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Undergraduate and Graduate Teaching Assistants' Perceptions of Their Responsibilities - Factors That Help or Hinder

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Abstract:

Effective teaching assistants (TAs) are crucial for effective student learning. This is especially true in science, technology, engineering, and mathematics (STEM) programs, where TAs are enabling large

programs to transition to more student-centered learning environments. To ensure that TAs are able to support these types of learning environments, their perspectives of training, their abilities, and other work related aspects must be understood. In this paper a survey that was created based on interviews conducted with eight TAs is discussed. The survey has four primary categories of content that are critical for understanding TAs' perspectives: (1) background, (2) motivation, (3) training, and (4) grading and feedback. This research team is first utilizing this survey at Purdue University to test for validity and reliability of the instrument, as well as identifying ways to improve the experiences and effectiveness of the First-Year Engineering Program's TAs' support system, training, hiring process, and any other relevant components of the infrastructure. The more generalizable goal of this research is to further develop this survey to be used by any STEM program as a diagnostic tool for identifying opportunities to enhance the TA support systems and therefore improve student learning.

SECTION I. Introduction

Teaching assistants (TAs) have come to play a prominent role in undergraduate instruction. They are fundamental to the success of large introductory science, technology, engineering, and mathematics (STEM) courses. At large universities, graduate teaching assistants (GTAs) teach the majority of the science laboratory and discussion sections [1]. There is also a growing movement towards using undergraduate teaching assistants (UTAs) in introductory courses with large numbers of students [2]–[3][4].

As more undergraduate students work as teaching assistants, their unique position as both student and instructor introduces the challenge of balancing student and teaching responsibilities. Another problem is that many teaching assistants reported being assigned to undergraduate courses with no prior training [5]. In the case of GTAs, they are assumed to have the content knowledge, while pedagogical knowledge is not emphasized [5].

Since TAs are crucial to the success of large courses with a student-centered pedagogy, this research was conducted to create a survey to act as a diagnostic tool for STEM program utilizing TAs. Similar surveys have been created to understand TAs' perspectives of the benefits of training, effectiveness of course materials, helpful experiences, and many other aspects of programs [6]–[7][8][9]. This survey was created based on an analysis of existent, relevant surveys and previous research on interviews conducted with TAs in the First-Year Engineering Program at Purdue University. This survey tool targets TA responsibilities, training techniques, and other identified factors to answer the research question. This study is driven by the following research question: How do TAs perceive the affect of their previous experiences, motivations, and training on their ability to enact their responsibilities (e.g., grading, giving feedback, and helping students)?

In our previous study to investigate how TAs perceive their responsibilities and to identify factors that influence their ability to execute their responsibilities, eight TAs (i.e., 4 UTAs and 4 GTAs) from a large introductory engineering course sequence (enrolling about 1700 students) were interviewed in Fall 2012 [10]. This course sequence has introduced the use of authentic, team-based, iteratively-solved open-ended problems, in the form of mathematical modeling activities [11] and design projects. Some of the TAs' common responsibilities include: (1) attending TA training, (2) preparing for class, (3) helping with in-class activities, (4) supporting the course instructor and other TAs, (5) grading and

giving feedback on students' solutions, and (6) helping students by answering questions in and out of class. From 18 different responsibilities within these six categories, TAs most frequently discussed five responsibilities from the three categories of training, grading, and helping students [10]. Prior knowledge and experience, training, and intrinsic motivation were among the most helpful factors; time commitment and the open-ended nature of problems were among the most frequent hindering factors. The helpful factors were aspects of TAs' positions that they identified as better enabling them to execute their given responsibilities. The hindering factors refer to difficulties that the TAs expressed.

SECTION II. Literature Review

Fuller (1969) identified three concerns that teachers have: concern about self, task, and impact. He considered these concerns linearly in that teachers progressed through them with experience [12]. Choo et al. (2011) built upon these concerns and proposed the following specifically for graduate teaching assistants: class control, external evaluation, task, impact, and role/time/communication. These concerns highlight teachers' worry about being deficient or incapable [13]. However, the impact concern represents a GTA's hopefulness and desire for growth. In terms of professional development, the aim is for teachers to view these other concerns in terms of growth and improvement, rather than deficiency.

These concerns served as a framework for this study. This study aimed to identify the presence and form of these concerns for both graduate and undergraduate teaching assistants in an introductory engineering course sequence. The three categories that emerged from the qualitative piece of the study were training, motivation, and grading. Training is a crucial piece in TAs development and understanding of both their role and their tasks. Motivation, both external and internal, relates to concerns with external evaluation, role, and impact. Grading and feedback relate specifically to the unique task required in teaching these courses.

A. Training

Training is considered crucial for the success of TAs to fulfill their job requirements [7], [14]–[15][16], especially grading and giving feedback [10]. There have been various forms of surveys that have analyzed different important aspects of training and identified some fundamental knowledge that should be understood about TAs' perspectives on training, its benefits, and its affects. Some of these include their perspectives of the value of various content within training [7], their understandings of pedagogical approaches and how they feel training affected their knowledge [8], and their understanding of their role as TAs to ensure all aspects align with the programs' intended role for the TAs [9].

B. Motivation

Motivation was identified as one of the helpful factors for TAs in helping students and teams [10]. Motivation and its effects have been a subject of many studies (e.g. [17]–[18][19]). Both intrinsic and extrinsic motivations have been discussed in different studies as influential factors in choosing to teach. Some of the intrinsic motivation factors are personal satisfaction with career, working with children, and contributions to society. Extrinsic motivational factors include salary, job status, and job security.

C. Grading – Feedback

Effective instructor feedback is vital for student success; it is also acknowledged to be a challenging responsibility [20]. Many studies have identified attributes of effective feedback [20]–[21][22][23]. Feedback should be timely and constructive, and it should scaffold students' learning [21], [22]. Feedback given in open-ended problem solving settings should be responsive to students' solutions [23], while not pushing a single “correct answer” [24]. The amount of progress towards a high quality solution that students make in open-ended problem solving settings depends heavily on the feedback they receive from the instructor, which in many courses are the TAs [23].

SECTION III. Method

This study has a qualitatively driven design [25]. In the qualitative component of this study, interviews were conducted with TAs to explore their perspective of their TA position. From this data, a quantitative instrument was developed.

A. Setting and Participants

About eight graduate and eighty undergraduate teaching assistants for two sequential first-year engineering courses enrolling about 1700 students were asked to participate in this study in Spring 2013. The two courses are required for all FYE students and each is a 2-credit hour course (with 4 hours of face-to-face class time per week). The UTAs range from sophomores that just completed the FYE courses to second-year seniors completing their fifth year of college. All UTAs are required to take the courses (or the honors sequence) and pass them with a B or better to be a TA in these courses. Prior to administering the survey, the team piloted the survey with a GTA from the FYE Honors Program at Purdue; the GTA gave feedback which led to some minor modifications. Then the survey was distributed. There was a 25% response rate for GTAs (i.e., 2 GTAs responded) and a 54% response rate for UTAs (i.e., 43 UTAs responded).

B. Instrument

The survey instrument was created based on the prior interview findings to further investigate TAs' perceptions of their responsibilities and the factors that help or hinder their abilities to execute their responsibilities; the survey focuses on prior experiences, training, grading/feedback, and motivation. The survey facilitates understanding of a greater number of TAs' perceptions regarding their responsibilities. This survey contains four sections: (1) background information, (2) motivation, (3) training, and (4) grading and feedback. The motivation, training, and grading/feedback sections consist of 6-point Likert scaled items, with a scale of importance that ranges from not at all important to extremely important, a scale of agreement that ranges from strongly disagree to strongly agree, a scale of beliefs that ranges from very untrue of what I believe to very true of what I believe, and a scale of frequency that ranges from never use to always [26].

The background information section focuses on understanding potentially relevant prior knowledge and experiences that the TA may have (e.g., took the course as a student, level of education, field of study, tutoring experience, and other TA positions).

The motivation section aims to understand TAs' intrinsic and extrinsic motivation regarding their TA position. A motivation category was included to identify intrinsic or extrinsic motivational drive for

being a teaching assistant. The questions were adapted from Factors Influencing Teaching (FIT) choice questionnaire by Richardson and Watt (2006) [18].

The training section includes questions about the types of training the TAs received and questions about time spent and effectiveness of the various aspects of training they received. The TAs are queried about three types of training (i.e., university level, departmental level, and course-specific level) and three modes of training (i.e. online, face-to-face, and apprenticeship). These modes of training are also further defined by how they are taught (e.g., lecture, discussion, practice grading, and role playing). There are “other” options wherever applicable to allow a TA to indicate any additional training formats.

The interviews revealed that a primary concern for TAs was providing feedback to their students. In this course, the process of providing feedback is critical to the implementation of the open-ended problems. The feedback and grading portion of the survey asks about the types of work the TAs graded and/or gave feedback on (i.e. close-ended problems and open-ended problems). The TAs are prompted to rate how prepared they feel to do various grading and/or feedback tasks. The last portion of the grading/feedback section focuses on the types of feedback TAs give. They are prompted to rate how often they feel they use various types of affective feedback (i.e., praise, neutral, and negative) and cognitive feedback (e.g., summarize student work, state correct answer, ask thought-provoking questions, and copy content from training materials). The last portion of the survey prompts the TAs to rank their training and prior experiences from most to least helpful in developing their grading and feedback skills.

SECTION IV. Future Work

TA interviews [10] were used to inform the development of a survey. The survey has been administered to the participants within the setting described in the method section. Preliminary results will be presented at the time of the conference. After the data from the surveys are quantitatively analyzed, the research team will utilize this data and the qualitative analysis of the interviews to conduct a final mixed methods analysis.

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