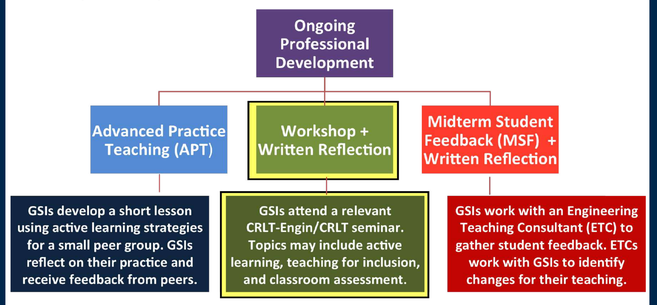
Leveraging Reflection to Deepen Engineering Graduate Student Instructor Professional Development

M. Taylor Haynes II and Tershia Pinder-Grover
mthaynes@umich.edu and tpinder@umich.edu

Introduction

Preparing graduate student instructors (GSI) to teach engineering students requires practical and relevant training. Historically, there has been concern that graduate students, especially in the STEM fields, were not receiving adequate training to prepare them to teach as graduate students and as future faculty. However, more recent research has shown that when engineering graduate students receive instructional training, they are more likely to use teaching methods to engage undergraduate students when they become faculty (Lattuca, 2014).

All first-time engineering GSIs are required to participate in an all-day pedagogical training prior to the start of classes and ongoing professional development for the term. To complement the initial training, GSIs are provided with a choice between an Advanced Practice Teaching Session, participating in Midterm Student Feedback, or attendance at a Pedagogical Workshop. All of these options are accompanied by a written reflection.



This research will primarily focus on the GSIs written reflections from the pedagogical workshop. It is through this context that we'll begin to address our research question:

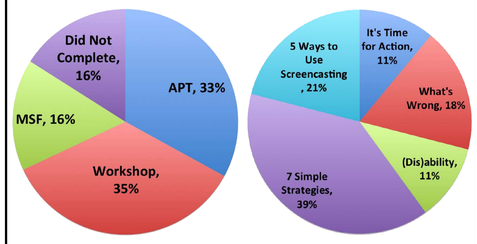
- To what extent do new engineering graduate student instructors reflect on their ongoing professional development and apply the new skills from the pedagogical workshops to their classroom experiences?

Theoretical Framework

This project explores new Engineering GSIs' perceptions of their ongoing pedagogical professional development through the lens of Wlodkowski's motivational factors for adult learners (Wlodkowski, 1999). As summarized by Felder, Brent & Prince (2011), there are five key characteristics to engage adult learners. The combination of our workshops and subsequent written reflections are designed to meet this goal.

Analysis of GSI Written Reflections

Step 1: Reflection Sorting



GSI Selections for Professional Development | **Workshop Selections by Engineering GSIs**

Of the 53 engineering GSI attendees at the pedagogical workshops, 38 submitted written reflections for analysis for analysis in Fall 2013.

Workshop Descriptions

5 Ways to Use Screencasting
Participants learned how to apply screencasting, an adaptable video recording technology, into their teaching.
7 Simple Strategies to Improve Your Teaching
Activities created to highlight the principles and demonstrate applications put forth by Chickering and Gamson (1987).
(Dis)ability in the Classroom
A series of theatrical vignettes provoked conversation around a range of issues related to student disabilities and their implications for teaching and learning.
It's Time for Action
Participants learned about a variety of active learning techniques and then formulated a plan for implementing active learning in their own course.
What's Wrong?
This session focused on identifying when a student is having a mental health challenge and what steps GSIs can take to provide support.

Step 2: Open Coding and Discussion

For their reflections GSIs were provided the following prompts:
- Compare and contrast the teaching-related strategies that were presented in the workshop.
- Select one strategy and explain how you can use it in your current

Word Cloud for all reflections submitted by GSIs who attended a workshop

Following analysis by 2 coders, a discussion around the results was held to identify persistent themes within the set of reflections for each workshop.
From the written reflections, there was a distinct divide in tone and content when analyzing across the various workshops. Awareness-based workshops focused on identifying and responding to student needs. The strategies discussed in these sessions begin with raising awareness and developing instructor's sensitivity for the topic in addition to providing some strategies for supporting students. In contrast, Application-based workshops focused on teaching techniques that could be planned and immediately implemented in the classroom or lab.

Awareness Based Pedagogical Seminars	What's Wrong?
	(Dis)ability in the Classroom
Application Based Pedagogical Seminars	7 Simple Strategies to Improve Your Teaching
	5 Ways to Use Screencasting
	It's Time for Action: Generating and Active Learning Plan

Step 3: Axial Coding and Thematic Analysis by Seminar

After the construction of a refined list of thematic elements, we identified the relative number of written reflections containing a discussion of each theme.

Awareness Based Pedagogical Seminars

Title	Number of reflections	Major themes
What's wrong? Navigating concerns about student mental health	7	• Process of talk, identify issue, and then refer to applicable resources (N=7) • Need to refer students to resources over providing treatment (N=6) • Create a calming/relaxed atmosphere during conversations with students (n=6) • Maintain students' privacy (n=6) • Become aware of campus resources and students' needs (N=5) • Follow up with students after initial referral (N=4)
(dis)Ability in the Classroom.	4	• Show appreciation for students who disclose their disability (N=4) • Ask students about their needs(N=4) • Anticipate student needs and being aware of issues that might create difficult situations for students with disabilities (N= 3) • Post materials ahead of time (N=3) • Increase in awareness of disability issues (N=3) • Increase sense of compassion about the experience of students with disabilities (N=3)

"Through the process, we need to realize our limitation and do not over promise, so that students who need help can get the most from the appropriate resources." (Reflection from a GSI attending "What's Wrong? workshop)
"Much of the time, just being able to talk about their issues with the instructor and getting some basic advice can be enough help [for] the student to overcome their distress." (Reflection from a GSI attending "What's Wrong? workshop)

Application Based Pedagogical Seminars

Title	Number of reflections	Major themes
Seven (simple) strategies to improve your teaching	15	Encourage active learning (N=11) Encourage cooperation among students (N=9) Describe benefits to students (N=9) Set and support high expectations (N=7)
Five Ways to Use Screencasts	8	Provide resources for students (N=8) Provide technical information (tutorials) (N=7) Challenges and concerns about the use of screencasts (N=7) Provide greater clarity in material (N=6) Address common confusing points and student questions (N=5)
It's time for action: Generating an active learning plan	4	Use intentional mistakes (N=3) Use cooperative groups (N=3) Describe benefits of active learning in general (N=3)

"I have already begun to apply this strategy in the course I instruct. I have the students work on more challenging real-world design problems both in assignments and in the actual time I spend with them. I have found the approach to be incredibly effective in that it successfully engages the students, motivates them to work together, and helps them to gain a true understanding of not only the concepts, but how the concepts can be applied and exist in the world around them." (Reflection from a GSI attending "Seven Simple" workshop)
"Often, many of the strategies discussed in the seminar are intended not only to assess students' needs and comprehension level, but also they are important in encouraging and inspiring them to learn. Active learning encourages students to take an interest in the learning process by becoming involved in it directly. Student-instructor contact can also be used to inspire students by imparting the instructors own passion and excitement for the subject to the student." (Reflection from a GSI attending "Seven Simple" workshop)

Discussion

Each of the five workshops discussed addressed a diverse set of teaching techniques, ranging from active learning strategies to addressing the mental health needs of students. For each workshop, the written reflections collectively highlighted teaching approaches presented in the sessions; however, there were certain methods that resonated more readily with the first-time engineering GSIs. Additionally, it's important to recognize that there are a variety of factors that may not have been mentioned in the written reflections that influence how GSIs are able to adopt strategies, including: the nature of their GSI assignment, their disciplinary backgrounds, and their reasons for choosing particular workshops.Future directions will be focused on the analysis and coding of reflections for the Advanced Practice Teaching and Midterm Student Feedback professional development sessions.

Acknowledgements

We would like to thank Anne Greenberg, who conducted the statistical analysis for this project. Additionally, we are grateful to the Center for Research on Learning and Teaching, the REBUILD Program and the College of Engineering for their continued support and commitment to excellence in graduate student instructor professional development.

References

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. AAHE bulletin, 3, 7.

Felder, R., Brent, R., & Prince, M. Engineering instructional development: Programs, best practices, and recommendations. Journal of Engineering Education. 100(1), 89-120.

Lattuca, L. R., Bergom, I., & Knight, D. B. (2014). Professional Development, Departmental Contexts, and Use of Instructional Strategies. Journal of Engineering Education, 103(4), 549-572.

Wlodkowski, R. (1999). Enhancing adult motivation to learn: A comprehensive guide for teaching adults. 2nd Ed. New York, NY: John Wiley & Sons.