

Investigating the Formation of Engineers and the Future Professoriate: Linking Academic Writing to Doctoral Socialization, Persistence, and Attrition

Though doctoral engineering education is understudied as a whole, attrition in graduate engineering education is particularly unexplored. Recent reports by the Council of Graduate Schools reported that in engineering, the 10-year completion rate for doctoral programs for domestic students was only 59%. Attrition is problematic for several reasons. First, since many domestic students are funded by federal grants (through NSF, for example) and through domestic industry, each domestic student that leaves academia prematurely represents a lost investment. Second, graduate students are required for the continued quantity and quality of engineering research and development that supports all facets of engineering, impacting defense, biomedical applications, and energy technologies) and will be future thought-leaders in engineering industry and academic research. Even though engineering is usually represented solely as a mathematical and scientific discipline, being able to successfully write for an academic engineering audience can be the difference between completing a Ph.D. or leaving without a degree. However, to date, no research has studied the linkage between engineering writing and attrition/persistence and career goals for engineering graduate students. This study employs both qualitative interview techniques and statistical methods to study domestic graduate students who have decided to stay in graduate school and those that decided to leave academia.

According to Academic Literacies Theory, Role Identity Theory, and Vygotskian Sociocultural Theory applied to graduate students and academic writing, the ability to communicate as a member of a discipline (i.e., develop disciplinary discourse) is critical to the development of disciplinary identity and feelings of belonging to a research community. Other studies have linked these characteristics to persistence in graduate school; however, no work to date explores student attitudes and concepts of writing in engineering as it relates to attrition, persistence, and goals of careers in academia for graduate students. An exploratory embedded mixed methods approach with a qualitative emphasis to this research is proposed over the three years of this grant. This research design seeks to examine the writing approaches and attitudes of graduate students in graduate programs and in students who decided to leave academia before completing their graduate studies (non-completers). With the broader purpose of forming competencies and identities for future domestic faculty from graduate students, the guiding research questions for this study are as follows: (1) How do graduate students at various stages in their Ph.D. programs in engineering perceive the role of academic writing as it relates to academic persistence and the desire to pursue academic careers? (2) How are these perceptions different or similar for graduate students who are considering leaving or have left their Ph.D. programs before graduating? (3) Can writing concepts, attitudes, and self-efficacies (measured through survey constructs) predict or correlate strongly with graduate engineering students' attrition or persistence? The intellectual merit of this work lies in the fundamental advancement of theories of engineering formation and socialization at the doctoral level, which to date are underexplored. Furthermore, the role that writing plays in the socialization process, including its potential relationship with the decision to leave academia has not been explored in a rigorous quantitative way in any discipline. As the broader impacts of the study, the findings of the study will facilitate the development of writing based interventions to increase the persistence of U.S. doctoral engineering students. Broader impacts activities include dissemination of research results via academic courses for graduate students and workshops, webinars, and resources for graduate students and faculty.