Training Graduate Student Instructors Effectively:
The University of Michigan Model

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Introduction

Most of todays graduate student instructors (GSIs, a.k.a. "the TA") were undergraduates themselves a mere semester or two before. Can we say with confidence that these individuals are adequately prepared to teach their former peers and perhaps some-day take the place of their professors? We must look not only at how GSI training programs might improve the education of the instructed, but also of the instructor. The TAship is often seen as a sort of internship for those interested in possible academic careers. Therefore, the skills, behaviors, and attitudes developed during this training period will play a crucial role in defining their approach to teaching as faculty[1].

This paper strives to examine the nature of how GSIs develop into junior faculty, what an ideal training program might entail, and how the University of Michigan's College of Engineering has recently begun to address this issue. In writing this paper, it is the author's sincerest hope that administrators will see the value in a quality GSI training program, professors will see the obvious need to become involved, and students will realize how important such programs can be to their success as GSIs and potentially professors.

GSI training programs can have a profound impact on the entire university. It has been argued that training programs for new GSIs should emphasize the importance of teaching, encourage them to consider jobs in academia, and develop useful communication skills[2,3]. Furthermore, faculty who participate in such programs benefit by refreshing their own teaching skills and interest in teaching[2]. Compassionate, well-trained GSIs can also improve retention rates among undergraduate students. Tobias found that effective teachers have a strong effect on student retention rates in the sciences[4]. The idea then would be to match well-trained GSIs with incoming freshman, where the impact on retention would be the greatest.

And of course, GSI training programs improve the quality of education that undergraduates receive. In a recent survey at Cornell University, engineering students were asked to identify what factors were most discouraging to them during their studies. Of the 31 factors identified, uncaring professors/GSIs, poor quality of instruction, and

poor GSIs were ranked in the top six[5]. Clearly, students are aware when they are fortunate enough to have a "good" GSI or professor.

But what makes someone a "good" instructor? Feldman identified eight characteristics of good teaching[6]. These include:

- Concern for students
- Knowledge of subject matter
- Stimulation of interest
- Availability
- Encouragement of discussion
- Ability to explain topics clearly
- Enthusiasm
- Preparation

We must recognize that a well thought-out and proactive GSI training program can improve performance in many, if not all, of these categories.

GSI Development: A Review

Graduate students, like undergraduates, are undergoing an intense learning experience while they are in school. Most of us recognize this developmental process in their research activities, but we tend not to notice the development that occurs while they serve as GSIs. GSIs are constantly socializing themselves toward the role of teacher and researcher[1]. This section will provide a brief overview of the developmental process that GSIs undergo.

As they progress from new student to experienced student to Ph.D. candidate, graduate students are invariably changing how they think, behave, and reflect on their environment. This same process is occurring among students who are teaching. In fact, the two are closely interconnected. Sprague and Nyquist[7,8] have conducted much of the work on developmental processes in GSIs. They established three primary stages that GSIs pass through on their way to becoming potential professors: senior learner, colleague-in-training, and junior colleague.

At the senior learner stage, students have just recently become graduate students and are still striving to shed the identity of being an undergraduate student. They are generally more eager to learn than undergraduates, but so far they have only acted as learners[7]. As teachers, these students tend to identify closely with their pupils, but express a great deal of anxiety about their value and capabilities. And their repertoire of teaching techniques is usually limited to what they observed as undergraduates.

Colleagues-in-training tend to be more experienced GSIs, more confidant in their skills and open to explore other teaching styles and techniques[7]. At this stage, GSIs begin to adapt other teaching methods to their personal style and begin to see teaching as an enjoyable exercise. However, students at this stage, who have just recently become familiar with the technical language of their discipline, may overwhelm students at a

lower level. A negative reaction from students at this point could deter the GSI from continuing into the professorate.

The final stage is that of the junior colleague. Here the GSI's focus is on finding ways to improve the learning of the students they teach[7]. To progress further, the GSI will need opportunities to make professional judgments and experiment with new educational techniques.

Determining the developmental process stage of an individual GSI is not an easy task, but it can be made simpler by asking the following four questions developed by Sprague and Nyquist[8]:

- What are GSIs concerned about?
- How do they talk about their discipline?
- How do they relate to authority?
- How do they relate to their students?

How do they relate to their students?

What are GSIs concerned about?

The concerns of GSIs vary widely, but in general, they follow similar distinctions as the developmental process. At the senior learner stage, GSIs are concerned with "survival issues" (e.g. How will I dress? Will students like me? Am I able to teach this subject?). At this point GSI anxieties are at their highest. Students at the colleague-in-training juncture are more concerned with developing the appropriate skills (e.g. How do I grade papers? How do I organize a lecture?). Finally at the junior colleague stage, GSIs are more concerned with outcome assessment (e.g. Why aren't my students learning fracture mechanics? How can I motivate them to read the book?). A supervisor of GSIs could easily identify these concerns early in the semester with a simple questionnaire or informal discussion.

How do they talk about their discipline?

GSIs, like all graduate students, go through a period of learning the discipline's lingo and how to use it appropriately. Students in the senior learner stage tend not to understand the complexities of the topics they are discussing and have a limited grasp of the language. They are thought to be "pre-socialized" to the field[8]. But for the same reasons, these GSIs have an appeal to their students who are in a similar situation. At the colleague-in-training stage students are becoming more "socialized". Through their research they have become more focused on the language and ideas. However, these GSIs may now overwhelm their students with technical jargon and complex topics since they have not yet developed an ability to explain the topics in multiple ways. Junior colleagues not only see the complexities of the knowledge they are teaching, but also find innovative ways to explain it to others. At this stage, GSIs are "post-socialized". A proactive supervisor might opt to hold a seminar on presenting information differently to different audiences[8].

How do they relate to authority?

A student's response to authority can vary widely depending on who the authority figure is and in what capacity they serve. This range does not coincide as well with the three stages, but can be seen as a constantly changing spectrum of responses. In general though, graduate students evolve from being dependent upon rulebooks and supervisors, who must tell them how to do something, to independent educators.

How do they relate to their students?

Perhaps the most important aspect of a GSI's development is in his or her relationships with students. Here GSIs face a group of evaluators one-on-one. Success can bring confidence and excitement; while perceived failure can result in resentment and a lack of interest in teaching.

Early in their development, GSIs feel a close affinity to their students. There are many reasons for this including recent memory of life as an undergraduate, ease with people their own age and possibly familiarity with current culture and thinking[9].

As GSIs progress into the colleague-in-training stage, they become more detached from their students. They begin to see them as sources of feedback information that can be used to change and improve the class. GSIs may even begin to see possibilities for pedagogical experimentation at this stage. In the final, junior colleague, stage, GSIs see their students as "clients". They begin to concern themselves with how an educational technique might impact students and what their students' needs really are. It is important that at this stage GSIs do not lose the notion that they must still be able to relate to their students effectively.

Having identified the developmental process stage of a graduate student, what can the college, department and/or supervisor do about it? This is the topic for the next part of this paper.

A Model for GSI Training

Here I propose to indicate what I feel would make an ideal model for training GSIs at a large research institution. I do not purport to suggest that such a model would work everywhere, nor that it is even feasible everywhere given budgetary and time constraints. Rather it is a suggestion that should be adapted to meet the culture, resources, and interests of individual institutions.

Typical GSI training programs often include some form of presemester orientation workshop and/or occasional courses or seminars on theory, lab supervision, practice teaching, videotape critiques and help for international GSIs[2,10]. Few universities make a concerted effort to go beyond this point. GSIs indicate that they have the most difficulty with issues related to discipline strategies, grades, effective communication, adaptation to a foreign culture, and feelings of isolation[11]. Each of these items could be handled in a campus-wide training program. But as Sprague and Nyquist point out, a truly successful training program provides individual support to meet individual needs[8].

Thus, an ideal model for GSI training would include campus-wide initiatives, peer mentoring, and faculty supervision and mentoring. This three-pronged assault provides support in an individual as well as efficient way. And it offers students a non-threatening environment to develop from senior learner to junior colleague.

Campus and Departmental Programs

Campus-wide programs generally involve teaching easily generalized topics, such as teaching strategies and philosophies and communication skills[12,13]. These programs are extremely efficient and can be organized and run by trained professionals from a campus teaching center. However, they fall short where specific methodologies and course content must be discussed. And they are not always successful at addressing the professional development of GSIs within a specific discipline. A study at Central Michigan in 1991 found that most GSIs were mixed in their response to campus-wide training programs, but rated departmental programs highly[14]. In engineering specifically, another study found that 59% of GSIs spend their time in laboratories, raising important issues that campus-wide programs may not address[2]. Thus, departmental programs must be seen as an essential tool in combination with campus-wide activities.

Peer Mentoring

A network of mentoring individuals, both student and faculty, would support broad-scope programs in an ideal setting. GSIs will only consult professors in low-risk situations (e.g. how to grade the homework, whether to allow make-up exams). They tend to approach more experienced GSIs with high-risk questions (e.g. how a professor might react to a challenge of authority, how to teach an unfamiliar subject matter)[7]. This dynamic suggests that experienced GSIs are essential to the dissemination of information, policies, and ideas to their less experienced counterparts.

Furthermore, experienced GSIs as mentors have a calming effect on their colleagues. A University of Oklahoma study on GSIs teaching English found that the use of "peer consultants" significantly reduced GSI anxiety levels and enhanced teaching effectiveness[10]. The same study found no change in GSI anxiety among those students who did not take advantage of peer consulting, but were still involved in campus-wide training workshops and courses. Such findings make a very strong case for experienced GSI mentoring.

For such a system to work, GSI mentors must be given sufficient training and knowledge to fulfill their important duties. This is an excellent opportunity for campus-wide teaching centers to become involved in individual training initiatives by training mentors to serve inexperienced GSIs more effectively. Skills that could be taught to these GSIs include microteaching and video-critiquing techniques, classroom observation, and one-on-one discussion techniques[7].

Faculty Mentoring

Most development programs look only at new GSIs, and for this, there must be some form of faculty supervision within the department. But a truly ideal environment would

provide mentoring to GSIs during their entire tenure in graduate school. Faculty within the discipline have the best opportunity to provide this most important aspect of turning raw graduate students into potential educators.

Sprague and Nyquist have developed a model of the role of a faculty mentor based on their three stages of GSI development (senior learner, colleague-in-training, and junior colleague)[7]. With each of these stages, a successful faculty supervisor will tailor an approach to GSIs in different developmental stages. A campus-wide teaching center would become involved in training faculty mentors to observe, identify and respond to the stages of GSI development.

When GSIs are still in their senior learner stage, a faculty mentor must accept the role of manager. Their responsibility is to set minimum standards of performance for GSIs and make certain that all GSIs are aware of policies and procedures. These may be handled in a pre-semester workshop or orientation. The GSI might be asked to serve as a grader or hold office hours. The faculty mentor might evaluate the student's performance in this first teaching experience and provide feedback. They would also seek to promote an open and honest environment where GSIs can come to the faculty mentor with questions and concerns. All of these activities are aimed to alleviate the anxiety of first time GSIs, give them sound advice on handling their GSI role, and keep them moving toward becoming a colleague-in-training.

At this second stage of development, the faculty mentor would become a professional role model. GSIs are constantly taking in information about teaching from the professors they observe. The faculty mentor must serve as an effective model who not only demonstrates good teaching but also discusses the inner workings of the profession[7]. At this stage the GSI is taking on more responsibility, perhaps giving a lecture or two and leading their own discussion section. The faculty mentor must be sure to provide feedback at this stage by observing the GSIs teaching skills and holding regular workshops.

In the junior colleague stage the faculty mentor must become more hands-off and serve as a source of inspiration and encouragement for these talented GSIs to progress to academia. Here a GSI might be given sole responsibility for designing and leading a course. The faculty mentor should provide feedback on both the teaching skills and the professional decision making of the GSI. Plus they must open channels for a meaningful discussion of teaching issues that go beyond the mechanics of teaching.

Whether the faculty mentor is a single professor selected to provide this service to all GSIs in a department or a professor in charge of one or more GSIs for a single class depends on the culture and dynamics of the department. Regardless, such an effort should not be left solely to a single individual. All faculty within a department should take it upon themselves to develop their GSIs into professionals. Another professor interested in teaching might lead a weekly discussion on teaching issues. Likewise, each professor with a GSI might be made responsible for the performance of that GSI.

The ideal GSI training program can be seen as a goal which requires the involvement of the entire university community, including administrative support, campus-wide teaching

resource center input, departmental support, faculty mentoring and experienced graduate student involvement. The University of Michigan College of Engineering has been working to develop such a program in recent years. This system is described in the next section.

The University of Michigan Model

The GSI training program at the University of Michigan College of Engineering has been under development for the past three years. The structure outlined here is the result of this evolving process. The training program is organized into four distinct, yet inter-related, groups of individuals. These groups include the College of Engineering administration, consultants from the Center for Research on Learning and Teaching (CRLT), faculty coordinators, and graduate student mentors. For the sake of brevity, the next section merely outlines the responsibilities of each of these groups as seen from the perspective of the college administration[16].

College Administration

The administration is primarily interested in the general oversight of the GSI training program. They have little direct involvement with GSIs but wish to ensure that appropriate funding and resources are allocated to training programs. They also work to encourage the development of training programs within each department. The responsibilities of the administration are to:

- Provide overall framework and oversight for GSI training
- Develop budget
- Communicate with department chairs regarding faculty coordinator appointments and training schedules
- Act as point of contact for departments and CRLT consultant for general questions and requests
- Support collaboration between faculty coordinators, graduate student mentors and CRLT
- Create and maintain e-mail groups and handbooks for faculty coordinators and graduate student mentors

CRLT Consultants

CRLT is a university-wide office for the promotion of excellence in teaching and the development of innovative teaching methodologies. In this role, the office is called upon to provide GSI training to much of the university, including the College of Engineering. Within the engineering program, the responsibilities of the CRLT consultants are to:

- Design, plan and implement GSI orientation
- Implement workshops for international GSIs
- Provide sufficient training for graduate student mentors
- Meet regularly with graduate student mentors to provide consultation, support and resources

- Provide consultation services to faculty within engineering
- Serve as a resource for faculty coordinators

Faculty Coordinators

The faculty coordinators are individuals selected by the department chair who are expected to serve as a supervisor and mentor to GSIs within that department. Since each department is given a great deal of latitude in selecting and outlining the responsibilities of the faculty coordinator, there tends to be significant variation from department to department. In many cases, the faculty coordinator is also the graduate committee chair. In some instances, the coordinator only works with new GSIs and in others is responsible for all GSIs. In particularly large departments, staff may be available to help the coordinator supervise and administrate the training of new GSIs. In general, the responsibilities of these individuals are to:

- Communicate and enforce the expectation that new GSIs are required to participate in training
- Ensure that GSIs are compensated for training (a union requirement at the University of Michigan)
- Work with CRLT consultants to design and deliver the GSI orientation
- Coordinate and facilitate a departmental orientation for each semester outlining issues specific to the department
- Supervise and work closely with the graduate student mentor.
- Monitor the quality of GSI performance and determine if intervention is needed
- Encourage GSIs to obtain feedback on their teaching throughout the term
- Hold mid-term discussions with GSIs to address any potential problems
- Provide an end-of-year activity report including assessment of departmental training efforts and recommendations

Graduate Student Mentors

Graduate student mentors are experienced graduate students, usually selected by the faculty coordinator, who have shown a strong aptitude for teaching and are familiar with the department's specific policies and procedures. In general these individuals are volunteers and receive little, if any, compensation for their work. At the University of Michigan, two departments are so large (Electrical Engineering and Mechanical Engineering) that it was felt a full time graduate student mentor was needed. Therefore, the college administration agreed to provide a 35% appointment, including stipend and benefits, for a graduate student mentor from each of these departments. The responsibilities of the graduate student mentor are to:

- Assist in the design of the department training efforts
- Provide continued training, support, and guidance to new and experienced GSIs throughout the term
- Serve as a liaison between GSIs and department administration

- Initiate and maintain an archive of information to help guide future graduate student mentors
- Work closely with the faculty coordinators in supporting the GSIs and strengthening the training program
- Provide an end-of-year activity report in conjunction with faculty coordinator

Clearly, this training program has a heavier emphasis on training new GSIs rather than mentoring those GSIs who might be in the colleague-in-training or junior colleague stage of their development. This additional step could, and perhaps will, be made by having the faculty coordinators provide more of a mentoring role to experienced GSIs as described above. In some sense, this system does provide for experienced GSIs in that those who are interested in teaching can become graduate student mentors.

Conclusion

At the University of Michigan, a GSI training program has been instituted which incorporates a strategy of providing support for GSIs from four different areas. The college administration provides both financial and administrative support to the overall training program. A university-wide teaching center organizes a college-wide, engineering-specific training program and provides consultation services to others involved in the program. Faculty coordinators work at the departmental level to establish clear criteria of performance for GSIs and to resolve individual problems as they arise. Finally, graduate student mentors serve as non-threatening resources for information on policy and procedure, evaluators of GSI performance, and providers of effective feedback.

Regardless of the model used for a GSI training program, it is essential that the developmental stages of GSIs be kept in mind. The GSI's stage of development has a profound impact on the effectiveness of a particular type of training. While this may seem like a daunting task, training GSIs is essential. If, in the future, we are to continue to make improvements in teaching, we must start with the GSIs of today.

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