Experiences of Graduate Student Mentors Mentoring Graduate Student Instructors

Timothy M. Hancock, John W. Norton Jr.

University of Michigan, Ann Arbor, Michigan

Abstract

This paper describes the graduate student mentor (GSM) program at the University of Michigan College of Engineering. The GSM program is an innovative way to enhance the quality of the instruction provided by the graduate students in their paid instructional roles. Graduate students who teach, called graduate student instructors (GSIs), go through an orientation at the beginning of their first semester of instruction. The GSM program complements the orientation and training that the GSI receives by providing mentoring and support throughout each semester that the GSI teaches. This paper will elaborate on the details of the GSM program at the University of Michigan College of Engineering from a mentor's point of view and will provide some examples of typical GSM/GSI interactions. In addition survey data from GSIs will be presented to characterize the overall effectiveness of the GSM program.

1   Introduction

The Chronicle of Higher Education has reported that many colleges are making efforts to better prepare their graduate students to teach in the classroom[1]. These efforts are generally focused on instructional programs which provide Ph.D. students with pedagogical knowledge[2]. In addition to formal training programs, it has been proposed that faculty mentoring of graduate students can be an effective way to provide graduate students with feedback about their teaching[3]. Although faculty mentoring can be an invaluable resource for graduate students, this can be logistically difficult to implement for all graduate students that will be teaching in the classroom or laboratory. The logistics problem of organizing faculty to formally mentor GSIs at the department or college level is circumvented at the University of Michigan College of Engineering (CoE) by providing GSIs with mentoring services from a small pool of senior graduate students that have teaching experience and are interested in the scholarship of teaching and learning.

Graduate student instructors (GSIs) are an important component of the CoE teaching staff. There are 318 faculty, including assistant, associate and full professors, as well as 62 non-tenure track instructors. An average of 215 GSIs supplement the instructional faculty each term, along with an untold number of graders. The duties of a GSI are varied and range from leading

discussion and laboratory sections to holding office hours. In many instances the GSI spends more time with the students than the primary instructor, making the GSI very influential in the students' learning. Because the GSIs are a valuable resource for the CoE, it is necessary to ensure that the GSIs are properly trained and mentored. However, the high GSI turnover rate confounds these training objectives – on average, 49% of the GSIs are teaching for the first time (Figure 1). Because of this high turnover rate, when a graduate student receives a GSI appointment, it is usually their first exposure to teaching.
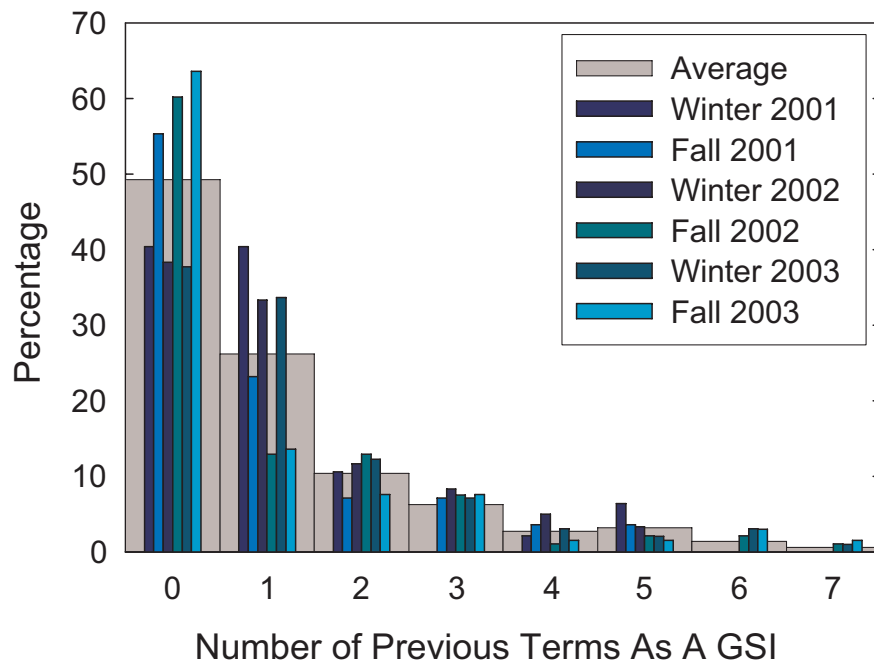

Figure 1: On average, 49% of the GSIs each semester are teaching for the first time at the University of Michigan College of Engineering.

2   What is a GSM?

The GSMs are coordinated by the University of Michigan Center for Research on Learning and Teaching (CRLT) and hired by the CoE. The GSMs are current graduate students that are already receiving their primary funding as a GSI or research assistant (RA). The office of the Associate Dean of Graduate Education provides the GSMs with a 10% appointment corresponding to an average of an additional 4 hours per week. The program logistics are managed by CRLT staff and do not require direct faculty involvement for the program to be successful. There are usually 10 to 12 CoE GSMs who are jointly coordinated by a GSM coordinator, usually a former senior GSM, and an instructional consultant from CRLT. The GSMs all have at least one semester of teaching experience and in many cases have been nominated for or won teaching awards for their teaching. Once hired, GSMs are given additional training by CRLT. This training covers such topics as working with GSIs, observing classrooms, collecting and providing feedback. In addition, many of the GSMs have completed an advanced teaching course offered at the University of Michigan. The graduate level course, *Teaching Engineering,* is taught by Dr. Susan Montgomery and covers a variety of pedagogical issues.

The CoE uses a college-wide GSI training and orientation program that is coordinated by CRLT. The training consists of two plenaries, two practice teaching sessions and several concurrent sessions. Many of the concurrent sessions are designed and are facilitated by the GSMs. The concurrent sessions for the fall 2003 orientation were as follows:

- Preparing for a Section
- Delivery of a Section
- Teaching Problem Solving Skills
- Grading Issues
- Office Hours Issues
- Bridging Cultures in UM Classrooms

In addition to the concurrent sessions, the GSMs also facilitate many of the practice teaching sessions where students are given the opportunity to give a short explanation and receive feedback from the GSM and their peers.

At the beginning of the semester, all of the GSIs are assigned to a GSM. This results in each GSM being responsible for between 20 and 30 GSIs which they mentor throughout the semester. The GSM mentoring process includes email, phone, and personal contact, and involves many dimensions of the classroom experience, including providing general information, problem solving, quality analysis and feedback. The GSMs also meet twice a month to discuss problems and issues that arise. These meetings usually have an instructional theme such as providing feedback, dealing with classroom cheating, holding office hours, etc. The GSM meetings also provide a forum to discuss more detailed classroom problems that a GSI may have presented to their GSM. This forum allows a number of potential scenarios and solutions to be developed and discussed, which allows the GSM to present a number of well thought out responses back to the GSI who originated the problem.

The GSMs also send emails to their GSIs that may contain teaching tips, web links to teaching resources or information about upcoming teaching-related seminars. These emails may include information about on-campus programs and seminars, teaching-oriented information emails from groups such as the "Tomorrow's Professor" list-serv, and information about various teaching-related web and hard-copy information sources.

Finally, the GSMs are available for one-on-one consultations to talk about any problems or ideas relating to the GSIs' teaching, their students or their primary instructor. The GSIs often raise interesting issues with the GSMs. In between their bi-monthly meetings, the GSMs use an email group to discuss these various issues and to elicit potential solutions to these problems. These consultations are a confidential service and nothing is ever reported to the college, department or faculty. Occasionally GSMs are asked by a GSI to intervene on their behalf, usually in the form of a verification of GSI's teaching ability to a departmental authority, although this is fairly unusual.

As the middle of the semester approaches, the GSMs advertise to their GSIs that they are available to conduct an observation and/or midterm student feedback (MSF). MSFs are mechanisms to provide feedback to the GSIs in the middle of their teaching assignments so they

may be able to improve their teaching practices. The MSF usually consists of the GSM attending the discussion section or laboratory and observing and recording details of the student/teacher interaction. Then the GSI leaves the room and student feedback is elicited, either in the form of a "class interview" or response cards of various sorts (Figure 2). The GSM compiles the review in aggregate form, usually typed up as a letter or report, and has a meeting with the GSI to discuss their strengths and possible areas of improvement. Considerable effort is made to ensure that all of these activities are confidential for the GSI. The GSI is free to make good reviews available to departmental superiors or use them in teaching-related portfolios.

Center for Research on Learning and Teaching (CRLT)

Midterm Student Feedback Form

In your small group, please discuss both strengths and suggested changes. Write down items/topics about which there is agreement among a majority of group members. If there is strong dissenting opinion, please make note of it.

I. List the major strengths of the course (what is helping you learn in the course?). Please explain briefly or give an example for each strength.

Number of people in group_____

Strengths	**Explanation/Example**
1.	
2.	
3.	
4.	
5.	

II. List changes that could be made in the course to assist you in learning. Please give specific examples and possible suggestions for improvement.

Areas that need improvement **(Please explain or give an example)**	**Possible Suggestions**
1.	
2.	
3.	
4.	
5.	

Figure 2: Example of Midterm Student Feedback Form

As a quality control measure, GSIs who had an MSF receive an end-of-semester survey from CRLT through email regarding the MSF they received. An example of the survey is shown in Figure 3 and provides valuable feedback to the GSM. Mid-semester feedbacks are voluntary on the part of the GSIs and there is no departmental or college requirement to have MSFs. However, the authors believe that it would be beneficial for the GSIs and students if it was mandatory for all first semester GSIs to receive mid-semester feedback. This would require providing individualized feedback for as many as 50-100 instructors per semester and is not feasible from a staffing point of view at this time. A more detailed description of the GSI orientation and GSM program at the University of Michigan in the CoE is available in O'Neal and Karlin[4].

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1. **Was the GSM effective in implementing the process and discussing the feedback?**

   _____ Yes   _____ No

2. **Overall, did you feel the service was valuable? If not, please explain.**

   _____ Yes   _____ No

3. **If you felt the service was valuable, what made it so (check all that apply)?**

   _____   It enabled me to discuss my teaching with a consultant
   _____   It confirmed assumptions I had about my teaching/my students
   _____   It gave me new insights into my teaching/my students
   _____   It gave me specific strategies to improve my teaching/course
   _____   The atmosphere in my class improved as a result of the service
   _____   It gave me more confidence in my teaching
   _____   It made me aware of resources and programs relevant to my teaching
   _____   Students appreciated the process
   _____   Other:

4. **Did you make any changes in your course/teaching this term as a result of this service? Please Explain.**

   _____ Yes   _____ No

5. **Do you plan to make changes in future terms as a result of the service? Please Explain.**

   _____ Yes   _____ No

6. **Would you recommend use of this service for colleagues in your department? Why or why not?**

   _____ Yes   _____ No

7. **Additional Comments**

Figure 3: Example of email survey sent to GSI after the GSM completes a midterm student feedback (MSF). This provides valuable feedback to the GSM to make improvements to their mentoring.

3   How the GSM program benefits the GSI

The GSM provides a valuable service to the GSI because they are mentors rather than critics. The GSMs go to great lengths to encourage the positive components of the GSI's teaching abilities, and to avoid censuring GSI performance. The GSM is a guide for the GSI as they embark upon a new experience since in many cases it is the GSI's first time teaching. In the authors' opinion, program success depends upon using mentors from the GSI's peer group. Peer-level GSMs are achieved by selecting GSMs who are also engineering students, and in many instances are from the same department as the GSI. Because the GSMs are responsible for a

relatively small number of GSIs, it is possible for the GSM to develop personal relationships with the GSIs, which also helps develop contact on a more regular basis.

The general GSM duties are to answer simple questions and provide guidance concerning common teaching and classroom issues that arise. These questions are effectively addressed by the GSM because they are experienced GSIs and may have addressed the same issue in their own teaching. In addition to their own experiences, each GSM has the benefit of the collective experience of the other GSMs, which allows each GSM to be able to address a larger breadth of issues than they would otherwise considering only their own experiences.

4   How the GSM program benefits the GSM

In addition to being a resource for the GSI, the GSM program allows the GSM to learn and grow as an educator. In many cases, the graduate students that are accepted into the GSM program have aspirations to teach at the college level. At research-oriented universities, especially in engineering programs, graduate students principally focus on research. Hence the GSM program benefits the GSMs because it allows them to stay involved with teaching while progressing with their technical research. After only one or two formal GSI appointments early in their graduate career, a graduate student in the GSM program can focus on their doctoral research but continue to develop as a teacher by spending an average of four hours per week working as a GSM. This allows the GSM to continue to learn about the scholarship of learning and teaching through their interaction with the Center for Research on Learning and Teaching (CRLT).

The GSMs also benefit from round table discussions at their bi-monthly meetings. These discussions contribute to the GSMs' breadth of teaching experiences. Also, through the interaction with the GSIs, the GSMs are exposed to situations that may not have come up in their own teaching. These situations compel the GSMs to consider educational methods that appropriately respond to various situations and that can improve student learning under a variety of situations. Overall the GSM program is a great opportunity for the graduate students who are selected to participate in it because they are able to provide a valuable service to the college of engineering while making themselves more attractive as future faculty candidates.

5   Examples of GSM/GSI Interaction

Throughout the term GSIs present GSMs with any number issues, some very minor, while others very serious. The following sections describe typical interactions that a GSM may have with a GSI.

5.1   Pedagogical issues

Both new and experienced GSIs encounter various teaching and classroom problems that they would like to address. These problems include inattentive or late students, questions regarding how to grade or provide feedback on homework, and similar items. One question that that GSIs consistently go to their GSM about is what to do about students who do not participate in discussion.

The class was an introductory course on computer programming, and had a large fraction of students who were taking the course to meet degree requirements. The GSI, a senior in electrical engineering, was a very capable programmer and was interested in eventually pursuing a faculty position. However, he was concerned that he was not "reaching" his students. The GSM performed a classroom observation, sitting quietly in the back of the room, taking notes throughout the class session. About 10 minutes before the end of class, the GSI introduced the GSM to the class, and then left the room so that the GSM could interview the class. The GSM had a series of questions to ask the class, and was able to engage the class in a candid review of both the positive and negative aspects of the GSI's teaching methods. Almost all of the students actively participated in the give and take of the questioning period. The observation and interview were very informative, and both revealed a number of specific actions the GSI could use to improve his teaching effectiveness, but also provided positive feedback to bolster the GSI's own confidence. Later that day, the GSM and GSI met to discuss the MSF. Among the suggestions were to speak louder and with more confidence, and to have a longer question and answer period during the end of each class. However, the MSF confirmed the GSI's successful use of email to contact the class, and class's high regard for his programming abilities and classroom content.

It has been well researched that an active learning environment will benefit the students and this is typically made clear to the GSIs during their training sessions at the beginning of their first semester of teaching. Some GSIs have no say in the content or structure of the discussion section as it has already been planned out by the primary instructor of the course. However, in many cases, a GSI has some freedom in the format of his or her discussion section. Perhaps the GSI starts out the semester by re-presenting the material from the lecture and quickly finds that they are simply repeating the lecture and students seem uninterested. Although the GSI has heard of active learning at orientation, they may not be sure what it is or how to implement it in their classroom. This is where they may approach their GSM for help.

The GSI had been assisting in the course for several semesters, but seemed to be "losing" the students during various periods of the weekly small group discussion. He felt that the students were getting bored or uninterested in the class. The GSI contacted the GSM to perform a mid-semester feedback with specific focus on his teaching methods, and to obtain feedback from the students regarding their apparent boredom. The GSM performed a class observation, and then, after the GSI left the classroom, solicited student feedback. The GSM was able to determine that the class was generally happy with the instruction, but had a large number of students who had heavy class loads on the day of the small group discussion and were tired as a result. The GSM also verified the GSI was teaching in a generally effective fashion for a normal class, and presented several suggestions to motivate and improve the classroom atmosphere. The feedback increased the GSI's confidence and provided information to dramatically improve the classroom dynamic.

The GSMs have numerous resources at their disposal. If it is early in the semester, the GSM may recommend that the GSI attend a seminar presented by CRLT. Typically there are 8-10 educational seminars per semester, with one or more addressing some aspect of active learning in the classroom. In addition to the seminars, the GSM may draw on their own experiences or refer to a teaching resource such as *McKeachies's Teaching Tips*[5] to provide the GSI with ideas. Finally the GSM would most likely offer to the GSI to perform a midterm student feedback (MSF) to provide the GSI with specific data to determine if the changes that were made are benefiting the student. Depending upon GSI interest, over the course of the semester the GSI can help improve his or her students' learning by working with the GSM to evaluate and then modify his or her teaching.

5.2   Interpersonal issues

Because they are graduate students, GSIs are often in a transitional peer group. They are no longer inexperienced undergraduate students but they are not yet competent researchers and educators. Typically, undergraduate students and professors are not in the same peer group. On the other hand, graduate students may identify with both groups because they are transitioning between them. Such transitioning may occasionally put a GSI in a difficult situation. Perhaps the professor, as primary instructor for a course, has made a decision that appears unfair to the students. The students may seek out the GSI to vent their frustration about the professor and the GSI can respond in several ways.

The GSI may contact their GSM to discuss the appropriate approach to this situation. From the standpoint of a student, the GSI can understand the students' frustration and would not be pleased with the professor's decision if they were a student in the class. However as an instructor the GSI can see the motivation of the professor but does not want to risk being perceived as a "bad guy" by the students. Often a situation like this is easily resolved by the GSI simply talking to their GSM. Other scenarios also concern GSI/GSI and GSI/GSI/instructor interactions.

> *The GSI had been with the course for several semesters, and had helped the professor write some of the curriculum. However, the course had two GSIs, and the other GSI, new that semester, was very willing to let the experienced GSI do most of the class coordination, grading and such. The experienced GSI didn't want to confront the professor over the issue, but was annoyed about the issue. The experienced GSI contacted the GSM to vent about the situation and to discuss possible remedies. The GSM brought this up with the other GSMs via email and was able to quickly obtain several possible alternatives to bring with him when they met. Alternatives discussed included tracking hours, tracking responsibilities, and/or polite email overtures to both the other GSI and the professor to discuss the issue. The GSI/GSM meeting allowed the GSI to vent his frustration, let the GSM sympathetically listen, and then allowed them both to discuss alternatives. As it turned out, neither the other GSI nor the professor were even aware of the experienced GSI's frustrations, and the GSI was able to make several suggestions which were accepted.*

As a mentor, the GSM can be an objective third party removed from the situation. It may be necessary only for the GSM to listen to the GSI as they confidentially vent to someone without the consequences of student or professor repercussions. In addition to informing the GSIs about learning and teaching, the GSM can be a resource for non-pedagogical problems the GSI might encounter in the classroom.

6 Effectiveness of the GSM program

Survey data is used to evaluate the effectiveness of the GSM program. The survey is administered to all of the GSIs in the CoE at the completion of the semester. Before the fall 2002 semester, the survey was done on paper and administered via campus mail, resulting in a response rate of approximately 20-30%. Since the fall 2002 semester the survey has been administered using the web. A web link is emailed to the GSIs and they are asked to fill out the survey online. This has resulted in a higher response rate of 40-50%. The survey consists of twelve questions; most of which are multiple-choice while the final two require open-ended written responses. The twelve questions are shown in Figure 4.

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1. **Including the current term, for how many terms have you been a GSI in the College of Engineering?**
    1   2   3   4   5   6   7   8   9
2. **What is your current appointment level as a GSI?**
    50%   40-30%   25%   <25 %
3. **In which department do you currently teach?**
    AOSS   AERO   BME   ChE   CEE   EECS   ENGIN   IOE
    MSE   ME   NAME   NERS   FE   PharmE   PIM   Other
4. **Which of the following describe your current duties as a GSI (check as many as apply):**
    hold office hours   attend class   teach a lab
    teach a discussion section   give lectures   grade homework or papers
    grade exams   grade labs or projects   hold review sessions
    email with students   maintain website   other
5. **What is the average number of hours you spend each week emailing with your students?**
6. **Are you aware that the College of Engineering has Graduate Student Mentors (GSMs)?**
    yes   no
7. **What is the name of your GSM?**
    don't know   name 1   name 2   name 3   name 4 …
8. **Have you had any teaching-related contacts with this GSM?**
    yes   no
9. **If you answered yes to question 8, was that contact (check as many as apply):**
    observation   email discussion   telephone discussion
    in-person discussion   attended roundtable or lunch   collection of feedback
    other
10. **How would you rate your GSM's performance?**
    excellent   good   fair   poor
11. **What did you learn from your GSM?**
12. **Could your GSM improve his/her services? If so, how?**

Figure 4: Example of the survey that is given to the GSI at the end of their semester of teaching.

Questions 1-5 provide CRLT and the CoE with information about the GSIs while questions 6-12 provide information about the effectiveness of the program by asking specific questions about the GSMs. For the last three years, 100% of the GSIs that responded were at least aware of the GSM program. In addition, the GSMs have been effective in making themselves visible to the

GSIs that they are mentoring. Figure 5 shows the percentage of the GSI responding to the survey that knew their GSM by name. Although there seems to be a decreasing trend over the last four semesters, this is most likely attributed to switching from a paper survey to a web-based survey. From winter 2002 to fall 2003 the response rate increased form 28% to 49% resulting in a more representative data set than in previous semesters when the survey was administered through campus mail.
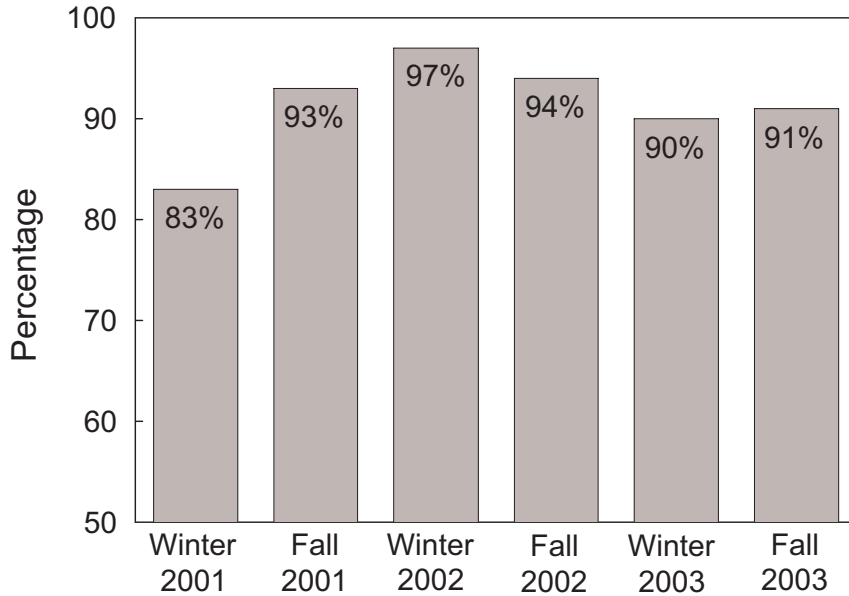

Figure 5: Percentage of GSIs responding to survey who knew their GSM by name.
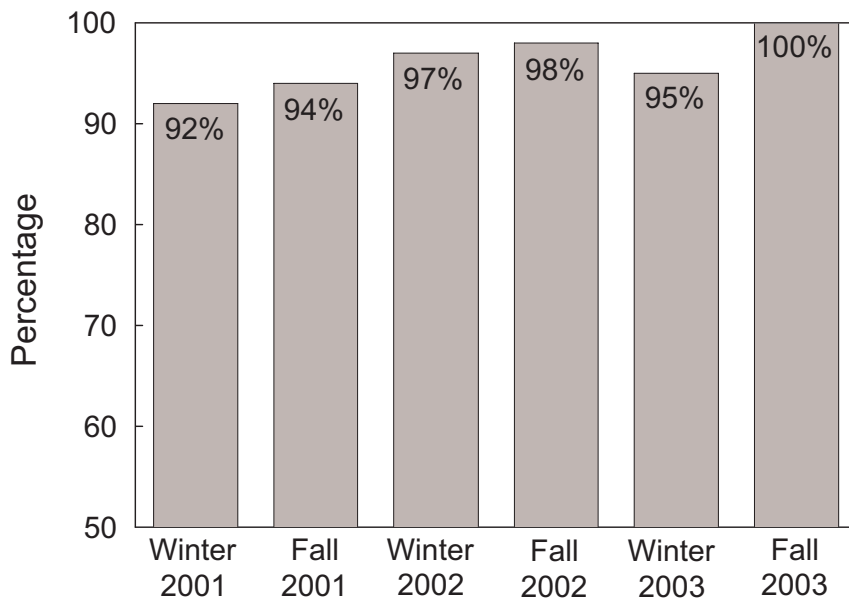

Figure 6: Percentage of GSIs surveyed that rated their GSM as excellent or good (only includes those GSIs that reported having teaching related contact with their GSM).

The GSIs that have responded to the survey have been pleased with the performance of their GSM. This is evident from Figure 6 which shows that more than 90% of the GSIs who reported having teaching related contact with their GSM rated their GSM as excellent or good. Although this numerical data is satisfying and provides some evaluation of the program, the real testament to the program's success is the written comments provided by the GSIs in response to questions 11 and 12. Below is a representative sampling of GSI responses for the winter 2003 term.

What did you learn from your GSM?

- Biggest thing I learned is tips about time management. Teaching and responding to students at certain time and as well as getting my own research done. Email has helped a lot.
- He made some very helpful comments about being a GSI at the new GSI orientation back in January that helped me feel more confident about teaching.
- Haven't really taken advantage of my GSM, unfortunately...
- He gave me some good tips on how to approach grading and handing back exams. He also encouraged me to sign up for some CRLT seminars which I found very helpful.
- He had several ideas in response to student feedback for pacing and lecture styles.
- How to handle special circumstances regarding grading, student concerns, students' interactions with other students, and professor interactions.
- I didn't need him.
- I haven't really used my GSM, but I know that if I ever have a problem he is the person I can contact.
- I learned quite a bit about the resources that are available to help assess and improve teaching skills, and had help in directing a student to appropriate psychological help.
- I learned some of the details of motivating students to learn. I also learned some innovative teaching techniques.
- I learned both my strengths and weaknesses of my teaching, after the MSF. Also, I discussed with him how to remove the weaknesses, and I could rectify a few drawbacks of my teaching.
- Learned from his experiences as a GSI; to deal with surging workloads, with the professor and fellow GSIs.
- Things TO do and NOT to do in a review session. Small details in our behavior towards the students which we should be careful with. How to present a session, how to speak, how to address people and how to answer questions in a correct manner.

Could your GSM improve his/her services? If so, how?

- Actually, he does a great job of keeping in contact with us. I wish the university had started this program earlier, because I would really have profited from it in my first two years here (97/98).
- Have a mandatory meeting with GSI's so that they know how helpful it is to use your GSM at least once.
- He has been visible, but not intrusive. I think he has done a great job and should be commended.
- Her services were already everything they needed to be.

- He's doing a very good job. He's always available and willing to help. He has definitely been helpful. Maybe the only improvement I see would be for him to meet with all his GSI's at the beginning of term (I am not aware that this happened).
- I didn't really give him the chance, he was very willing to help but I never took advantage.
- I think the GSM service is fine; however, it would have been nice if they taught you how to use Coursetools or MEonline or if they directed you to someone that could.
- I would have liked more feedback after he came and observed my class.
- She should keep up the great work, but I can't think of anything she needs to improve.
- She is perfect. Her MSFs are excellent and always very helpful. Though I have taught the same class three semesters in a row, her MSFs are always helpful because you never have the same bunch of students.
- No, He's very thoughtful and helpful. He always tries to make sure that we get the most relevant information to address our teaching issues.
- No, she was available if I needed her. That was fine for me, since I was fortunate enough not to have issues in my GSI experience. Having 2 other GSI's for the course as a resource probably helped significantly too.

7   Program Challenges

Overall the GSM program is successful, but there are some potential improvements. A continuing challenge which the program faces is its centralized organization, due to being managed at the college level rather than the department level. This requires extra effort by CRLT and the GSMs to publicize their services because GSIs and faculty are less likely to interact outside of their own department. Although effort is made to hire GSMs from a variety of departments, it is still not possible for each of the GSMs to be a mentor in their home department. For instance, an Industrial and Operations Engineering student might be a GSM for an Electrical Engineering GSI. Such a disconnect results in the GSIs lack of interest in using their mentor. In addition, GSMs can have difficulties understanding and/or appreciating traditions and customs unique to a particular department.

In an effort to have more GSI and faculty involvement in the program, it might be necessary to change the teaching climate in the college. While the University of Michigan is a large research institute, one of its primary functions is to educate undergraduates. Changing the attitudes of the GSIs toward teaching can be difficult when many of the GSIs are required to teach solely as a source of funding for a semester. The faculty generally support education, but have limited resources to devote to teaching instruction, compared to those resources devoted to their research agendas.

8   Conclusion

At the University of Michigan College of Engineering the turnover rate for graduate student instructors (GSIs) is high. On average, each term 49 % of all GSIs teach for the first time. Such high turnover presents a unique set of challenges in preparing graduate students to teach and is addressed with approximately 10 hours of training at the beginning of the semester for new GSIs. To supplement the initial training, all GSIs are assigned to GSMs to guide them through the semester. In addition, the GSMs use their teaching experience to answer common questions that

arise. In some cases the GSMs observe the GSIs' classroom to document their teaching and to obtain responses from the students that are later provided to the GSI in aggregate form. This paper has outlined the GSM program and described how the program benefits both the GSIs and GSMs. Finally, typical examples of GSM/GSI interactions were presented along with an evaluation of the GSM program.

Acknowledgments

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TIMOTHY M. HANCOCK
Timothy M. Hancock (hancockt@umich.edu) received the bachelor's degree in electrical engineering (BSEE) from Rose-Hulman Institute of Technology in 2000 and the master's degree in electrical engineering (MSEE) in 2002 from the University of Michigan. He is currently completing the Ph.D. at the University of Michigan developing SiGe RF components at 24 GHz (www.eecs.umich.edu/~hancockt).

JOHN W. NORTON JR.
John W. Norton, Jr. (jnorton@umich.edu) is working on his doctorate at the University of Michigan in civil infrastructure systems with a focus on optimal drinking water technology implementation under the direction of Walter J. Weber, Jr. Norton won the University of Michigan College of Engineering Outstanding Student Instructor Award for the year 2001-2002 and intends to pursue an academic position after earning his doctorate.