

From Industry to Graduate School: How Returners (Re)Learn How to Write

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Abstract

In recent years, a number of researchers have studied returners in engineering graduate programs; these are students who, after graduating with a bachelor's degree in engineering, have chosen to enter the workforce for a significant period of time before beginning a graduate degree. Previous research has shown that returners bring unique strengths to their graduate programs. They are highly motivated, aware of the implications of their work, and interested in applying it to the real-world problems with which they are familiar. They do, however, face many challenges. One such unexplored cost involves writing. Professionals in industry have to communicate, and much of this communication is in written form; however, the rhetorical genres in industry differ significantly from academia. This may present challenges, and returners need to transfer their writing skills from the industrial context to an academic context. In this exploratory study, we developed an interview protocol and conducted interviews with four (n=4) returner participants in the engineering doctoral programs at a major Midwestern university. The common themes revealed in the interviews form the basis for implications for how graduate engineering programs can help returners make a successful transition from skilled industry writers to effective academic writers.

Keywords: Returners, writing transfer, industry, graduate programs, academic writing

Introduction

Although the majority of new engineering graduate students are recent university graduates, there is a small contingent that comes from several years in industry. Some want or need additional education in their field, and others may be pursuing new interests. In recent years, there have been several studies on “returners” in engineering graduate programs, defined by Peters & Daly as those graduate students who, after receiving their bachelor's degree, work for five years or more before pursuing a graduate degree.¹ In fact, one study suggested that returning to pursue a graduate degree after about five years in industry is optimal timing.²

In another study, ten returners at a major Midwestern university were interviewed about their motivations and experiences. Participants in that study were drawn from different STEM fields, and included both masters' and doctoral students.^{1,3,4} An initial analysis, conducted on a subset of the participants, examined changes in their identity as they transitioned from professionals to students; a full analysis of the data used Expectancy Value Theory (EVT)⁵ to look at the value that they saw in pursuing a graduate degree.⁴ In EVT, value has four components, three positive and one negative; the positive values are Utility, Interest, and Attainment, with Cost being the negative value.^{5,6} It was found that Utility was the predominant value driving participants to return, although it took different forms for the participants.^{3,4} It was also found that Cost could be sub-divided into categories, with the categories of Intellectual, Financial, Balance, and Cultural/Environmental costs emerging from the data.⁴ Intellectual costs included the need to

learn new computer programs, and to re-learn forgotten material. Some research has indicated that these costs may be part of the reason why the numbers of returner graduate students remains small.² The topic of this paper, transfer of writing skills to a new context, could also fall into this cost category.

On the other hand, the transfer of writing skills from industry to academia could be considered part of a returner's "experience capital," an expression coined by researchers who studied nontraditional students who returned to a university for a Ph.D. in Engineering Education.⁷ As the authors define "experience capital," it refers to the personal and professional knowledge people accumulate in life. The authors contend that this "experience capital" makes returners well equipped for graduate school.

An additional study focused on engineering returners in doctoral programs throughout the United States, and compared them to direct-pathway students, those who had little or no gap between their undergraduate and graduate degree programs.⁸⁻¹¹ This study included both a survey and interviews; the survey provided information to characterize the returners, and to look further at the value of their return to school, using the EVT framework.⁸⁻¹⁰ The interview phase was designed to learn more about the intersection between work experiences and doctoral research, and at the impact this had on the research process.¹¹

In addition to these studies specifically on returners, there has been research conducted on the more general population of older, or non-traditional, students. This work covers a variety of different fields, and includes adult students in many different types of degree programs. It also does not specifically focus on their work experience, although Schilling did focus on the experiences in graduate school of returners.² This body of work indicates that life experiences impact students' experiences in school. It has been found that older students have better teamwork skills¹² and work-related skills with various types of tools and equipment.¹³ They tend to have better time management skills than younger students¹⁴, greater ethical awareness¹², and a higher work ethic and motivation level.^{12,13}

They do face certain challenges, though, due to their non-traditional pathways. They may have challenges in finding the appropriate graduate program, navigating the admission process, and securing funding, since they have been out of the university environment and immersed in a different environment.^{2,15} Once these students are admitted, they may find that they need to refresh their knowledge of higher-level mathematics and learn new computer programs.⁹ Furthermore, they may need to deal with personal and family responsibilities that younger students do not have, and may feel that they do not fit into the graduate student community.^{2,15,16}

Literature Review

Academic writing is an important part of graduate programs, even in many engineering disciplines, where students are expected to publish several papers en route to the Ph.D. The concept of writing transfer—generally defined as the application of writing skills across rhetorical borders such as different courses or from the university to industry--provides the pedagogical framework for the current study. Writing transfer theory draws from connections

among knowledge-making, learning processes, and the contexts in which writing occurs.¹⁷ Writing transfer has been attracting much attention in recent years, and in 2011, Elon University launched the first of a three-year research seminar on “Critical Transitions: Writing and the Question of Transfer.” This seminar brought together researchers from numerous institutions representing several countries and led to a special 2012 issue of *Composition Forum* on writing transfer¹⁸, the *Elon Statement on Writing Transfer*¹⁹, and ¹⁷.

Most of the existing writing transfer research has dealt with the transfer from first-year composition to Writing in the Disciplines (WID) or from undergraduate writing to writing in the workplace.^{20,21} Much of that research has shown that relatively little transfer takes place in either context²², which is one reason why engineering employers often bemoan the writing ability of their new hires. Studies in which engineering employers are asked about the writing skills of recent college graduates also often reveal a mismatch between university writing assignments and workplace documents.^{23,24} These discrepancies occur in such aspects as audience, purpose, organization, appropriate amount of content, sentence complexity, and word choice. If the knowledge of how to write “learner genres” such as lab reports does not necessarily transfer to the workplace^{25,26}, is there any reason to believe that familiarity with workplace genres is any more effective in preparing returners to successfully undertake the academic rhetorical genres of graduate school?

Studies of adult returners to undergraduate work, called “reverse commuters” in one²⁷, find these students bring to the classroom writing skills acquired in various environments in their lives—personal, community, prior education experiences, and workplace, and many of them are writing in these different spheres simultaneously with their current schooling. Self-identity and the value they place on writing are important aspects of how they transfer their writing skills.

At present there exists scant research investigating how returners transfer their industry writing skills to the academic context of graduate school. The most relevant research looked at *industridoctorander*, Swedish vehicle engineers whose companies sent them for advanced degrees while they continue to work.²⁶ Asked about the writing differences they noticed between these two environments, the engineer/students mentioned the types of documents; the internal audiences in the workplace versus the external audiences for published papers and their distinct reasons for reading; the archival purpose of many workplace documents compared to knowledge sharing in academic papers; the result-oriented focus of workplace documents; and a more rigid writing style and format in published papers.

While graduate school returners may have experience writing such documents as technical reports, proposals, instructions/procedures, specifications, patents, and memos, many may not have ever written journal and/or conference papers, fellowship and/or grant application essays, and other documents common to advanced graduate students.

Not only are some of the academic rhetorical genres unfamiliar to returners but so too are the purposes and audiences for the writing. Returners may have written proposals to *persuade* company higher-ups to adopt a design change, while in graduate school, they may write answers on an exam to *demonstrate* their understanding of technical concepts to their professors. In this regard, returners share newcomer status with their classmates who come straight from undergraduate school and/or are writing in an additional language. Most enter graduate school

as newcomers to their academic discourse community, or community of practice. According to Casanave, “Academic discourse is a ‘second language to everyone, full of terminology (necessary), jargon (needless and pretentious), formal turns of phrases, and unfamiliar research methods, theories, and philosophical stances.’”²⁸

Unlike direct pathway graduate students, returners enter graduate school with more varied rhetorical experiences due to their years of writing in industry. They have already learned how to write in a new context when they began their professional careers and continued this learning process as they needed to produce different types of documents, either in a new position in the same company or after moving to other employment. The amount of time they devote to writing at work is substantial and rises as engineers move up the corporate ladder.²⁹ Thus, they may have more “cultural capital” (similar to the previously mentioned “experience capital”) on which to draw in the transfer process than their classmates.³⁰ Research has shown that cultural capital can help a writer transfer or adapt his/her rhetorical strategies to a new context more effectively than a writer with little cultural capital.

However, even with substantial writing experience, it requires rhetorical consciousness on the part of the writer to achieve writing transfer. Transfer does not happen automatically, even for the most competent writers. Smart showed that economists who had adeptly written internal documents such as “research memoranda” and “analytic notes” struggled to write an article for an important publication.³¹ In a more recent paper, an academic who studies writing transfer revealed that he faltered when starting to write in a completely different genre.³²

Research Questions

Due to the exploratory nature of this research, we chose to formulate research questions that were very general in nature. The interview protocol, as discussed under Research Methods, was formulated in accordance with these broad questions in order to allow for the elicitation of unanticipated information. The research questions for this work were as follows:

- Do returners transfer their industry writing skills to the academic writing documents required in graduate school?
- If so, what strategies do they employ to achieve this transfer?

Research Methods

Participants. In order to understand the intellectual costs associated with returning to graduate school from industry, we collected data from four returner graduate students at a large university in the Midwest with more than 3400 graduate students spread among 13 different engineering programs. This sample size, though small, is sufficiently large for quality qualitative work in this initial exploration.³³ This small sample size was also a reflection of the limited population of returners. A potential list of students was initially identified through Graduate School records, sorted by the number of years between the BS or MS degree and when the students started their Ph.D. With those criteria, only 29 domestic engineering students at the University met our desired conditions. We emailed these students to invite them to participate in the study and scheduled interview times with those who responded. The demographic data for our study

participants are provided in Table 1. Pseudonyms were assigned to participants in order to protect identities, in accordance with the study protocol approved by the university Institutional Review Board (IRB).

Table 1. Demographic Data for Study Participants

Pseudonym	Gender	Age	Gap years	Current Status	Graduate field of Study
Alexander	M	33	5	4 th Year PhD	ECE
Benjamin	M	42	6	2 nd Year PhD	Engineering Education
Charlotte	F	33	5	3 rd Year PhD	Engineering Education
Denise	F	30	7	2 nd Year PhD	Civil

International students are the majority of graduate students in the engineering programs at Purdue University, West Lafayette (1960 students out of 3463 total enrollment for 2016-17).^{34,35} However, this study is limited to domestic Ph.D. students in engineering who spent time in industry during the five or more years after receiving their undergraduate degrees for a couple of reasons. The decision to exclude international students from this study was based on two reasons. First, writing in an additional language introduces a significant variable to this study. Second, although we are aware of international returner Ph.D. students being supported by industry, such as Samsung, we are not familiar with research on rhetorical contexts in international industry. This could make fascinating research, but it is beyond the scope of the present study.

We chose to limit the graduate student participation to those in at least the second year of a Ph.D. program because they are more likely to need to write a wider, and more academic, variety of documents than students in masters' programs. These documents include, but are not limited to, journal and conference papers, fellowship and grant application essays, preliminary examinations, and dissertations.

Data Collection. An interview protocol was developed and piloted with two recently graduated returners to test the strength of questions and understand the breadth of possible answers. We made minor changes to the interview protocol based on the pilot.

Next, data were collected using semi-structured interviews organized by the protocol which is conversational in nature, covering the areas of previous writing experience, transfer of writing experience, and personal perspectives associated with their transition in writing style (See Appendix A). The graduate student researcher interviewed each participant separately in interviews that lasted approximately one hour. Interviews were audio-recorded.

Data Analysis. The data were analyzed for emergent themes using open, axial, and selective coding in order to construct new theory as it emerged from the data.³⁶ First, each audio file was studied by itself in order to determine emergent themes in that interview. This step was

completed separately by three individual researchers for each interview. Next, the researchers compared themes across the interviews, noting similarities and differences in how they analyzed data. Next, the researchers looked across the collection of interviews to identify themes that appeared in the interviews.

Results

The four participants came from different industrial backgrounds, and therefore there was some variation in their experiences. Their responses to the protocol questions did have some common themes, however. Each participant is discussed individually, and then the similarities and differences are addressed.

Alexander

While Alexander's five years of work experience included a large corporation and some consulting, his primary work experience was in the medical field, working for a start-up that made implantable medical devices. As a computer engineer, his writing took several different forms. For internal audiences, he wrote documentation to explain the function of the software he had designed. The documentation that he produced for external audiences was intended to be used for FDA certification of the products being developed. His documentation included test specifications and test reports. In order to learn how to write this type of documentation, he "just kind of jumped in," and looked at examples of existing documents. While he did not have any formal education or training in how to write these types of documents, he did mention a colleague who served as a mentor. This colleague worked in the quality assurance department of the company, and she provided him with quick feedback on his documentation. This feedback allowed him to improve his writing over time, and produce better documentation.

As he prepared to go back to school after the start-up company lost its funding, he found that it took significant time for him to write application essays, as this was writing he was not used to doing. Once in graduate school, he did not feel that writing was a different transition, but he acknowledged that it could have entailed a "big learning curve." His writing in graduate school has covered a wide range of documents. He wrote class reports in some classes, essays for a successful application for the NSF Graduate Research Fellowship Program (GRFP), several sections of a draft paper that was never published, and was working on his own first paper submission at the time of the interview. He had also written a new project and the tutorial materials for students for a class when he was a Teaching Assistant (TA), creating step-by-step instructions for the students to follow. In addition, he had written protocols for animal research involving surgery on rats. He specifically mentioned that these protocols had to follow a very rigorous template, and that it was important to include the proper level of detail so that the protocol was flexible enough to cover simple changes in procedures, but specific enough to be approved. He also discussed less formal documents such as e-mail communications, and spoke of barriers that he saw in communicating with some international collaborators, based on specialties of the people involved, and mentioned an incident in which he felt there was some miscommunication.

His graduate advisor provided a minimal level of mentoring, primarily in advising him to read journal papers to become familiar with the way they are written and helping Alexander outline a

research paper; his advisor told him that he is a good writer. He also pursued some formal education in writing as a graduate student, and took a class offered by his engineering school focusing on NSF GRFP applications. In this class, students wrote their NSF fellowship essays, received extensive feedback from professors who had served as reviewers for this fellowship, and produced multiple drafts of their essays as the class progressed.

Benjamin

Benjamin had extensive work experience, with ten years passing between the completion of his bachelor's degree and starting the master's degree, and another six years between finishing his master's degree and beginning his doctorate. His work experience included work on GPS, embedded systems, and avionics for a defense contractor, as well as work for small consulting companies, a bank, and a large insurance company. His specific job tasks included writing code, designing software architecture, and teaching corporate education. His writing in industry included design documentation, test plans, proposals, standards documents, process documents, user documentation, and some business documentation. His audience for these documents was generally his peers, and the documentation was intended to be informative, used for training and occasionally for decision-making. He said that in his industry experience, "everyone assumes you must already know how to write" because of being a university graduate. He also mentioned that he modified his writing based on the audience, including their preferences for format, and discussed the issue of length and level of detail. In his experience, design documents tell more of a story, while end users of a design want something more succinct, with only the information they need. While in industry, he also wrote some papers on technical topics. Overall, his assessment of his writing in industry was that he had many opportunities to practice writing, but it was mediocre practice; he felt that the quality of writing in industry did not have to be as high as in academia.

In his first classes as a Ph.D. student, he described his writing as being similar to what he did in e-mails. He received feedback in his first semester, then took a formal class in academic writing offered through his engineering program during his second semester. In that class, he learned how to structure research writing, to write well, to become familiar with the different parts of a typical paper, and the need for writing multiple drafts and editing. He felt that this class showed that he had a fairly good process for writing, despite the fact that he felt the editing process was inefficient. He stated that while he was not a bad writer, he felt that he was not yet a research writer. However, he could see the "gap," and was making a conscious effort to bridge it.

Benjamin specifically talked about the tone of writing, and stated that in industry, writers lose their impact by hedging, and are expected to be decisive, while in academia, a certain level of ambiguity is expected. He also discussed the different standards for supporting assertions in writing. In industry, his own expertise was typically sufficient for making claims, while in academia, citing past work is extremely important. He felt that writing in graduate school was an adjustment, and that he needed to re-train himself in order to be effective in a new context. He was very reflective about his own writing, mentioning the need to understand the "ecosystem" of his new writing environment and recognizing its inherent values and differences. Thus, Benjamin was well aware of the need for adaptability and adjusting to the context and audience for his writing.

Charlotte

Charlotte's work history included five different companies. She started her career as a plant engineer, and switched to a series of different companies, primarily large firms. Her experience included some time with a consulting company as well as work for manufacturing companies. While she did make some contributions to proposals while consulting, her typical writing in industry consisted of e-mail communications. She spoke of sending e-mails on a daily basis, often for status reports or troubleshooting. She also wrote issue reports on problems. Her audience for her writing was exclusively internal customers, and she spoke of these e-mails as a "conversation on paper," and mentioned that she typically ignored pleasantries in the back-and-forth conversation. In industry, she had not had any formal education in writing, just relying on her undergraduate writing skills.

While she felt that writing came naturally to her in industry, and she had loved writing, her graduate school experience was quite different. She described herself as having been a "pretty confident person," but said that writing in graduate school has been a struggle for her. Charlotte spoke of academic writing as a "foreign land," and said that her professors wanted to help her, but didn't know where to start, because they "didn't know where I came from," and said that they expected a level of skill that she did not have. She felt that her industry experience writing was, if anything, a disadvantage; she stated that "when I write it, it doesn't come out in academic-ese." Her writing in graduate school, up to this point, has consisted of papers and class assignments, and she was frustrated with her lack of preparation for writing, especially compared to her classmates. In hindsight, Charlotte wishes she had taken a summer writing course before beginning graduate school. She mentioned initially resisting adapting to the expectations of her new discourse community, but she has started to "conform." Although she felt her writing was getting better, she was getting feedback indicating that her citations were too old, since she tended to want to cite the first people to work on something, rather than more recent work.

In learning to write in the academic context, she used both formal and informal resources. She sought out a professor, read some writing books that he recommended, and worked on her writing with him. She described this as the beginning of her renewed confidence in her writing abilities. She also used the university's writing center, and went to workshops held by her program. She felt that the workshops were less useful to her, because she tended to have questions, and needed to have an opportunity to ask them. She also leveraged her cohort in graduate school, and received feedback from them on her writing. She mentioned that she had heard academic writing described as a conversation, but felt that it was a very different type of conversation than the e-mail writing she had done in industry.

Denise

Denise's work experience was all with the Army Corps of Engineers, who is funding her graduate education, and for whom she still produces some documents. Her writing experience at work included some technical reports, incorporating many calculations, and many one-to-two page memos. These memos were primarily internal, at least initially; they were written to document decision-making, and went through the colonel in her area before going to the local agency with which the Corps was working. As she learned to write in the context of this job, she received extensive feedback from her bosses. They were both detail-oriented, and her initial

work came back with many red marks. Over time, this helped her to learn how to tailor her writing for this particular audience. Denise felt that she had an advantage in learning how to write in industry, since she had grown up in a “liberal arts family” and gone to a liberal arts-focused high school. At home, her father was a lawyer and her mother was a librarian, and this cultural capital meant that she clearly understood the importance of writing from an early stage in her life. However, she did not enjoy writing, asking, “What engineer likes it? Nobody likes writing.” However, she freely acknowledged its importance, and stated that industry taught her that others will judge a person based on one’s writing.

In graduate school, Denise has written papers for classes, project reports, and some research documentation for the state’s Department of Transportation (DOT). This documentation was a technical paper, published out of the university, in contrast to most of her writing on this project, which was internal for the state DOT. She commented on the need to communicate findings in a way that they can be implemented or action taken, and recognized that writing in industry and academia has a different purpose, style, and audiences. One feature she specifically mentioned was legal jargon, which she definitely did not encounter in academia.

Denise did not feel that the transition to academic writing was difficult, and said that her previous experiences helped her learn to adjust to new writing contexts. She intuitively felt that those extra years of practice in industry gave her an advantage. In learning to write in the academic context, she mentioned that her advisor has helped her with organization and formatting. Although Denise did not think her advisor was a good writer, he did teach her about being clear in her use of examples. In addition, she also reads academic papers to learn what is expected, and what sections need to be included. Denise commented that she has also learned writing skills from a lab mate, another returning graduate student who is a very good writer with more experience in academic writing. She noted that industry and academia have very different styles of writing, with writing in industry being direct, decisive, and purposeful. In fact, Denise said that graduate school course assignments did not feel valuable to her because they did not result in any action.

Discussion

There were definitely variations in the types of documents each participant generated in industry, and in their level of comfort with the transition to academic writing. Charlotte was at one end of a continuum, with her difficulties and lack of confidence, while the other participants did not seem to feel that transitioning was difficult. It is possible that this is a function of the type of writing that each person did; the other participants had to write in specific formats in industry, such as Army Corps of Engineers memos, FDA documentation, or test procedures. These specific formats required them to learn how to transfer their writing skills among different professional genres before they entered graduate school. Despite the variety of different experiences, some common themes emerged from the data. One overarching theme was the recognition that academic writing is different from writing in industry, with several key differences noted, such as the need for citations and evidence in academia, and the value of brevity and directness in industry. The participants had different views on their enjoyment of writing; while Denise specifically said that she did not like writing, despite her ease of adjustment to academic writing, while Charlotte had liked writing, although she had a difficult transition.

Theme #1: Need to support claims

One common theme was the need to support assertions and provide citations in academic writing. The students expressed this idea in several different ways, with Benjamin specifically stating that his own expertise was not sufficient anymore, as it had been in industry. All of the participants noted that all claims in academic writing required support, and that this was different from writing in industry, where citations and supporting evidence were far less necessary.

Theme #2: Brevity, directness, and purpose

Writing in industry was described as being brief and direct, with a clear purpose of communicating essential information, perhaps for internal decision-making or end-user instructions. Whatever the context, the writing results in some type of action. In academia, writing tends to be longer, with some ambiguity or uncertainty in conclusions. The students expressed that in industry, if someone “hedges,” then their writing will not be effective or convincing. In academia, in contrast, ambiguity is often present, and writers are more cautious about making definite assertions.

Theme #3: Audience awareness

All four participants realized that they needed to be adaptable, and had to be aware of their audience. Each was aware of the internal or external audiences who would be reading and acting on their writing in industry, such as their supervisors, the FDA, or local agencies of some kind. The students knew that a certain level of detail was expected, and that providing too much or too little detail would be negatively perceived. Several of them also mentioned the need to write so that “anyone could understand it” in industry; the implication was that this is not necessary in academia where the reading audience would be far more limited.

Theme #4: The role of feedback in learning to write

While some of the participants utilized formal avenues for learning to write in academia, all of them benefitted from feedback in both industry and academia. Much of their learning came from reading well written documents in the particular genre, modeling their work on those documents, and improving based on feedback from experts in that type of writing. It is interesting to note that none of them had any formal training in how to write in industry; it was expected that they would know how to write, and all of their training was informal and accomplished through feedback and examples of what constituted good writing in a given context.

Conclusions

These four students clearly were self-reflective on their transition from writers in industry to academia. Each recognized that some cognitive adaptation was necessary for successful writing in their Ph.D. programs, and Charlotte, in particular, had experienced considerable dissonance during the process of acculturation to academia. Furthermore, each was adept at finding and using various resources to help them learn to write in graduate school.

For professors who work with returner graduate students, it is worthwhile to recognize the strengths—capital—and weaknesses—costs—these students bring to classroom assignments and later academic research writing. Rather than assuming that graduate students already know how to write appropriately or will readily infer it, professors need to be explicit in introducing students to the expectations of their academic discourse communities. Although engineering professors are not experts in teaching writing, they do have ample experience writing publishable papers; that knowledge can be passed along to students along with the technical. What follows are some specific examples of how engineering professors can guide their graduate students through the transition to academic writing.

First, professors could collect and post examples of published papers they consider to be especially well written. It would help students if the professors would annotate the examples so the students could understand what makes them well written. In addition, if professors devoted some time during research lab group meetings or class sessions to discussing the rhetorical merits of the paper, this would enrich the learning experience for the students. Professors could also leverage the writing experience of their advanced students to have them lead research labspecific writing groups. These examples would be similar to students' learning from examples in industry.

Another idea, ideally complementing rather than substituting for the previous one, would be to post a list of onsite and online writing resources for students to consult. Some specific engineering programs, such as Charlotte's and Benjamin's, offer courses in academic writing, but this is still the exception rather than the norm in engineering. Their College of Engineering also provides short workshops on various writing topics open to all graduate students. On most campuses, there are writing centers that provide resources, including individual tutoring and workshops. These centers are often available to work with engineering professors to create customized writing workshops for engineering students. These writing centers also have online resources, and there are numerous graduate student listservs and blogs devoted to writing so that returners can access them at their convenience.

Any of these suggestions would benefit all new graduate students as they learn to write in their engineering discourse community, whether those coming directly from undergraduate studies, from industry, or even from either context in a non-English speaking country.

Limitations and Future Research

While this study has illuminated some themes in the transition from writing in industry to writing in academia, there is much work yet to be done in this area. The four participants in this study, while diverse, do not fully cover the range of writing that engineers encounter in industry, or the types of experiences they can bring to their graduate education. Neither do they represent the many disciplines in engineering, many of which have some specific rhetorical conventions that newcomers need to adopt to become members of their academic discourse communities. Furthermore, while three engineering disciplines are covered, these participants cannot be considered representative of their discipline as a whole, as each engineering discipline is diverse and practitioners work in many different types of positions in industry.

Another limitation arises due to the single university involved in the study. In addition to the limited study population size, different universities provide different types of services and training in the practice of writing. All of these limitations point to the need for further, more comprehensive, study on this topic.

A larger study involving students from other universities should be undertaken to more fully examine the types of writing that returning graduate students may have undertaken in industry, how they learned to write there, and how they later transferred those skills to academia. This study should attempt to learn the reasons why the transition is easier for some people and more difficult for others. In other words, it would be useful to determine what cultural or experience capital and use of strategies can help returners make the transition to academic writing more easily so that the costs of the transition do not undermine them.

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Appendix A – Interview Protocol

Interview Protocol

Opening Statements

- Thank you for taking the time to talk to me. I'm going to give you some background on how this will work.
- Explain interview logistics
 - Our conversation will be recorded and later transcribed. Everything you tell me will be confidential. All identifying information will be removed on the transcript and the audio will be kept in a secured location.
 - Do you have any questions about the consent form?
 - Can I get you to sign it if everything seems okay to you?
- Structure and purpose of the interview
 - The purpose of the interview is for me to understand your experiences with writing, in both the academic and industrial contexts, and how you understand the purpose and process of writing.
 - There are no right or wrong answers to any of the questions I ask you.
 - I'll ask follow-up questions so that we can arrive at a deeper understanding of your experiences.

- I'm going to leave some open time after I ask a question. I won't jump in to clarify a question if there is a pause. I want to give you time to think. If you need clarification of a question, please ask me.
- Do you have any questions for me before we get started?

Demographic questions

- I'd like to start by getting a little bit of information about you. How old are you?
- And how many years passed between the time you received your bachelor's degree and the time you returned to school?
- What were your undergraduate and graduate programs? (possible clarification – mechanical engineering, electrical engineering, etc.)
- What year are you in your program?
- What jobs did you hold between undergraduate and graduate school?

Previous writing experience

- Tell me about your writing experiences in industry.
 - Did you write technical reports, as part of your job? What types of written communication did you use? (e.g., status reports, process or product specifications, manuals, patent applications, proposals, technical reports, memos, trade journal articles, etc.)
 - Who were the audiences, both internal and external, for the writing you did in industry?
 - What was the purpose for the writing you did in industry?
 - How did you learn to write in industry? Did you have a mentor? Were there company guidelines for how to write particular documents?
 - Did you ever write academic papers (conference or journal) as part of your industry job?
- Tell me about your writing experiences in graduate school.
 - What types of documents have you written in graduate school? (Some ideas to prompt them: fellowship/grant applications, project reports in classes, papers of various types, etc.)
 - Have you written any conference or journal papers? (ask if they didn't already mention conference/journal papers in the above question – in either case, if yes, probe for details on them)
 - Have you begun writing your dissertation yet? (probe for details on that writing experience)

- Who were the audiences for the writing you have done as a graduate student? ○
What was the purpose for the writing you've done as a graduate student? What is it intended to accomplish?
- How did you learn to write in graduate school? (Additional questions to probe further: Did you learn from your advisor? A writing course or workshop? The writing center? Other students in the program? Textbooks?)

Transfer of writing experience

- Did you feel it was difficult to transition from writing in industry to writing in academia?
 - Did your writing experiences in industry help you write more effectively as a graduate student? If so, how?
 - Did your writing experiences in industry make it more difficult to write effectively as a graduate student? If so, how?
- What strategies did you use to transition from writing in industry to writing in academia?

Closing

- Do you have anything else you want to add about your experiences with writing, either in industry or as a graduate student?
- Do you have any questions for me?