AC 2009-210: SOCIALIZATION TO THE PROFESSORIATE THROUGH RESEARCH COLLABORATION: EXAMINING WHAT ENGINEERING DOCTORAL STUDENTS ASPIRING TO FACULTY CAREERS LEARN FROM FACULTY MENTORS

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Socialization to the professoriate through research collaboration: Examining what engineering doctoral students aspiring to faculty careers learn from faculty mentors

Abstract

This qualitative study explored the socialization process of engineering doctoral students committed to a career as a faculty member. Using qualitative methods, 20 engineering doctoral students from four Predominately White Research Institutions (PWRIs) were interviewed to understand how research collaborations some doctoral students have with faculty members prepared them for a future faculty role. Findings suggest that engineering doctoral students learn about the complexities of a faculty role that include the various duties and expectations of faculty members (e.g., securing external funding, managing a research team, managerial aspect of operating from a grant). Engineering doctoral students also learn about the importance of (or value placed on) securing external funding to support research.

Introduction and Related Literature Review

According to some scholars, there exists a mismatch between faculty expectations and current doctoral training in graduate programs in the US. For example, the focus on research in graduate education, the growth of contingent faculty members, the diversity of institutional types, and the ever changing nature of faculty roles all contribute to the changing demographics of American colleges and universities, consequently changing faculty employment practices. The preparation of doctoral students then should include a variety of learning experiences that equip newly minted doctoral holders with the knowledge, skills, and abilities to be successful in this changing environment.

The preparation of doctoral students in research is one area said to be mismatched, with scholars contending that faculty members are still functioning as usual. That is, faculty members are socializing (or cloning) doctoral students to be researchers like themselves. There is also the assumption that doctoral students will assume faculty positions in programs and in institutions similar to the programs and institutions they were trained in. Another line of research posits that doctoral students assist faculty members with research that further promotes the faculty member’s research agenda but may not advance (or reflect) the student’s research interests. Still others contend that these limitations in the training of doctoral students are not likely to change because they have worked well for tenured faculty members in the past.

Conceptual Framework

The Graduate and Professional Student Socialization Model offers the most comprehensive framework for understanding the socialization process for doctoral students. It suggests that graduate students are socialized in their departments and respective fields as they learn the knowledge and skills needed to be successful in their programs and fields, interact with faculty members and peers, and become involved in various activities within their fields. Figure 1 displays the conceptual model. One of the core elements (knowledge acquisition) of the model is the focus of this paper.
Purpose

The purpose of this qualitative study was to explore the socialization process of doctoral students in engineering fields committed to a career as a faculty member. Specifically, this study attempted to understand what knowledge and skills are acquired during research collaborations some doctoral students have with their faculty members. One core element of the Graduate and Professional Student Socialization model (knowledge and skills acquisition) was used to explore doctoral student socialization. The main research question guiding this study was:

What contribution does research collaboration with a faculty member play in the socialization of doctoral students in engineering committed to a career as a faculty member? The following sub-question guided the overall research question: What do doctoral students in engineering learn about faculty careers through their research engagement with faculty mentors?

For purposes of this study, faculty mentor was defined as the person who collaborated with the doctoral student on a research project and who the doctoral student identified as the
person having the most significant role in helping to prepare the doctoral student for a faculty role. Doctoral students were defined as graduate students at four research universities who were enrolled full time and who had completed their course work. Research collaborative activities included a range of activities (e.g., conducting research, writing for scholarly publication, presenting at professional meetings) that involved participating in the research process with a faculty member.

Methods

Twenty (N=20) full-time doctoral students in engineering programs at four predominately White research institutions (PWRIs) from the Northeast, Midwest, and Southwest regions of the United States participated in this study. Participants were recruited with the assistance of department chairs and faculty members from each of the institution’s engineering graduate program areas.

Researchers used purposeful sampling methods by selecting engineering doctoral students who were enrolled full-time, completed their course work, had research experience (e.g., experience conducting research, presenting, or writing for publication), and had a faculty mentor. Table 1 displays a more detailed description of the sample participants.

Table 1.
Sample demographics of engineering sample participants (N=20)

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<thead>
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<td>Fifth</td>
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<td>Beyond fifth</td>
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Data Collection Procedures

Semi-structured telephone interviewing was the technique used for gathering data. Interviews were audio-taped and transcribed verbatim for analysis. Each interview followed the same protocol. For example, participants were asked a total of 12 interview questions related to what their perceived they learned about research, what they learned about faculty careers, how invested they were in the research collaborative relationship, and what factors contributed to their interest, either positively or negatively, in a faculty career. This paper will only report findings related to what engineering doctoral students learned about faculty careers from their research collaborative engagement with faculty members.

Analysis

The analysis process began with the researcher (first author) reading the interview transcripts several times. Analysis was then driven by the research questions, participants’ responses, and the frequency of responses. Data were analyzed using the constant comparative method, a method for code building that results in patterns, themes, and ultimately overarching conclusions to develop related to the experiences of participants.

Three themes emerged from the data regarding what engineering doctoral students learned about faculty careers through their research collaborative experiences with faculty mentors. First, engineering doctoral students learned about the complexities of a faculty role. Second, engineering doctoral students got an up-close view of the various duties, obligations, and expectations of faculty members. Third, participants learned the importance (and value) of securing external funding for research. These findings are presented in Table 2.

Findings and Discussion

Complexities of Faculty Role

Doctoral students in engineering disciplines engaged in collaborative research experiences with their faculty mentors learn about the complex duties and responsibilities of faculty members that reach beyond teaching and research duties. Eleven (n=11) participants spoke about better understanding the many responsibilities their faculty mentors were involved in. In some cases, this knowledge about the complex faculty roles (that included learning about the promotion and tenure process) prepared doctoral students for what they should expect as future faculty members. Joyce, a third year, computer science doctoral student shared what she now has come to learn about the complex duties of a faculty member. She states:

I know now that there’s a large number of facets to a faculty career. A much larger number than I had originally thought. Even at my undergraduate institution I knew that faculty members had to do some sort of teaching and research and service through the schools, but within each of these requirements there can be any number of categories of other types of requirements and so especially working with my current advisor.
who does a lot in various areas, I think there are a number of different requirements that I
didn’t know about before. (Joyce, computer science, University D, 3rd year, 20-30,
White, female)

Joyce now sees that there are layers within the main duties of a faculty role (e.g., teaching,
research, and service) that she did not realize before working closely with her faculty mentor.

Duties, Obligations, and Expectations of Faculty

Engineering doctoral participants spoke about learning about the “duties, obligations, and
expectations of faculty members” by working closely with their faculty mentors on research.
Specifically, ten (n=10) participants spoke about learning how “managerial” in nature a faculty
role was. Faculty duties, obligations, and expectations included faculty members serving on
committees, managing research labs, supervising students, hiring (and firing) student lab
assistants, and completing paperwork involved in managing their research labs. Participants also
expressed how “time consuming” they perceived a faculty role to be. For example, Martin, a fifth
year, chemical engineering doctoral student stated:

The biggest thing that I know now is that a faculty career is that it can consume your life
if you let it. It really becomes an issue of what – how you manage your time, what you
value in your life. If you allow it to take over your life and consume every minute of
your day, it will. And I can't deny that I do feel some pressure from my own advisor to
work longer hours, to devote more of my time to just research, and I’ve had to develop
my own method of dealing with some of those requests or suggestions that you must not
be working hard enough. And so I’ve really worked hard and I think that will serve me
well in the future to define myself not just by my job and my work, but overall as a
person and not care as much what other people think, but rely on the fact that I know I do
good work and that that will be appreciated in and of its own and if it can't be appreciated
for that, then I have to find another job or another mentor or another area that will
cultivate my interests and cultivate me as a person not just an employee. (Martin,
chemical, University D, 5th year, 31-40, White, male)

For this participant, working with his faculty mentor allowed him to see how time consuming a
faculty role could be. He even felt pressure at times to devote more time to his research.
Consequently, Martin had to develop his own mechanisms for dealing with the demands on his
time.

In addition to learning about how time consuming a faculty role can be, many
participants learned about the managing aspects of a faculty role, particularly for faculty who are
involved in externally funded research. Consider the following quote related to the managerial
aspect of a faculty role.

It seems like it’s much more of a managerial type position than getting into the nuts and
bolts if you will. You know, you – I didn’t realize to the extent that he goes out and
inquires, gets these contracts, research contracts, and then he oversees everything,
obviously, but it’s much more of a managerial type position than I had perceived in the
past. (Chris, mechanical, University B, 3rd year, White, male)
A majority of participants viewed the life of a faculty member as one that involved teaching and research, but these responses suggest that a deeper understanding of the intricate details of faculty life are the reality for most faculty members at research universities.

**Importance of External Funding**

Thirteen (n=13) engineering doctoral participants had a better understanding of the value placed on research, particularly at research institutions and the importance of securing external funding for research. All participants were working for faculty who had funded research projects, which allowed students to see how sponsored research worked. This included learning about how the institution valued sponsored research, the publication process, and how faculty members sought external funding. Consider the statements from Amy, a doctoral student in mechanical engineering and Iggy, an environmental engineering doctoral student.

How much you do of either one [teaching and research] depends on what kind of school you go to. If you want to be at an R1, it’s all about research and my faculty being an R1 wants me to go to R1 so it’s all about research and getting research money and getting research grants. Teaching, you could be mediocre, that’s okay. So, you know, just doing enough to get by. And do important service that helped all of the above, you know, research and teaching, any kind of service. And what I learned about research funding is about not just getting funding, but the kind of funding you get or the quality of funding. (Amy, mechanical, University D, 6th year, 31-40, Black, female).

Amy continues talking about the importance of crafting research in such a way that you can secure external funding.

The thing I’ve learned is that first of all you do the research that’s going to get the funding. So, I mean the basic technical skills are there, and the tools are there, but you are going to have to keep forming research questions that are aligned to whatever the most funded types of research are. You have a chance of not being successful. So, you look at what’s being funded either by the federal organizations or the government or companies and then you try to see how your skills and techniques fit with those and you align your research to those.

Similarly, Iggy, the environmental engineering doctoral student from University C spoke about “selling” yourself and your research to secure funding. He states:

Grant writing is huge. It’s almost as if you’re selling yourself and your research area…I guess communicating that to others through, you know, conferences or whatever. Bringing on the right students to help you succeed in research and I guess delegating, you know, that’s like a management thing I think. (Iggy, environmental, University C, 5th year, 31-40, White, male)
In addition to learning how much value is placed on research and securing external funding for this research, Iggy’s comment also relates to how managing this funding becomes a part of the faculty role.

Consistent with the literature, participants in this study learned what was considered normal and valued in the academy through their research collaborative experiences. Participants learned that faculty roles are complex in nature and include several layers within the roles of teaching, research, and service. Research seemed to be an important role, one that is valued in research universities. Participants came away from their experiences understanding that research is essential for success and is valued over teaching.

**Implications**

This study explored what engineering doctoral students learned about faculty careers from their research collaborative experiences with faculty mentors. Implications for future practice and research are discussed below.

As primary socializing agents for doctoral students, graduate faculty members are in a unique position to provide a realistic picture of their roles to doctoral students aspiring faculty careers. Participants in this study had one idea of what they thought a faculty life entailed, but after their research collaborative experiences, understand more clearly the complexities involved with a faculty role. Faculty members, serving as mentors, should openly discuss the realities of their working lives and possibly present alternative career options to students who may not desire to work at research universities or in industry.

Doctoral students and individuals considering doctoral training might benefit from these findings. This study provides data and insight on the working lives of faculty members in engineering. Participants, who once had unrealistic views about faculty life, now have a clearer picture of the duties, responsibilities, and expectations of faculty. Identification and discussion of faculty duties as perceived by some participants could encourage current doctoral students and potential graduate students to take a more active role in their career preparation by exploring the complexity of faculty roles in more detail. This practice will prepare a more informed next generation of faculty.

This study also has implications for future research. Authors explored research related activities that contribute to the socialization process of doctoral students in engineering. Additional studies might explore what students are learning from their faculty mentors about teaching and service as it relates to socializing them to a faculty role. Participants in this study were also from research universities. Future studies might examine the socialization experiences of engineering doctoral students at different institutional types (e.g., comprehensive, private, small liberal arts, minority serving institutions). Future studies might also consider disaggregating the sample by gender and ethnicity to learn if there are differences in what women and ethnic minority doctoral students in engineering are learning about faculty careers from their faculty mentors.
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<th>Jacob</th>
<th>Wanda</th>
<th>Chris</th>
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<th>Martin</th>
<th>Melanie</th>
<th>Kelsey</th>
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<th>David</th>
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<th>Tom</th>
<th>Bruce</th>
<th>Iggy</th>
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Note. X indicates participant offering comment related to theme. –Indicates participant feeling unprepared in area (e.g., how to write grants to secure external funding)


