see what was taught in the last course and what problems and exam questions were given in previous courses. A paradigm shift is needed in which the faculty members need to be made aware of educational technology, pedagogy, and also some training is imparted to them in methods of teaching. They should be told how to design a new course, focus on objective based learning. It is for the Deptt. to check how a new course that a faculty member wants to offer fits with the overall objective and aims of the Deptt. There are a large number of courses based on individual preferences only.
- e. There is very little contact between the students and faculty.
- f. English language is a problem for many students. In this respect, it would greatly help if video of lecture or sound track of lecture is given to them along with course notes.
- g. We should take help from PG students on a large scale as tutor help, specially to help weak students (after some training by faculty). The students can be paid a decent (respectable) sum for engaging in such an additional activity. UG students helping UG students may not be a good idea.
- h. Time and effort devoted to teaching must be given its due recognition in all respects, and not just for research work. Teaching is our prime commitment.
- i. We need to be better organized as time is not far when accreditation would be imposed on us, even by foreign standards. So we must seriously look into the requirements of accreditation and plan accordingly.
- j. Giving projects to group of students would help. There are ways of evaluating individuals for the work done in groups as well.

## **One study: Center for excellence in teaching and learning, Minnesota State University**

### **Impact of Class Size on Student Performance**

There is one significant difference between large and small classes that appears consistently in the research. When it comes to the attainment of higher-order academic skills such as problem solving, written expression, and critical thinking, students in smaller classes do acquire more of these skills than do students in larger classes. Thus, while the literature demonstrates that large classes prove no obstacle to the acquisition of specific, course-related, factual knowledge, students in larger classes are at some disadvantage in developing an ability to think better by using skills beyond the basic acquisition of information.

### **Impact of Class Size on Student Attitudes**

Here again the various research studies over the years have reached some consensus. Smaller classes do lead to a more positive attitude toward the subject matter of the course. In the most extensive study of class size and student attitudes [8], the specific conclusions were:

1. Students tend to be the most upset when confronted with larger classes in their majors. Students tolerate larger classes for general education courses, elective courses, or prerequisite courses in other disciplines more readily. Students definitely expect smaller classes in their major and express dissatisfaction if they do not get them.
2. Larger classes appeal less to students with higher GPAs. Better students seem to desire the positive impacts of smaller classes on the development of higher order cognitive skills.
3. The reason that students in general viewed larger classes less favourably than smaller classes was the perceived lack of faculty-student interaction in the larger classes and the deleterious impact on student motivation inherent in large classes.

### **Impact of Class Size on Student Evaluations of Faculty**

Faculty members fear that students in larger classes may systematically lower their faculty evaluations to express their dissatisfaction with the size of the class. Fortunately, the consensus in the literature on class size and student evaluations provides a good deal of comfort to faculty who teach the larger classes and have their students evaluate faculty teaching. Research consistently indicates that class size does not affect student evaluations of faculty in any significant manner. Students tend to minimize the impact of general course-related characteristics when evaluating faculty teaching effectiveness. Only a very small part of the overall evaluation of a faculty member is apparently contingent on environmental or physical factors such as time of day, classroom amenities, and class size perceived to be beyond the faculty member's control. The overwhelmingly important determinants in overall student evaluation of faculty are the instructor-specific characteristics such as enthusiasm, course organization, instructor's command of course material, fairness of grading practices, and so on. Essentially almost all studies found that class size was statistically insignificant in explaining instructor evaluations by students. One recent study [4] did find some evidence that class size can have some measurable impact on the middle range of student evaluations. Excellent and poor faculty are unaffected by class size. However, the larger class sizes do somewhat penalize those faculty members whom student rate in the "fair" to "good" range.

#### **What can be done**

Even larger classes can appear "smaller" by using some of the teaching tools and techniques of smaller classes. A creative use of classroom assessment techniques and active learning exercises can effectively break up larger, lecture oriented classes into smaller learning units of student groups. Thus faculty can teach some of the higher ordered skills without sacrificing some of the attractive FTE (full time equivalent) generation of the larger classes.