How to Teach Effectively: Analysis and Experiences

A Term Project

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Abstract

Teaching assistant is a challenging job, and it is an important supplementary for teacher's lecture. In this paper, we studied the various problems we faced during our teaching classes and we came out with some practical techniques of "how to teach effectively". Based on the research we did and the cases we experienced, we proposed several methods to improve teaching skills. Most of the teaching techniques being discussed here are for lab sections and discussion groups, because our experiences are limited to this and also now a days lab sections and discussion groups are two common styles in the teaching process of Computer science and it's engineering applications. Our methods are useful and practical. We have experimented some of our methods in our lectures and we have got good feedbacks from the students. We expect to use all the skills we learned in this paper to improve our teaching in the future.

1. Introduction

Teaching assistant is a quite challenging and important work. The first reason is, it is an important supplementary for teacher's lecture. As a TA, our responsibilities usually include teaching lab sections, leading a discussion group, and answering questions during office hour, etc.. Due to the limitation of time, it is impossible for the instructor to cover everything in the class, or explain everything in very detail. And the modest age difference between TAs and the students may lead them to identify more strongly with TAs. So when they have problems, they may seek help from TAs first. You should not only be familiar with the knowledge, but also know how to teach them. The second reason is, in computer science department, most TAs' responsibility is to lead lab sessions. The lab is a practical extension for the knowledge learned in class. As a TA, you need to help students understand the theoretical knowledge, and learn how to exploit those theories to solve problems as well. Same thing happens for discussion session, another common class style in computer science department. Repeating topics in more details, explaining homework, and showing examples are not enough. What is more important is to help students learn how to use the knowledge to solve practical problems.

Students expect a lot from the lab and/or the discussion sessions. They want to learn effectively and efficiently. It is TAs' duty to help them achieve this. There are tremendous discussions on how to become a good TA. What are the teaching techniques a TA should have? In this paper, we focus on the topic of how to teach effectively, because it is critical both for the TAs and the students. Based on the research we did and the cases we experienced, several methods are proposed to improve teaching skills. Some of them have been used in our practical lecturing and feedbacks are good.

The remainder of the paper is organized as follows. Section 2 reviews some previous work on effective teaching by some organizations and universities. Section 3 talks about the methodologies we proposed to teach more effectively, such as prepare before hand and the correct attitudes as a teaching assistant. And section 4 concludes this paper.

2. Review of the Literature:

As the result of its importance, more and more groups are making their efforts to achieve effective teaching. Throughout 2002, the Southeast Center for Teaching Quality and Just for the Kinds, Inc. worked together and surveyed twelve schools to find out how teachers learn to teach effectively [1]. Their studies produced striking findings and several teaching techniques to be effective they listed out are very helpful. Tufts University is one of the institutions which maintain a link to give tips for graduate teaching assistant [2]. Many of the tips are concerned about effective teaching.

Besides the educational organizations, several individuals also contribute their valuable experience and opinions regarding effective teaching. Sami Rollins, an assistant professor of Computer Science Department at Mount Holyoke College wrote a paper to talk about a number of techniques she incorporated into her teaching, which greatly improved the effectiveness of the teaching process [3]. Dan Garcia, who was named

an Outstanding Graduate Student Instructor at UC Berkeley in the fall of 1992, shared his opinion about teaching effectively in an essay [4].

3. Effective Teaching Methodologies

Based on the studies we have done about effective teaching and our own experience, we bring forward several potential techniques/skills which are crucial to achieve this. In this section, we point out the most significant qualities in our opinion and explain them one by one.

3.1   Preparing offhand

It's always better and advisable to learn all the material before going to class. May it be a lab session or be it a class session, the instructor (we refer Instructor as Teaching Assistant here) should always know the material to its depth. For a lab session the instructor should also be prepared by running the demo offhand. And for a class session the instructor should prepare some good handouts or some good power point presentations so as to leverage the learning skill of the students. Doing some brain storming on possible difficult questions before hand also helps in the class. *Author2* have an experience regarding this. Once he had a student who was smart enough to ask difficult questions in order to try the knowledge level of the instructor. So to handle this type of intentions of some students, we suggest that the instructor should be well prepared with a note of all the tricky things and difficult questions and answers.

3.2   Attitudes & Expectations

Maintaining High standards in class in terms of attentions and concerns is the second most important thing. If it's a class session then it's the responsibility of the instructor so as to keep everybody inspired through out the class duration. The instructor should encourage active learning. And also he/she should make sure by asking repeated relevant questions that the students understand whatever he teaches. And if it is a lab session the instructor should give instructions at the beginning of the lab session. While giving instruction he/she should emphasize all important points and also he should cover all the technical concepts lying under the experiment. *Author2* has an experience regarding this. In his lab session while he gives instructions at the beginning of each class, many of the students don't pay attention and don't listen. But while doing the experiments those students face problem and ask the same question which the instructor has already explained at the beginning. The instructor faces the same question or doubt lot of times from the students. So to avoid this type of dilemma in class, we suggest that the instructor should announce at the beginning of the class that he is not going to attend the same doubts of students what he already has taught at the beginning. This would make sure that everybody listens at the beginning. Also we suggest that the instructor should encourage active participation from all of the students at the beginning session of discussion by asking questions and rewarding *cookies*.

3.3   Developing and Distributing Teaching Expertise

Teaching is always a noble profession. The feeling of explaining students a difficult thing or a concept is indescribable. Best teaching methodologies involves frequent unusual pauses, surrendering before students, good blackboard work, Eye contact, clarity of voices etc etc. Also relating lessons to practical world and giving a lot of real life examples help students to learn better. It's always a best part of the teaching to give scopes to students to say and participate. *Author1* has an experience regarding this. She teaches and leads a discussion section which needs a lot of chalkboard work. She used to write very quickly on the blackboard, and then began explaining what she had just written without pausing. Students either choose to copy the notes from the board, missing what she says, or only copy important points from the board (sometimes nothing at all) and listen to her. Neither is good, since both involve lots of information, in written and in spoken form. From students' feedback, she noticed that this is a significant problem and can be solved in a

better way. Though her strategy is not unique or innovative, it does seem to be effective. She creates a handout filled with excruciating detail containing almost everything she would say during the course of a discussion section. With her handout confidently in hand, now students are able to listen (and understand) the explanations what she gives rather than spending the whole time catching up with what has been written. Also she got a positive feedback from the students regarding distributing the handouts in the class. It helps students!

3.4   Tight focus on curriculum, Assessment and instruction

While teaching in a class or while handling a lab session and giving instructions at the beginning of the lab, the instructor should always remember the importance of time. In a class session he/she should keep in mind what portion exactly he wants to finish by the end of the class time. That would give him/her a fair idea up to what extent he/she can attend the questions of students and allow active participation. Participation is always welcome from students but it should be of interest to all of them. Any out irrelevant question can be taken by the instructor offline. In lab session the instructor should give more emphasis on time distribution. He/she should give a time line for each activity of a particular lab session and he/she should encourage students to stick to that time schedule. *Author2* has an experience on this. In his lab some students come very late and they don't care for the instructions given at the beginning of each class. Even they don't finish the lab in time. So to avoid all the late turn ins from students the instructor should take some measurable steps. *"Late comers must bring cookie for the whole class", "Extra credit for regular attendance of the lab"* may resolve this kind of issue. He is planning to adopt these two formulae in his oncoming classes.

3.5   Use of Instructional resource

Often students get confused about how to use all the available resources properly and effectively. So while teaching in the class or giving instructions at the lab sessions, the instructor should give sufficient pointers to all instructional resources. It should include the name of the text book, name of all reference books, all related WebPages and well written handouts if any. Also the instructor should provide a chart on using these resources. This chart should be a strategic resource management plan which would help students to know where to find what. *Author2* has an experience on this. While he was in his undergraduate, one of his mathematics professors was teaching very well but the professor never told his students the resources he was using. Professor was not cooperative and he didn't want anybody to share the material what he had been teaching. This led the author and his colleagues in the same class a lot of problem as because they couldn't find sufficient resources to study for the finals and all of them did badly in the paper.

3.6   Leadership

Leadership is the most important quality of an instructor in the class. The first quality of a good leader is his/her voice. So if an instructor has a command over his/her voice while explaining something that would give students a fair idea whether the instructor has in-depth knowledge on the topic. Handling embarrassing situations in the class or in the lab is the second most leadership quality of an instructor. The most embarrassed situations may be something like failure to answer some difficult questions before the class, or making a flopped joke or being funny by students etc. Also sometimes in lab sessions it requires to make groups of students to work together. And also it requires sharing the electronic circuit components in the lab session. So tackling all these problems in class doesn't require much skill but it requires some sort of leadership of the instructor. He/she should lead them in the right way and also inspire them to cooperate with each other. The cooperation shouldn't encourage any kind of malpractice. *Author2 and Author3* have some experiences regarding this. In their current teaching classes, often students need to share the lab components with each other and all of them need to work in groups of two persons. So sometimes it becomes difficult for them to manage all the groups with limited number of lab components. Still they manage well by their virtue of leadership and by their experience. They know that a group doesn't require the components all the time. A

group requires the components only to test its final outcome of the programming. So the authors allocate the components to the groups based on the time the groups finish their programming.

3.7   Learning from Students

Somebody says, "A student is the best teacher of a teacher" [1]. That's true! A teacher's knowledge will almost be constant if he/she doesn't teach anymore. If he/she teaches he/she tries to prepare so that he/she learns more. So students help in the learning process of a teacher. Also Learning from students directly is a great thing to do. But an instructor should move beyond his/her ego and should always be in a position to welcome any new ideas or any simplified explanations to any complex concepts by the students. In a class or in a lab the instructor should utilize the knowledge of good students for the shake of a weak student.

4.   Conclusion

In this paper we have analyzed our current problems in teaching and we have analyzed the possible ways to handle these problems. We have come out with seven categories of effective methods of teaching. We have mapped our experiences into each of this category and proposed some solutions to all our problems. Some of the proposed solutions have already been tested by us and by our students. Students gave good feedback regarding those solutions. Other solutions will be adopted by us in the times ahead. So from this paper we got to know the good practice in undergraduate education lies on encouraging contact between students and instructor, developing reciprocity and encouraging cooperation among students, encouraging active learning, giving prompt feedback, emphasizing time on task, communicating high expectations, and respecting diverse talents and ways of learning. We expect to use all the skills we learned in this paper to improve our teaching in the future.

References

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[3]   http://www.nmsl.cs.ucsb.edu/~srollins/teachingstatement.html

[4]   http://www.cs.berkeley.edu/~ddgarcia/teaching/effectiveness.html

[5]   http://honolulu.hawaii.edu/intranet/committees/FacDevCom/guidebk/teachtip/teachtip.htm