

Seven Traits of a Highly Effective Engineering Educator

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Abstract

This paper enumerates and illustrates the seven traits of a highly effective engineering educator. These traits include - being organized, understanding the importance of the first day of class, using teaching tools effectively, being compassionate, giving rapid feedback, asking questions, and having high expectations.

Introduction

To become a better basketball player, you may attend camps, practice and play competitive games. However, knowing the traits of players like Michael Jordan has its own unique place in learning to become a better basketball player. In the same spirit, this paper presents seven traits of a highly effective engineering educator.

In 1987, the Education Commission of the States and the American Association of Higher Education co-sponsored the work – “Seven Principles for Good Practice in Undergraduate Education”¹. This work, supported by extensive research and experience, came up with guidelines for faculty, students and administrators for improving undergraduate teaching and learning.

In the 1990s – “Seven Habits of Highly Effective People”² and “Emotional Intelligence”³ became best sellers in the personal growth segment. These books and other similar ones shifted the prevailing paradigm from efficiency to effectiveness and from prestige to self-contentment.

This paper is a synergy of the above three works, personal experiences, teaching enhancement seminars, and many discussions (some passionate) I have had with my engineering peers at the University of South Florida and at other universities around the nation.

To keep this article readable, I call the effective educator - **Efed**. I refer to Efed also as ‘he’ (the author does recognize that engineering has a deep-rooted challenge to bring gender

diversity and opportunity to its profession) for the sole purpose of keeping the article readable.

The seven traits

1. Efed is organized

Efed asks himself before every class, “Do I know what topics I will cover in my class? Do I have an outline? Am I beginning with an end in my mind? Have I marked my lecture notes so that I do not fumble around to find them during the class? Am I going to assign homework in that class? To invoke a class discussion, do I know what questions I am going to ask students during the class? Do I have usable dry markers in my pocket or am I going to use the dried out ones available in the classroom!”

Efed clearly explains the expectations and the goals of the course, and their relation to the overall curriculum and education of the student. Since he has spent time and effort in developing the course handout, it clearly includes test dates and make-up policy, grading components and their weightage, teaching assistant information, generous office hours, objectives and outcomes of the course, homework assignments, course schedule, and assigned page numbers from the book. All policies are fair, and there are no surprises during the semester.

2. Efed understands the importance of first day of class

First impressions last a whole semester. Often, Efed sees his peers excusing the first day of class right after taking the attendance and passing their one-page course handout. However, for Efed, it is the most crucial day of the semester. After taking the attendance, he remembers as many names possible and before giving the handout, asks students, “When you signed up for this class, what did you expect from this class?” Many will give him “that” look which says, “Is it not what we are here to know?” Efed asks them then, “Do you go to a movie and not know anything about the movie except its name?”

As the students open up with their thoughts about the course, Efed clears any rumors heard from former students. He dispels myths that they may have already developed about the course and its pre-requisites. He answers statements like “I am never going to use this course” carefully and passionately, but without unnecessary emotion.

3. Efed uses teaching tools effectively

No matter how many times Efed teaches the same course, he keeps on improving his teaching methods to make him more effective. Efed continually learns new ways of teaching via new textbooks, continuing education classes, education articles, and new multimedia resources.

Nowadays, there are many tools available to Efed to make teaching effective. These include multimedia presentation software, videos, Internet, mathematical packages, and interactive educational software. He uses these tools only when it improves the understanding of the course material. He does not abuse the modern technologies such as Power Point to cover a huge amount of material, or even worse, show page after page of the textbook through presentation viewers.

The number of waking hours has not changed for either Efed or his students. Hence, he does not supplement but complement the course with new tools. For example, if he wants to assign projects in a course, he knows whether use of tools such as mathematical packages compensates for the extra effort. Otherwise, expectations may turn unrealistic and turn off the students from learning.

Efed recognizes that old teaching tools are still effective - whether it is using the chalkboard to derive a formula and punctuating the derivation effectively with underlying principles from previous courses, or it is maintaining eye contact with the students. A recent speaker at our school said, "In my Advanced Fluids course, I never saw my instructor for whole semester." Shocked by his remark, he quickly added, "He was always facing the blackboard."

Most students want to relate their classroom experience to the industrial world. If they do not see the connection, it is hard for them to be motivated. Efed does not hesitate to call the alumni and ask them how they have used the course in the workplace. These queries bring contemporary real-life examples into the classroom. In many metropolitan universities, students themselves can be a resource of these real-life examples. This is because many of them are working part-time as an intern or in co-operative education programs in engineering companies.

4. Efed is compassionate

Efed believes in his students. He shows respect for students by not only treating them as unique individuals, but also through his preparedness for the class. Efed always asks himself how he can improve the students' understanding of the concepts.

Efed respects the time of his students by coming to class on time and by stopping lecturing at the scheduled time. Nothing is more annoying to a student if a teacher habitually comes late to class or rushes through the material at the end, while he use class time to tell his long "war stories". In fact, coming early to class opens informal discussions with the students. It also lets students pause their troubles.

Efed gives full attention to the students who have problems in the course. Although many of the cases are not emergencies, a few deserve Efed's full attention. Once, I had a student who wanted to withdraw from my course in the last month of the semester. Years ago, I may have answered with a categorical 'No'. But now, I wanted to understand him. I learned that he had cancer, and chemotherapy was wearing him down. Fortunately, his cancer went into full remission and in the following semester, he made an "A" in the course. Efed gives the benefit of the doubt to the student. As he gains experience, Efed is able to distinguish between genuine and lame excuses.

For special and extreme cases those that stretch Efed's time or are beyond his capability of help, Efed does not hesitate to refer students to the campus career counseling services.

The contact with student during office hours is very important to Efed. It is an opportunity for teaching students how to learn on their own. Rather than just solving the problem

they have come to you with, he guides them to find the solution themselves. Yes, it takes more time to do so, but Efed is interested in effectiveness, not efficiency. Criticism, if warranted, is gentle and never directed toward the student.

During office hours, Efed can get the opportunity to recognize different learning styles of the students. Centuries ago, the teacher to student ratio was 1:1. Each style of learning was accounted for. In our current environment of teaching courses with hundreds of students, we can still account for different learning styles during office hours, class discussions, and in the grading policy. Grading that extends beyond quizzes and tests, to homework assignments, web-based quizzes, projects, writing assignments, class presentations and participation, reflective writing, and attendance can accommodate different learning styles.

Efed meets students outside the classroom in hallways, during cookouts, and by attending professional society meetings. It gives him a chance to learn about the students in an informal setting. Students are more inclined to ask questions about their career goals and share their life outside of school. Knowing them as a whole person, Efed can give better advice about their curriculum and career goals.

5. Efed gives rapid feedback

Efed returns graded assignments and tests in the next scheduled class period. Students quickly get an idea of where they stand, and make amends to understand future lectures. He uses modern technologies such as web-based tutorials that give immediate feedback to the student.

6. Efed asks questions

On average, an instructor waits ten seconds or less before they answer their own question. Efed waits a little longer to make the students uncomfortable enough to ask questions. There is no better way than this to start a discussion. It is an opportunity to understand what they are struggling with, and what myths they have started to develop.

It is also a way to appreciate the learning style differences of his students⁴. For example, many students are interested in knowing "how" to solve a problem. Instructors hope that the student would rather ask a "why" question as opposed to a "how" question because the how question is misconstrued as "How can I do well in the test?" However, these - "how" and "why" questions are the two main ways students learn⁵, and one way is not necessarily better than the other. The "how" student wants to dissect the topic, take it apart, and put it together, while the "why" student wants to talk it out and find some personal meaning to what he or she is learning.

The discussions in Efed's classroom do not just take place between the instructor and the student, but between the students themselves. Many times, Efed gives short in-class assignment to students to start an exchange of ideas between them. Yes, some of Efed's colleagues complain that there is not enough time to finish the course. However, Efed would rather have them gain an excellent knowledge of the most important and necessary material, instead of a mediocre understanding of a lot of material? Many times, he questions whether the material taught is

obsolete or even necessary. This itself creates more time for discussion in the classroom.

Also, to use classroom time more effectively, Efed asks students to learn parts of the course on their own. He then does not hesitate to ask questions on the self-learned material in the tests. His students gain an ownership of the material, develop confidence that they can learn new material on their own, and develop a habit of self-learning.

Efed encourages students to work in teams and study in groups for the tests. They then can learn from each other. He may even allow them to discuss homework assignments but not let them simply copy from each other. Again, new web-based technologies that generate unique homework assignments for each student can allow fostering of teamwork without sacrificing individual accountability.

7. Efed has high expectations

Mention that you have high expectations and many educators will call it an oxymoron. They perceive students are ill prepared in the first place. In fact, repeatedly, Efed finds that when students know that you are serious about their learning, and that high expectations are the norm for you, they will deliver. In fact, the high level of student performance no longer surprises Efed.

A word of caution - Efed's high expectations do not mean doubling the number of assignments and giving longer projects, but to make no compromises in meeting the objectives and goals of the course.

Conclusions

The seven traits of a highly effective engineering educator are discussed in this paper. The above is only a deliberate attempt to make us aware of what can make us an effective engineering educator. I know you see Efed in yourself, and there are many other traits you would like to include in the above list, as each course is different.

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Biography

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