
AC 2011-658: DOCTORAL STUDENTS AS COURSE INSTRUCTORS: THREE ENGINEERING TEACHING ASSISTANTS' SOCIALIZATION EXPERIENCES

Irene B. Mena, Purdue University, West Lafayette

Irene B. Mena has a B.S. and M.S. in Industrial Engineering, and a Ph.D. in Engineering Education. Her research interests include K-12 engineering education, first-year engineering, and graduate student professional development.

Heidi A. Diefes-Dux, Purdue University, West Lafayette

Heidi Diefes-Dux is an Associate Professor in the School of Engineering Education at Purdue University. She received her B.S. and M.S. in Food Science from Cornell University and her Ph.D. in Food Process Engineering from the Department of Agricultural and Biological Engineering at Purdue University. Since 1999, she has been a faculty member in Purdue's First-Year Engineering Program, the gateway for all first-year students entering the College of Engineering. She is currently the Director of Teacher Professional Development for the Institute for P-12 Engineering Research and Learning (INSPIRE). Her research focuses on developing, implementing and assessing authentic mathematical modeling problems; this has included teaching assistant professional development.

Brenda Capobianco, Purdue University

Brenda M. Capobianco is Associate Professor in the Department of Curriculum and Instruction, and School of Engineering Education (courtesy) at Purdue University. She holds a B.S. in biology from the University of Alaska Fairbanks, M.S. in science education from Connecticut Central State University, and Ed.D. from the University of Massachusetts Amherst. She teaches elementary science methods and graduate courses in teacher action research and gender and culture in science education. Her research interests include girls' participation in science and engineering; teacher's engagement in action research; and science teachers' integration of the engineering design process to improve science learning.

Doctoral students as course instructors: Three engineering teaching assistants' socialization experiences

Abstract

The purpose of this study was to explore and understand the types of socialization experiences that result from engineering graduate teaching assistants' (TAs) roles as course instructors. Socialization refers to an individual's process of becoming a part of a group. In the context of doctoral education, socialization can be a complex area to study, largely because there are many roles and groups for which graduate students can be socialized.

Using situated learning, more specifically the communities of practice literature, as the theoretical framework, this study looked at how three doctoral engineering TAs, with experience as course instructors, become members of the community of practice that is academia. This study was guided by the following research questions: 1) What socialization experiences do doctoral engineering TAs report going through as a result of working as course instructors? 2) What recommendations to improve the TA experience emerge from this study?

Data were collected in the form of interviews (individual and focus group, with participants from two schools of engineering at a Midwestern university). These data sources were analyzed and triangulated to find recurring themes. Results indicated several categories of socialization experiences, as characterized by the three TAs. Implications from the study suggest the need for a progressive TA model, in which TAs are given more responsibilities during specific stages of their program, culminating with the opportunity to be course instructors.

Introduction

The purpose of this study was to explore and understand the types of socialization experiences that resulted from three engineering graduate teaching assistants' (TAs) roles as course instructors.

Socialization is a term used in many different fields of study, such as anthropology, psychology, sociology, and political science, among others¹. Because it is used in different fields, the exact definition of socialization will depend on the particular field of study or context it is being used in, but more broadly defined, it is the process by which a child learns the ways and becomes a member of its community; it is "the development of the individual as a social being and participant in society," (p. 3) a process undertaken so that individuals can conform to their societies or groups². The process of socialization generally includes acquisition of transmitted knowledge and language, and "learning of social roles and of moral norms"² (p. 4).

This definition of socialization can be translated to the context of doctoral education. In this context, the process of socialization still involves an individual's process of becoming a part of a group; the difference lies in the community or culture the individuals are being socialized into. Golde³ writes that socialization for graduate students is really an "unusual double socialization" (p.56): students must become socialized not only to join the graduate student community, but also to join a profession⁴.

Socialization is an important factor for success and retention in doctoral education^{5,6}. Yet it is a difficult area to study, because there are many roles and groups for which graduate students can be socialized – for example, the role of graduate student and the role of member of a profession, according to Golde⁴. Adding to the complexity is that all disciplines are different, so it is necessary to understand the discipline in order to understand what the students will have to go through⁷. As such, it is necessary to consider these differences in order to understand what graduate students need to know and what values they are expected to adopt; that is, the context of the discipline and graduate program needs to be considered when looking at socialization.

Research has looked at socialization experiences in the humanities and sciences^{8,9,10,11}, but research on socialization has not been as common in the field of engineering.

Research Questions

This study looked at how three doctoral engineering TAs, with experience as course instructors, become members of the community of practice that is academia. The study was guided by the following research questions: 1) What socialization experiences do doctoral engineering TAs report going through as a result of working as course instructors? 2) What recommendations to improve the TA experience emerge from this study?

Theoretical Framework

Situated learning, and more specifically the communities of practice literature, was used as the theoretical framework. Situated learning refers to learning in context, where individuals are exposed to and work with a community's values, rules, and culture¹². Through this lens, learning is the result of participating in communities of practice^{13,14}.

Members of a community of practice have a shared understanding of the community's practice – where practice refers to both “the explicit and the tacit” in a certain context; for example, the language, tools, rules, “subtle cues, untold rules of thumb, . . . underlying assumptions, and shared world views” (p. 47) that define the community¹⁵. Learning about a community of practice comes from membership, because it is through membership that individuals learn “the process of being engaged in, and participating in developing, an ongoing practice”¹⁵(p. 95).

The process by which new members become a part of the community of practice is called legitimate peripheral participation¹⁵. This refers to a process in which new members start out as novices, and as they learn more about and participate more in the community, they transition to becoming experts¹⁴.

For the purposes of this study, the TAs were considered to be apprentice members of the larger community of practice that is academia. Working as course instructors increased these TAs' knowledge about the community's language, tools, and rules.

Context of the Study

This study is part of a larger study conducted at a large Midwestern research university. The larger study had the goal of examining the types of socialization experiences resulting from engineering teaching assistantships. In addition, differences in experiences by engineering programs and students' stages of doctoral study, among other variables, were analyzed as part of the larger study. The participants were 28 doctoral students employed as TAs. These participants were classified into three categories, based on their type of TA appointment:

- The Grader: This TA's responsibilities generally included grading, holding office hours, and answering student questions. While some were required to attend lecture, they were merely silent observers, not direct participants.
- The Lab Instructor: This TA graded, held office hours, answered student questions, and gave a mini-lecture or introduced a topic at the beginning of each lab session. In other words, the lab instructor had the same responsibilities as the grader, with the addition of teaching a group of students, usually in the context of a lab section. While the lab instructor was responsible for teaching, he/she did not have the freedom to decide what material to present or in many cases how to present it. Instead, they were given instructions on what to cover and many times, how to cover it.
- The Course Instructor: In this type of appointment, the TA was entirely responsible for a course. That is, in addition to the usual TA responsibilities of grading and holding office hours, among others, the TA was also responsible for teaching the course and preparing exams/assignments. Unlike the lab instructor, who also teaches, the course instructor has freedom to decide what material to teach and how to teach it.

According to the results from the larger study, the role of course instructor, compared to those of grader and lab instructor, comes with additional responsibilities and challenges, but also with additional rewards and learning opportunities. Yet, of the 28 participants in the larger study, only three reported being course instructors. This paper highlights the socialization experiences that come with this unique role, based on the three participants' descriptions of their roles.

Data Gathering Methods

The data for this study was collected as part of a larger study. For this larger study, the main sources of data were individual and focus group interviews. Participants were individually interviewed once. The questions in the interview protocol were designed to answer the research questions and were guided by what previous studies have found on the topics of socialization, situated learning, and communities of practice. After the individual interviews, the same TAs participated in follow-up interviews that were conducted in the context of several focus groups. Focus groups conducted after individual interviews allow researchers to "explore issues" (p. 23) emerging from the analysis of the individual interviews¹⁶. In this study, the focus groups provided an opportunity to probe deeper and to ask additional questions that would confirm the themes and assertions that had emerged from the individual interviews.

Data Analysis and Interpretation

Interview data was analyzed using open coding. As suggested by Creswell¹⁷ and Patton¹⁸, the data was first read to get a general feel for it and to start developing codes. A second reading consisted of actually assigning codes and seeing if new ones emerged. Next, the codes from the second reading were refined and applied to the data during a third reading. This coding process resulted in themes that appeared in each participant's data.

Each participant's data was first individually analyzed. Then, the findings from the three cases were compared to find common themes, as well as shared meanings and experiences.

Results

This paper highlights the experiences of three TAs, all three in their fourth or fifth years as doctoral students, who worked as course instructors:

- Bianca: Was a TA for four semesters. She was a lab instructor for three of these semesters, and a course instructor for one semester.
- Hank: Was a TA for six semesters. His responsibilities during these semesters were those of a grader, except for the one semester in which he was a course instructor.
- Susan: Was a TA for five semesters, and had the responsibilities of a grader. Her experience as a course instructor is a bit different from the other two TAs' experiences, as will be described below.

The results will highlight socialization experiences that specifically resulted from the TAs' appointments as course instructors. While the TAs also described experiences that resulted from their appointments as graders and as lab instructors, the goal of this paper is to describe the experiences that characterize the graduate students' semesters as course instructors. These socialization experiences are: undertaking of TA responsibilities, participating in professional development, interacting with faculty and students, and balancing teaching and research.

TA Responsibilities

The three TAs, as course instructors, were entirely responsible for a course. Bianca and Hank had similar experiences. They were instructors for a course and were responsible for every aspect of the course, including designing exams and assignments, teaching, grading, and holding office hours. This is how Hank described his experience as a course instructor:

“...[when I was] the primary organizer of the course [course instructor]...I do every responsibility...I arrange the homework, I come up with every homework, I come up with...all the exams, grade all the exams, create all the quizzes, come up with a course policy and...I come up with the exam schedule,...I will assign final grades, so yeah, I mean...I just have the entire duties of handling the course in my hands, so it's...been a big duty but it's been enjoyable.” (Hank, Individual Interview, 128)

This is how Bianca described her experience:

“...over the summer I taught [course]..., so I created all the course notes, I had quizzes..., homework, tests, so I created them and graded them and I did have like supplemental materials but that was really challenging, the course, doing all that, so I lectured and it was summer so it was every day of the week,...I [also] gave them like journal articles to read and we discussed those, and that was about it, oh I [also] had office hours...” (Bianca, Individual Interview, 140)

Susan was also a course instructor, but this experience resulted from a teaching fellowship she was awarded. This fellowship required her to go through the many steps and responsibilities an instructor would face, including designing assignments and exams. She had a faculty supervisor who mentored her and tracked her progress. This is how Susan described her experience with the teaching fellowship:

“...I went through literally everything a professor has to do, all the way from holding an office hour to writing a homework question to writing a test question to writing...entire exams, holding office hours, holding lectures, holding help sessions...that was a fellowship that was supposed to be half-time working on your graduate research as a fellow and then quarter time to half-time working as a professor so that you could develop all the skills required to actually teach...” (Susan, Individual Interview, 76)

“...they have to make sure that we over the course of the time, the three years that we’re doing the fellowship, they had to make sure that we had every experience that a professor could have in terms of dealing with teaching and advising, and so they literally had a big checklist and each semester they would say did you do these things, yes or no, and over the course of three years they expect everything that was on there to be checked off at least once, and that included writing homework and tests, writing solutions to homework and tests, holding office hours, holding help sessions, giving lectures and one semester we were actually required to team teach where we totally did half the class, half the class was ours...” (Susan, Individual Interview, 227)

These TAs, as course instructors, were exposed to some additional responsibilities, such as designing homework assignments and exams, which are not generally found in other types of TA appointments. In these TAs’ experiences, these were responsibilities they had only when they were course instructors, never when they were graders or lab instructors.

TA Professional Development

All three TAs participated in professional development workshops. While TAs with different TA appointments are sometimes required to attend certain types of training, these three TAs voluntarily sought ways in which they could learn more about improving their teaching.

Hank and Bianca attended teaching-related workshops offered by the University’s teaching and learning center. Bianca went as far as obtaining a graduate teacher certificate from the center.

To obtain this certificate, TAs need to meet several requirements, such as attending several workshops and having their teaching observed and critiqued. Here is how Bianca described it:

“...with the graduate teacher certificate I went to a couple of courses and learned more about...different ways students can cheat,...how to come up with a rubric,...bringing technology into the classroom...” (Bianca, Individual Interview, 191)

“...with the graduate student certificate you have to do the micro-teaching..., you just have somebody observe you and critique you so..., for the course I was TA-ing he critiqued me and watched me one day and then...he also had to do...course evaluations, like of yourself...you had to do one halfway through the semester and then one at the end and see how the scores were...” (Bianca, Individual Interview, 279)

Susan sought a different kind of professional development: she enrolled in education courses from an education department (these courses were not specifically for TAs, but for education majors). She decided to take some education courses, and ended up getting a master’s in education while working on her engineering Ph.D. In her words:

“...I actually studied towards a master’s in education...I had taken classes where I learned about different teaching methods and different learning styles...” (Susan, Individual Interview, 247)

“I started when I started grad school and did it, did across the board and I finished about a year ago.” (Susan, Individual Interview, 260)

Interactions

The TAs in the larger study described interactions with three groups of individuals: with faculty, peers, and students. As course instructors, the three TAs described in this paper did not have faculty supervisors, because they (the TAs) had full responsibility for the course. Therefore, they did not describe formal faculty interactions that resulted from being course instructors. Similarly, as course instructors, these TAs did not work with peers (other TAs), because they were the only ones responsible for the course. As a result, there did not seem to be any peer interactions resulting from their experiences as course instructors.

In terms of interactions with faculty, while Bianca and Hank did not have to meet with any faculty supervisors, Susan’s case was a bit different, because her fellowship required her to keep in contact with a professor. However, this was done in a very informal, unstructured manner:

“When I was doing the teaching fellowship I met that professor two to three times per week just by stopping into his office or running into him in the hall and he would ask me how something is going...” (Susan, Individual Interview, 268)

Although the TAs did not have faculty supervisors they met with in a formal, structured manner, they did sometimes depend on relationships with faculty they had previously developed, typically as a result of their previous TA experiences. These were faculty members they felt

comfortable approaching if they had any questions. What they mostly valued from these interactions with faculty members was getting advice and feedback. Susan, for example, said the following about the professor she informally interacted with:

“...the feedback I got from him was incredibly invaluable, he would constantly say ok I think this is something the students are going to have more trouble with so you’re going to have to dedicate more time in your lecture to this...and he was, I wouldn’t say looking over my shoulder but he was definitely guiding me along the way and I felt very comfortable asking him any time I had questions.” (Susan, Individual Interview, 428)

Hank said:

“...so this summer...when I taught specifically [when I was a course instructor]...I went to an instructor who I TA-ed for previously...and showed her my exams and things and asked what she thought of them, so...that was very helpful to get a second opinion on whether or not it was too hard or too easy,...she gave a lot of good feedback in that situation.” (Hank, Focus Group, 189)

As course instructors, the three TAs did frequently interact with students. They did so in an individual and small group setting, such as when students came to see them in office hours, but also in a large group setting, such as when they interacted with their students in the classroom, when they lectured. Although all three TAs had already experienced interacting with students in office hours, in their previous appointments as graders and lab instructor, interacting with a larger group of students was a new experience for Hank and Susan. Bianca had been a lab instructor before, so she had had experience interacting with a group of students in a classroom/lab setting. Hank and Susan, as graders, had interacted only with those students who came to office hours. As course instructors, they had the opportunity to regularly interact with all students in a class environment. Hank described it as follows:

“...well as a [grader] you have...a lot less interaction with the students [than] you do as an instructor, you know, the lecture is a major portion of the interaction between students and just you know, the course in general, so when you’re not doing the lecture you see less of them, and so it’s sort of...in office hours and help sessions,...typically every semester...there’s like a small subset of students that regularly attend office hours,...so...as a [grader] you usually end up...building relationships or seeing very much of a small selection of students, maybe 10%, 10 to 20% of the students you’d see regularly, and then some you never see at all, except for when they’re taking exams...” (Hank, Individual Interview, 420)

Being course instructors provided the TAs the opportunity to interact with all the students in the course, not just the ten to twenty percent who would attend office hours.

Balancing Teaching and Research

The TAs described the struggle that was balancing teaching and research. Being a course instructor was very time-consuming. Bianca, for example, talked about how the time commitment necessary for being a lab instructor compared to the time commitment necessary for being a course instructor:

“I would say about 15 [hours a week] when I was the TA [lab instructor], on average, and then for the course that I taught [course instructor] that was a lot of time,...I was spending probably three to four hours developing the notes a day and then an hour lecture, maybe two hours office hours, so like thirty to thirty-five hours a week for that summer.” (Bianca, Individual Interview, 158)

The time they had to spend on their teaching responsibilities many times interfered with the time they needed to spend on their research responsibilities. As much as they enjoyed teaching, they realized that their teaching responsibilities made them fall behind on their research work and slowed down their progress. They described it as follows:

“I mean obviously research got lost ‘cause the courses and the TA-ing...” (Bianca, Individual Interview, 390)

“...I mean it does take away from the work...like the reason you’re here...for instance I didn’t come in knowing who I wanted to work with and so as a TA I’m spending all this time working on this course and not necessarily enough working on what I need to be focusing on to get out of here...and you can kind of I think fall into that trap as far as like what gets more priority or how am I gonna use my time and so I think in a sense that is kind of negative...” (Bianca, Focus Group, 837)

“...well [teaching] takes away from your time that you could be spending on research and research is what gives you a degree and that’s what you’re here for,...I mean...I can’t complain about my experience as a TA ‘cause I really enjoyed it, but you know, ideally I would have those hours back to put in the other things also.” (Hank, Focus Group, 277)

Overall, the three TAs in this paper considered their experiences as course instructors to have been positive learning experiences. As a result of being course instructors, the TAs learned more about the teaching aspect of academia and indicated that they felt better prepared for an academic position. For example:

“[With the role of course instructor]...certainly there’s a lot of carryover to academia, you know, if I’m instructing a course..., like the same way I’m instructing a course now,...I can’t even over emphasize how much...it’s helped prepared me to take on that kind of role, so I mean...if I pursue a career in academia, as far as the teaching aspect goes, you know, it’s invaluable to have been a TA and to be involved with the courses...” (Hank, Individual Interview, 265)

“[The experience is]...gonna help a lot, like I definitely realized...how much is involved with like creating a course and...putting that time and energy into producing material, but it’s also like meeting the students, getting to know them, getting to understand, you know, what do they kind of wanna accomplish, why are they, not just like why are they taking this course, but are they gonna use it in the future, are they interested in this course...” (Bianca, Individual Interview, 321)

Also, while Bianca and Susan entered their doctoral programs knowing that they were interested in teaching in the future, this was not the case for Hank. Hank entered his doctoral program because he was interested in conducting research. The TAs’ experiences as course instructors strengthened Bianca and Susan’s interest in teaching, and led Hank to be interested in including teaching in his future plans. In his words:

“...I’m interested in research in general, which is why I pursue my PhD,...I’d wanna do research whether it was in academia or industry, but...academia particularly appeals to me because I really enjoy teaching, and...the teaching that I’ve done as a TA and as an instructor [course instructor] this summer...has really...sort of exposed me to that and I’ve found I’ve really enjoyed it, so...the added role of the teacher in academics is what appeals to me there.” (Hank, Individual Interview, 36)

Finally, the learning opportunities that the TAs described were, in the TAs’ opinions, a result of their roles as course instructors. They believed that this role provided them with unique learning opportunities that they would not have had as graders or lab instructors. Susan, for example, spoke very favorably of her experience as course instructor. When asked if she thought she either had had or could have these learning opportunities as a grader or lab instructor in her department, she replied as follows:

“Absolutely not. Because most of the TAs, if you look at them in our department, are literally people who hold office hours and grade exams, they don’t really do much other than that, well...a lot of them will write homework solutions too, but past those three activities they don’t do any of that stuff, they rarely lecture, virtually never will they be involved in actually writing an exam, those sorts of things.” (Susan, Individual Interview, 108)

Discussion

In this section, the main socialization experiences the TAs talked about as resulting from their appointments as course instructors will be described. These socialization experiences are: undertaking of TA responsibilities, participating in professional development, interacting with faculty and students, and balancing teaching and research. Some reasons why these can be considered to be socialization experiences, as explained by the literature on socialization and communities of practice, are provided.

The TAs described the responsibilities that came with their appointments as course instructors. Undertaking these responsibilities was a socialization experience for these TAs. The TAs talked about lecturing, holding office hours, and designing exams/assignments, among others.

These are activities also performed by university faculty, or those the authors classify as being the members of the community of practice. These responsibilities can be considered what Brown, Collins, and Duguid¹⁹ call authentic activities, which are activities that are characteristic of a community of practice. In the process of becoming a member of a community, participating in the authentic activities helps new members learn about what it means to be a member of that community, and begin to understand what makes established members of a community “act meaningfully and purposefully”¹⁹ (p. 36). Undertaking these responsibilities is a socialization experience for TAs because these responsibilities introduce them to some of the responsibilities that come with a faculty position.

The three TAs in this paper voluntarily sought professional development. They were not required to attend any of the professional development they attended, so it may not necessarily be correct to consider this to be a result of their having been course instructors. However, it can be suggested that the fact that they either knew they would be course instructors, or had already been course instructors, motivated them to seek opportunities where they would learn more about teaching. After all, all three course instructors in this study sought and participated in some kind of teaching-related professional development.

Participating in professional development was a socialization experience for the three TAs. The professional development activities not only continue to introduce and expose the TAs to tasks characteristic of the community of practice, but also many times provide them with best practices and strategies to improve their performance. In addition, professional development activities give the TAs an opportunity to further observe members of the community of practice, and in that way, get a better understanding of what these members do. After all, it is through observation, followed by the opportunity to carry it out, that “cultural practices” are successfully adopted¹⁹(p. 34).

The TAs in this study did not, according to their descriptions, formally report to any faculty members when they worked as course instructors. They did, however, informally interact with faculty members with whom they already had relationships. They would go to these faculty members whenever they needed advice or feedback about their course. Interacting with faculty members is an important socialization experience for doctoral students, because faculty are one of the main agents of socialization for doctoral students⁴. As established members of the community of practice, they help the students learn about the community by making “expert practice” be “visible and understandable”²⁰ (p. 55).

Another characteristic of being course instructors was the different types of student interactions that came with the role. As course instructors, the TAs in this study interacted with their students individually and in small groups, such as in office hours, and also in large groups, such as in a classroom setting. While TAs’ interactions with students have not been greatly discussed in the literature in terms of how they could be socialization experiences, it can be suggested that they can be a socialization experience for TAs. In the TA-student interaction, the TAs are the experienced, knowledgeable ones. This means that the students come to the TAs when they have questions or need advice. As a result, it can be suggested that the TAs can for a while try on the role of the faculty and better understand what it means to answer questions, advise, mentor, and guide.

Finally, the three TAs talked about the struggle that was balancing teaching and research. This has not been greatly discussed in the literature in terms of how it could be a socialization experience for TAs, but it can be suggested that it can be a socialization experience. Balancing teaching and research is a struggle faculty members, as members of the community of practice, also face. Therefore, the TAs are exposed to a struggle that is characteristic of the community of practice and they learn to find ways to deal with it so that they can perform as members of the community.

Implications

The results from this study described some of the socialization experiences that come with TAs' appointments as course instructors. This study is part of a larger study consisting of 28 participants. Of these 28 TAs, only the 3 TAs highlighted in this paper had the opportunity to be course instructors. These three TAs talked about the unique experiences and learning opportunities that resulted from their appointments as course instructors, which can lead to the suggestion that TAs should at some point in their programs be appointed as course instructors.

These three TAs, however, had been either graders or lab instructors before being course instructors, and these appointments helped prepare them for their appointments as course instructors. As a lab instructor, Bianca gained experience with giving short lectures and interacting with students in a group setting. As a grader, Hank was able to meet and develop working relationships with faculty members. He would then rely on these relationships whenever he wanted to discuss something related to questions or challenges he faced as a course instructor. Susan, as a result of her teaching fellowship, received preparation in different aspects of teaching, and like Hank, developed a working relationship with a professor who she then relied on for feedback. This leads to the suggestion that these three TAs' experiences as graders and lab instructors contributed to their having had positive experiences as course instructors.

These results, therefore, suggest the need for a progressive TA model, in which TAs are given more responsibilities during specific stages of their program, culminating with the opportunity to be course instructors. This model is described below.

Suggestion to Improve the TA Experience: Require That TAs Transition through Different Types of Assistantships – A Progressive Model

The authors propose that TAs be allowed to start out as graders, then move on to being lab instructors, and finally move on to being course instructors. As they transition, TAs will acquire more responsibility over time. Starting as graders may help them perform better as TAs and be more comfortable with their responsibilities, because as graders they will have the least amount of responsibilities. When they become lab instructors, they will already be familiar with grading and holding office hours, among other things, and can then dedicate time to their new responsibilities, such as teaching. In other words, implementing this transition means that TAs will be given more and more responsibilities slowly, to give them time to learn and get used to their current responsibilities before being given more.

Having them experience each type of TA appointment can also give them the chance to experience different amounts and types of interactions with students. As future members of academia, it is important that TAs learn to interact with students in different contexts. As graders, they will start out by learning to interact with them one-on-one or in small groups, during their office hours. As lab instructors and course instructors, they will learn to interact with them in larger groups, in the lab/class setting.

In addition, transitioning through the different types of assistantships will prepare TAs for an academic job, because the combination of assistantships will expose them to the different sides of the teaching aspect of academia. That is, going through the three types of teaching assistantships can give them a better idea of the variety of responsibilities they may encounter in an academic position. Fife, Racherla, and Killian²¹ support this proposition. They wrote (p. 35):

“Finally, while many [GAs - graduate assistants] feel that they are getting valuable experience, this may not be the entire story. For example, if teaching appointees do little more than grade, they are not getting all the experience they need. Grading is only one small facet of a university course. While young GAs may not be ready for the classroom, GAs who are advanced in the program can provide a useful resource for their departments both as supervised instructors, and then as stand-alone instructors. Senior GAs may be especially well suited to freeing up faculty by teaching many of the introductory courses. When properly supervised and administered, undergraduates will receive the education they need while allowing GAs to get the experience they need.”

This progressive model is also beneficial because it would align with the TAs' developmental phases. Sprague and Nyquist²² wrote that ideally, a senior learner (or a new TA) should be given an assistantship with main responsibilities being grading and holding office hours (that is, what has been described in this paper as being an appointment as a grader); a colleague in training (a TA with some experience) should be given more responsibilities, such as teaching a course (for example, what has been described here as being an appointment as lab instructor); and a junior colleague (a more experienced TA) can be given main responsibility over a course (that is, what has been described here as an appointment as course instructor). Similarly, Walker, Golde, Jones, Bueschel, and Hutchings²³ write that “achieving confidence and competence as a teacher...requires a consistent, progressive development of skills and responsibility” (p.67) and in fact propose progressive development as one of the principles in graduate student formation.

In sum, completing different types of TA appointments would be beneficial in preparing doctoral students to become better TAs, by gradually giving them more and more responsibilities. It would also be beneficial in preparing them for future academic positions by exposing TAs earlier on to different aspects and responsibilities of teaching.

Implementing the Progressive Model

While a progressive model can be beneficial in terms of TAs' development, the successful implementation of this model does require that programs be both willing and able to provide TAs

with the types of opportunities they need – programs need to be able to have the different types of TA appointments. This may be a challenge for programs that mostly have one type of appointment. If these programs are interested in implementing a progressive model, course offerings may have to be re-structured to create opportunities for all kinds of TA appointments. Engineering programs can also coordinate their assistantships with other engineering programs that may have different assistantship opportunities.

Even in those programs that are able to provide all three types of TA appointments, implementing a progressive model will require additional organization. Because TAs will need to transition through all three types of TA appointments, it will be necessary to keep track of the TAs and what types of appointments they have already been given. Complementary to this, decisions need to be made regarding the number of semesters TAs will be in a given type of appointment: should they transition through the three types of TA appointments in three consecutive semesters? Should they spend more than one semester in each type of appointment? Should TAs perform at some level before moving on? Should semesters in which they are TAs be alternated with semesters in which they are not TAs? Will TAs have to attend some kind of orientation or training every time they transition to a new type of TA appointment?

Conclusion

The purpose of this study was to explore and understand the types of socialization experiences that resulted from three engineering graduate teaching assistants' roles as course instructors. The results indicated several categories of socialization experiences, as characterized by the three TAs. The TAs talked about the different TA responsibilities that came with the role of course instructor. They also described the different teaching-related professional development activities they voluntarily sought. In addition, they described their interactions with faculty members and with their students, and finally, they talked about the struggle that was balancing teaching and research. These are themes that characterize the engineering TAs' appointments as course instructors, and these are also socialization experiences that can help the TAs learn about what it means to be a member of academia.

Implications from the study suggest the need for a progressive TA model, in which TAs are given more responsibilities during specific stages of their program, culminating with the opportunity to be course instructors. A progressive model would better prepare the TAs for the different responsibilities that come with the teaching aspect of academia.

One of the limitations of this study is the small number of participants. Future studies can focus on increasing the sample size, and in this way getting a more generalized and generalizable description of engineering TAs' experiences as course instructors. Knowing about the types of socialization experiences that come with the role of engineering TA can help departments and institutions ensure that they are providing their graduate students with the adequate opportunities to learn about and successfully transition into academia.

Bibliography

1. Brezinka, W. (1994). *Socialization and Education*. Westport, CT: Greenwood Press.
2. Clausen, J. A. (1968). Introduction. In J. A. Clausen (Ed.), *Socialization and Society* (pp. 1-17). Boston: Little, Brown and Company.
3. Golde, C. M. (1998). Beginning Graduate School: Explaining First-Year Doctoral Attrition. *New Directions for Higher Education*, 55-64.
4. Golde, C. M. (2000). Should I Stay or Should I Go? Student Descriptions of the Doctoral Attrition Process. *The Review of Higher Education*, 23(2), 199-227.
5. Lovitts, B. E. (2001). *Leaving the Ivory Tower*: Rowman & Littlefield Publishers, Inc.
6. Turner, C. V. S., & Thompson, J. R. (1993). Socializing Women Doctoral Students: Minority and Majority Experiences. *The Review of Higher Education*, 16(3), 355-370.
7. Gardner, S. K., & Barnes, B. J. (2007). Graduate Student Involvement: Socialization for the Professional Role. *Journal of College Student Development*, 48(4), 369-387.
8. Austin, A. E. (2002). Preparing the Next Generation of Faculty: Graduate School as Socialization to the Academic Career. *Journal of Higher Education*, 73(1), 94-122.
9. Gardner, S. K. (2007). "I Heard It through the Grapevine": Doctoral Student Socialization in Chemistry and History. *Higher Education*, 54, 723-740.
10. Golde, C. M. (2005). The Role of the Department and Discipline in Doctoral Student Attrition: Lessons from Four Departments. *Journal of Higher Education*, 76(6), 669-700.
11. Golde, C. M., & Dore, T. M. (2001). At Cross Purposes: What the Experiences of Today's Doctoral Students Reveal About Doctoral Education [Electronic Version]. Retrieved November 12, 2008, from www.phd-survey.org
12. Altalib, H. (2002). Situated Cognition: Describing the Theory (No. IR 021 877 Document ED 475 183) (ERIC document).
13. Driscoll, M. P. (2005). *Psychology of Learning for Instruction*. Boston: Pearson Education, Inc.
14. Lave, J., & Wenger, E. (1991). *Situated Learning*. New York: Cambridge University Press.
15. Wenger, E. (1998). *Communities of Practice*. New York: Cambridge University Press.
16. Morgan, D. L. (1997). *Focus Groups as Qualitative Research*. Thousand Oaks, CA: Sage Publications, Inc.
17. Creswell, J. W. (2008). *Educational Research*. Upper Saddle River, NJ: Pearson Education, Inc.
18. Patton, M. Q. (2002). *Qualitative Research and Evaluation Methods* (3rd ed.): Sage Publications.
19. Brown, J. S., Collins, A., & Duguid, P. (1989). Situated Cognition and the Culture of Learning. *Educational Researcher*, 18(1), 32-42.
20. Golde, C. M., Bueschel, A. C., Jones, L., & Walker, G. (2009). Advocating Apprenticeship and Intellectual Community. In R. G. Ehrenberg & C. V. Kuh (Eds.), *Doctoral Education and the Faculty of the Future* (pp. 53-64). Ithaca: Cornell University Press.
21. Fife, L. D., Racherla, G., & Killian, S. E. (1996). Graduate Assistant Usage in Oklahoma Graduate Computer Science Programs. *SIGCSE Bulletin*, 28(4), 33-35, 44.
22. Sprague, J., & Nyquist, J. D. (1989). TA Supervision. In J. D. Nyquist, R. D. Abbott & D. H. Wulff (Eds.), *Teaching Assistant Training in the 1990s* (pp. 37-53). San Francisco: Jossey-Bass.
23. Walker, G., Golde, C. M., Jones, L., Bueschel, A. C., & Hutchings, P. (2008). *The Formation of Scholars*. San Francisco, CA: Jossey-Bass.