Workshops on Fundamental Engineering Skills: A Graduate Student-Led Teaching Initiative

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The Problem
Teaching opportunities for graduate students in engineering...
- Are often limited to facilitating an established lab section
- Provide limited curriculum development opportunities
- Do not provide ample instructional experience

Undergraduate classes often require the use of engineering skills or tools that...
- Are not covered in class
- Students have forgotten
- Transfer students have not learned

Workshop Development and Implementation
1. Written Proposals
ASEE members interested in creating a new workshop are required to submit a proposal that outlines the workshop's scope, outcomes and prerequisites. Proposals are reviewed by the ASEE student chapter executive board.

2. Practice Workshops
To give student instructors a chance to implement their workshop prior to the official date, practice workshops are held with members of the ASEE student chapter. During these practice runs, peer participants provide feedback on workshop aspects that may need to be addressed prior to the official workshop, which include notation consistency, instructional pace, and breadth of material.

3. Workshop Environment
- 90 minutes of interactive, computer-based instruction
- Computer lab has 40 workstations and can be partitioned into two rooms
- Instructor sits at a single workstation
- Instructor’s screen can be projected onto multiple quadrant screens
- Students follow the instructor’s lead, making students active participants in learning

4. Roaming Assistants
In addition to the instructor, roaming assistants help students during the workshop. These assistants are members of the ASEE student chapter who answer individual questions and ensure students are not left behind.

Our Proposed Solution
We have developed a graduate student-led teaching initiative, as part of a student chapter of the American Society for Engineering Education (ASEE), that aims to fill two needs within the engineering community:
- Curriculum development and implementation experience for graduate students
- Supplemental instruction on fundamental engineering skills for undergraduates

Undergraduate academic advisors have identified skills for which supplemental instruction may be advantageous to students.

Participant Responses and Discussions
The workshop series has been seen as an asset by student participants, as shown by their replies to completed online and paper-based surveys, as well as focus groups.

- 95% of students surveyed found the workshops to be worth their time.
- 95% of students surveyed felt more comfortable with the taught skill after the workshop.
- 157 students responded to surveys following our workshops.
- 15+ departments are represented by students in our workshops.

- 40% of the students attending our workshops are transfer students.
- 70% of the students attending our workshops are undergraduates.
- 35% of students, on average, attend more than one workshop.

Instructor Responses and Discussions
A focus group for student instructors was held to gain an understanding of why graduate students are interested in developing workshops and whether the curriculum development experience is meeting their expectations and needs. Four instructors, who were not associated with the program evaluation presented here, participated.

- 17 workshops held to date, with 4 more currently planned
- 14 different instructors have developed and presented workshops
- 20 different ASEE members have participated as roaming assistants or helped with practice workshops

Why members participated in the workshop series:
Teaching is something I might want to pursue in the future and in general this [workshop development] is a great chance to develop skills you wouldn’t otherwise have a chance to develop.

I was interested in putting my knowledge into structure and into a structured workshop (sic).

Conclusions
We developed a graduate student-led teaching initiative, which provides curriculum development experience for instructors and engineering skills for participants. With the initial success of the program and its continued development and improvement, we hope to provide meaningful growth opportunities for both graduate student instructors and workshop participants.