

## Exploring How Faculty Mentoring Influences Faculty Productivity

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## **Work in Progress: Exploring How Faculty Mentoring Influences Faculty Productivity**

### **Abstract**

Faculty productivity is crucial for achieving tenure. Research suggests that mentoring during the tenure journey has positive effects. However, only a few studies link faculty mentoring and productivity. In this Work in Progress, we summarize an exploratory, sequential, mixed-methods study to develop a survey that links pre-existing factors, including demographic and personal goals, with mentoring and self-efficacy for research, teaching, and mentoring graduate students. In the current (exploratory) phase, we developed a conceptual framework based on an extensive literature review, then interviewed 14, pre-tenured engineering education researchers in order to identify themes that support or do not support the conceptual framework. In this paper, we report on our preliminary conceptual framework, research design and future work for our project.

### **Introduction/Motivation**

Faculty productivity is an important component in the tenure process and success for future academic careers. A report from the National Academies (2019) suggests mentoring has positive effects in Science, Technology, Engineering, Mathematics, & Medicine (STEMM). In spite of the importance of faculty productivity to individual and career success, as well as the generally positive effects of mentoring, research linking the two is lacking. Assessing possible connections is complicated by the fact that mentoring can take many forms, both formal and informal, to the point that a mentor and/or mentee might not even identify the relationship as mentorship. In addition, faculty productivity is influenced by myriad variables, making it difficult to isolate the effects of any one of them (Dickeson, 2013). Finally, the definition and operationalization of “faculty productivity” is strongly shaped by one’s position type (tenure/non-tenure), and institutional requirements and expectations, which vary from one context to another, or even across departments in the same institution.

Only a few studies link faculty mentoring and productivity, with most focusing on research and scholarship productivity (Muschallik et al., 2016; Forero et al., 2016; Griffin, 2012). Most of the research considers faculty in medical fields (Byars-Winston et al., 2011). Further studies focus on underrepresented minority faculty (Allen et al., 2018; Beech et al., 2013; Butz et al., 2018; Eagan et al., 2015). Muschallik and Pull (2016) used a quantitative approach to evaluate productivity of faculty in business administration and economics at European universities. They found faculty in formal mentoring relationships to be more productive than those without mentors or with informal mentors. They conclude that qualitative approaches would be useful to understand their observation that formally mentored faculty had higher numbers of publications.

The current study uses self-efficacy for research, teaching, and mentoring graduate students as a proxy for faculty development. Self-efficacy has been shown to be a predictor of actual behavior, although as the above studies show, “self-efficacy” can be highly contextual, specific, and nuanced (Bandura, 1997). Research has repeatedly shown links between self-efficacy and research productivity. Wester et al (2019) found significant and moderate correlations between faculty productivity and self-efficacy for general and quantitative research. However, correlations between faculty research productivity and self-efficacy for qualitative research were non-significant. Pasupathy, & Siwatu, (2014) found significant, though small, correlations between faculty productivity and research self-efficacy. Kozhakhmet et al (2020) found that training

and development practices enhance faculty research productivity by promoting research self-efficacy. Lambie and Vaccaro (2011) found statistically significant relationships between research self-efficacy and interest in scholarly publication among graduate students. Landino (1988) found significant indirect effects among university faculty due to gender, with women's self-efficacy for research being indirectly decreased by several contextual and environmental factors, including "feeling less mentored" (p. 10). On the other hand, being mentored within or outside one's department was associated with higher academic self-efficacy.

Although research on self-efficacy for teaching and mentoring among faculty is limited, published findings consistently confirm a connection (Carpenter et al, 2015; Curtin et al, 2016; Haddad & Taleb, 2016). In two studies of teaching self-efficacy among university faculty, number of years teaching was a significant factor in higher self-efficacy scores. Chang et al (2011) found that faculty with more than 6 years' university teaching experience evidenced higher teaching self-efficacy, while Mehdinezhad (2012) found higher self-efficacy in faculty with more than 20 years' experience. Studies such as the ones briefly reviewed here bear further analysis in developing a framework and further qualitative inquiry.

Faculty research and teaching offer excellent opportunities to infuse or hone entrepreneurial mindset (EM) (Mckenna, A et al., 2018). EM competencies result in effective research and teaching as well as career effectiveness. For example, proposal development benefits from an EM. New course development benefits from an EM. Therefore, entrepreneurial mindset is an antecedent to faculty productivity. This project identifies factors that impact EM and therefore, faculty productivity. Exploring how faculty mentoring influences faculty productivity includes identifying which EM competencies are promoted through mentoring.

### **Research Questions**

Our study aims to answer the following research questions:

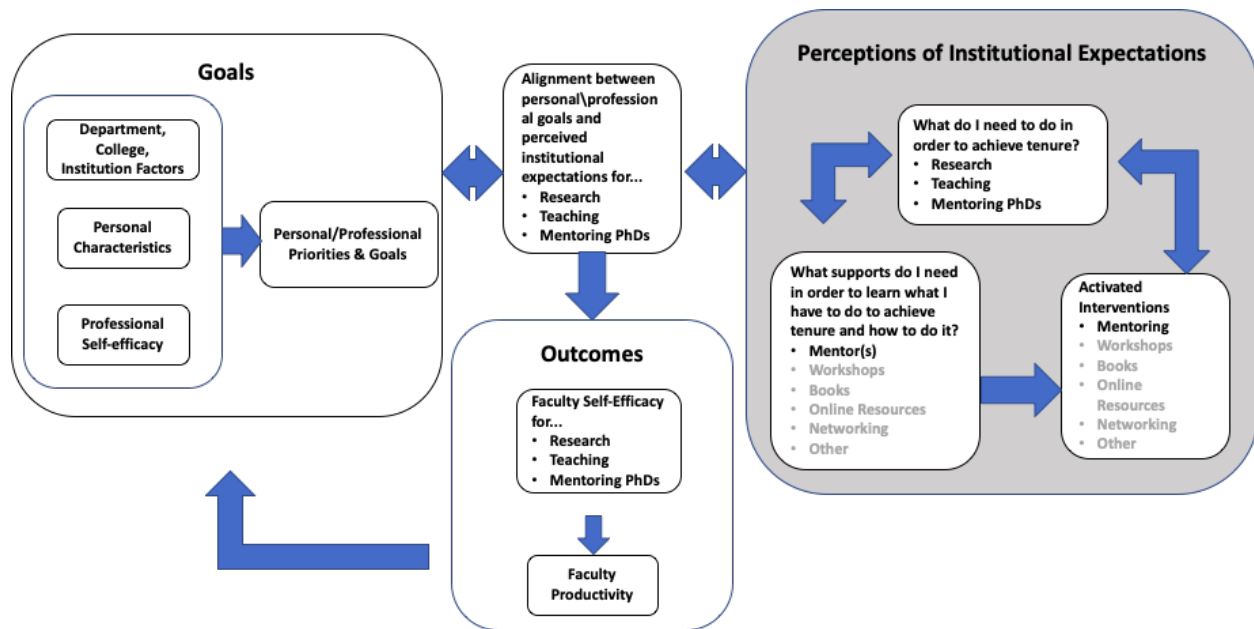
1. In what ways and to what extent does faculty mentorship influence self-efficacy for research, teaching, and PhD student mentoring?
2. What are the most relevant factors related to effective mentoring and the entrepreneurial mindset?
3. Do these factors vary based on faculty demographics, including personal characteristics?

### **Conceptual Framework**

A depiction of our preliminary conceptual framework is presented in Figure 1. The framework seeks to identify factors that influence faculty self-efficacy for research, teaching, and mentoring graduate students. One's personal and professional goals influence one's tenure-related activities, the Goals section of the framework seeks to identify motivating goals. We hypothesize that faculty productivity will be increased when personal/professional goals align with institutional expectations from tenure. Therefore, the framework seeks to identify faculty's perceptions of the institutional expectations for tenure, which can vary by individual even within the same institution. Understanding faculty's perception of tenure expectations influences the support faculty perceive they will need in order to meet those tenure expectations. Of the many forms of support available, this study focuses on mentoring. The goals and outcomes of mentoring are presumably shaped by one's personal and professional goals and one's perception of institutional

expectations. Ultimately, we seek to understand whether and how mentoring increases self-efficacy for common elements of tenure: research, teaching, and mentoring graduate students.

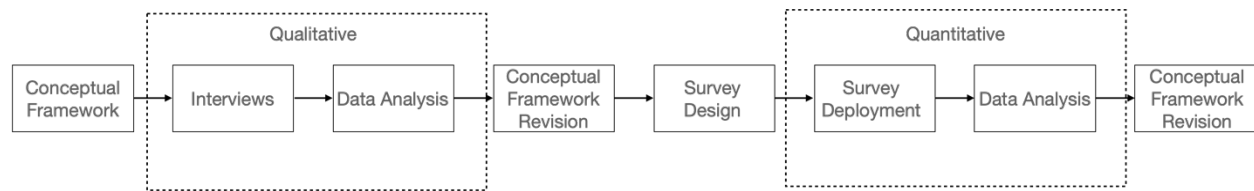
The preliminary conceptual framework was developed from an in-depth literature review during the exploratory phase of our design to further understand relationships between individual, departmental, institutional, and career factors affecting faculty self-efficacy and productivity. The framework will be revised based on the qualitative data analysis and survey analysis. The conceptual framework will serve as a foundation for future studies investigating mentorship and faculty productivity.



**Figure 1.** Preliminary Conceptual Framework.

### Research Methods

Our study utilizes the exploratory sequential mixed methods design (QUAL -> QUAN) (Creswell, 2014). This design is useful for developing a survey instrument when one is not readily available. Since our study is exploratory in nature, this design is most appropriate. This mixed methods design is developed in three phases: exploratory phase (preliminary conceptual framework), Qualitative phase, and Quantitative phase. After each phase of the design, necessary revisions will be made to our conceptual framework. A depiction of our research design is shown in Figure 2.



**Figure 2.** Exploratory Sequential Mixed Methods Design for our study.

Our design started with an exploratory phase, during which we developed a preliminary conceptual framework that was used to design an interview protocol focused on constructs of the conceptual framework. Once our conceptual framework and interview protocol were developed, we began the qualitative phase of our study. The qualitative phase of our study sought to gather rich descriptions related to each section of the preliminary conceptual framework. Our research questions elicited participant perceptions and experiences that would help 1) assess the elements of our emergent conceptual framework, and 2) provide guidance for creating survey items in the quantitative phase. Furthermore, we developed a screening selection survey to provide descriptive information such as family situation, demographics (race/gender), and academic rank (assistant, associate, full, non-tenure track). We administered the survey and received a sample of 14 pre-tenured engineering faculty at the rank of assistant professor for in-depth interviews. Interviews were conducted, transcribed, and transcripts were coded using *a priori* codes developed from constructs of the conceptual framework. Currently, thematic analysis is being conducted on the coding to seek emergent themes. The quantitative phase will consist of collecting survey data from a broad sample of pre-tenure engineering faculty.

Once thematic analysis is finished, we will use the results to inform the development of a survey instrument and make necessary revisions to our conceptual framework. Our ultimate goal is to elicit participant perceptions to inform our conceptual framework for use in further studies regarding faculty mentoring and faculty productivity.

### Conclusions & Future Work

In this Work in Progress, we have presented a discussion of our preliminary conceptual framework and our planned research design. After analyzing our interviews with 14 faculty, we will revise the conceptual framework and develop a survey instrument. We will pilot the instrument and then revise the conceptual framework and survey based on the results of the pilot survey. The final conceptual framework and survey developed from this work can be used as a guide for future studies regarding faculty mentoring and faculty productivity. This project has received funding from The Keen Foundation.

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