Self-Teaching College Teaching
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Abstract
Preparing graduate students for a career in academia has become a substantial concern among college educators. A new professor must obtain funding, develop a research program and publish to be awarded tenure. Furthermore, effective teaching techniques should be acquired before embarking on a professorate position. While some schools have begun to develop programs to train their graduates for careers in academia, most college teaching programs in engineering are not well established or non-existent. For a graduate student to acquire the skills and knowledge to be able to begin an effective teaching career, he must rely on his own initiative because of the general lack of guidance in the school system. To aid academia-minded students, an initial guide for the motivated student to begin informal self-training in the art of college teaching is presented. Types of resources for teaching instruction as well as primary focal content for a basic self-taught program is explored. The outline of this process consists of course work and practicing of basic skills followed by a team teaching session. These suggestions are discussed in the context of a fledgling formal training program established by an educational institution. These topics will greatly enhance the next professor to advance his career goals.

Introduction
There has been a recent upsurge of importance placed on training the future professorate as evidenced by the existence of the NSF Engineering Coalitions Program, the growth of the ASEE, and the inauguration of university policies nationwide that support the instructional direction of doctorate programs. Despite this remarkable trend, many engineering doctoral students who wish to pursue an academic career may struggle to acquire formal training at their respective schools and must create a program for themselves. The problem seems to be pronounced in engineering where students are being educated for technical positions rather than academia. Wankat and Oreovicz\(^1\) recognized this void and created a text for engineers to learn to teach. This article should provide any professorial candidate a starting point for a self-guided training program to learn about teaching at the college level and Wankat's text exemplifies a logical follow-up. The ideas combine the common experiences of the authors during their own struggle to learn to teach. The paradigms are by no means complete, but represent a cross section of information that has been most useful during the learning process.

This suggested program strives to fulfill three primary goals outlined below, that should be met as a prerequisite to becoming a college professor. The guidelines are general enough to provide university and college administrators an outline of a college instruction training program. Furthermore, the guidelines are
specific enough to enable a student to build his/her own program of study. Briefly, the three goals consist of gaining formal academic training, practicing this new knowledge, and finally team teaching.

The Program

1. Courses and Seminars

- First and foremost, the student should enroll in a class designed for college teaching. Primary focus should include learning about learners, motivating students, and effective teaching as well as the mechanics of structuring classes.
- Supplemental classes are encouraged for engineers to learn about the issues faced that are specific to them. Methods of these classes focus primarily on classical lecturing techniques and do not explore the psychology of teaching and learning.
- GTA training seminars are offered by the most schools on a university level as well as a college of engineering level. These short courses can provide some introductory information about conducting classes.
- Another source of training and instruction is seminars conducted by the graduate school departments and other university agencies concerned with the development of their students into professors.

2. Practice of Skills

- Working as a grader can build appreciation for the mundane (sometimes menial) work that goes into being a teacher. It is preferred that the student also log some instructional or classroom time.
- A GTA lecturing position is an excellent vehicle for learning to talk in front of a class where the lecture has been previously planned.
- Most students should be given the opportunity to substitute teach a lecture for their professor. The professor and student should work out how much control or freedom the student should have in designing the lecture.

3. Actual Teaching Experience

- The previous two overall goals of the program are considered a prerequisite to this final stage of development.
- At this point in the program, students will enter into a year long teaching experience with a mentoring professor. The initial semester should be “team taught” where the student and professor make decisions jointly guided primarily by the professor. The second semester would be directed primarily by the student with intervention by the professor only when necessary.
- If possible, the student should be awarded an instructorship position where he/she can demonstrate the culmination of positive training to be a teacher.
Courses and Seminars

The initial stage of the program outlines methods for a student to obtain formal training. By far the most crucial item in this list is a class that involves the psychological discovery of learning. The importance of the class can be viewed from three perspectives. The first benefit belongs to the participant of the class. By exploring how people learn, the student will establish a basis on which to build his teaching style and will acquire the tools to effectively teach at the college level. The second, a direct consequence of the first, allows the university to satisfy its obligation of placing qualified teachers in their classes. Finally, the college of engineering can use the class to identify those students who are genuinely interested in pursuing an academic career.

As previously mentioned, the class work should include the psychology of learning and methods to enhance the learning process. McKeachie, perhaps the foremost pioneer in the field of cognitive learning, describes this complex phenomenon and develops methods to enhance learning through appropriate teaching techniques. The class should include many of the more common ideas of learning such as those expressed by McKeachie. For example, some of the more basic principles surround the idea of “framework”. Prior knowledge is viewed as a framework, and new knowledge builds on this framework. Likewise Bloom’s Taxonomy is another basic principle dealing with levels of learning. In addition to learning these concepts the student should learn to recognize the ideas and implement new teaching techniques that emphasize how people learn. These illustrations exemplify the need for the type of class discussed. In a self-fulfilling way, the class can provide a “framework” to which the student builds his teaching style with proper justification of that style.

Conceivably, this highly recommended step in the training portion of the program maybe difficult to obtain. Fortunately for most engineering colleges, there is usually a college of education within the university structure that provides such course work. In the event that no such course exists within the university, it is suggested that an inter-disciplinary class be established for all students. Similarly, the student instructor is advised to seek this training from any source available as it is crucial to the development of a new teacher.

Practicing of Skills

It has often been said that there is no substitute for experience. And so should the student teacher obtain some experience before being thrust into a class. There is one looming caveat. How can someone get experience before they teach, without teaching? Fortunately, the problem is one of level confusion. For example, specific GTA assignments can provide portions of the overall experience without requiring the student to teach. During an assistantship, the student can grade papers, then administer a lecture and monitor an exam. Furthermore, he/she can be exposed to some of the issues faced by teachers on a daily basis without being subjected to the stress and without having to make pivotal decisions. This experience can remove initial doubts and fears of teaching and lecturing to prepare the student for the most important stage in the program.

Team Teaching

Team teaching is the most valuable step in this process. The student should find a “mentor.” The mentoring relationship depends on compatible personalities, respect, should be mutually beneficial. A
mentor is a person who takes a novice under his or her wing. The Mentor can transfer valuable experience about the mechanics of a class, share insight in syllabus, lecture, and test preparation, and give constructive feedback. At the beginning of the team teaching experience, the mentor carries much of the responsibility for the class. As the protégé gains experience and confidence, the burden of work shifts and the mentor assumes a more advisory role. This is a great opportunity for the protégé to demonstrate what has been learned in courses and seminars on teaching and build on GTA experience.

Conclusions and Acknowledgements

This outline is the result of the common experience of the authors in their personal search for engineering teaching knowledge. Their advisors, Dr. Elaine Scott and Dr. Charlie Reinholtz, guided and supported their efforts in obtaining this formal training. The college instruction training program can be characterized by three stages of development. The first two incorporate a formal academic training program with a rudimentary practice of some teaching skills, and can be performed concurrently. The third stage is the team teaching experience where the role of the advisor becomes crucial.

References


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