The Future Possible Selves of Graduate Teaching Assistants in First-Year Engineering Programs

Rachel L. Kajfez and Holly M. Matusovich
Virginia Tech, rlouis@vt.edu, matushm@vt.edu

Abstract - **In first-year engineering programs (FYEPs) the use of graduate or undergraduate level teaching assistants (TAs) is very common, but based on the literature little is known about the teaching experiences of TAs or their future aspirations with regard to their identity. Since TAs have direct contact with first-year students and may have a great impact on students' education, it is important to understand the TA perspective in terms of why they are teaching and what they would like to do after graduation. This paper explores the future plans of graduate teaching assistants (GTAs) who teach in FYEPs through the analysis of a set of survey questions using Possible Selves Theory (PST). With this information, we can better prepare GTAs for their future careers and can better understand their experiences teaching and their identity which will ultimately lead to systematic enhancements to teaching appointments and therefore improvements in first-year student education.**

Index Terms – future possible selves, graduate teaching assistants, identity

INTRODUCTION

In first-year engineering programs (FYEPs), the use of graduate or undergraduate level teaching assistants (TAs) is common. Based on a past research project, the average size of these programs is 800 first-year students so it is expected that there are multiple sections requiring the use of TAs to provide consistency across classes [1]. TAs involved in these programs serve in a variety of roles such as graders, lecturers, assistants, etc. [1]. Despite their widespread use and importance in FYEPs, based on the literature little is known about the experiences of TAs, their identities, or their future aspirations from a research standpoint.

Since TAs have direct contact with first-year students having a great impact on their education, it is important to understand the TA perspective in terms of why they are teaching and what they would like to do after graduation. Possible selves theory (PST), originally developed by Markus and Nurius [2], can guide us in understanding those future perspectives by having TAs envision future possible selves. Accordingly, we used PST as our framework for this research.

This paper explores the future plans of graduate teaching assistants (GTAs) who teach in FYEPs through the analysis of a set of survey questions to better understand GTA's future possible selves, i.e., aspirations for who they want to be in the future. These conceptions can include but are not limited to future careers, family roles, positions within the community, etc. Armed with this information, we can better understand GTA experiences teaching and prepare GTAs for their futures. Our hope is that this information can be used to ultimately lead to systematic enhancements to teaching appointments and training which will impact the quality of teaching in FYEPs by GTAs.

I. The Larger Study

This study is part of a large multi-phased exploratory mixed methods research project aimed at understanding the motivation to teach and identity development as teachers of GTAs serving in FYEPs. The first phase of the project involved interviews and the second phase involved a national survey created from the literature, existing scales, and data collected in the interviews. Both approaches to data collection focused on motivation and identity from the GTA perspective.

II. This Analysis

This analysis focuses on a sub-set of the survey phase conducted within the context of the larger project. Specifically we examine the open-ended possible selves questions along with some of the demographic information that was collected from the survey participants. This piece of the overall research project provides a unique perspective on GTA aspirations and desired future possible selves that can inform the rest of the research project and FYEP literature in general.

LITERATURE REVIEW

Based on a review of the literature, articles related to GTAs in engineering mainly focused on describing GTA development programs (e.g., [3], [4]) or guides and tools for GTA evaluations and assessments (e.g., [5], [6]). Articles in the first set usually focused on describing specific programs developed for unique departmental or organizational needs. For example, Crede, Borrego, and McNair [2] examined a GTA development program in engineering framed in communities of practice [7]. In their work, they discussed a program that was implemented to provide supported teaching experiences to engineering GTAs to enhance their teaching abilities. Articles in the second set tended to

describe evaluations or assessments of GTAs. For example, Cox, Hahn, McNeill, Cekic, Zhu, and London [5] documented a program called G-RATE which allowed multiple stakeholders to give feedback to GTAs about their teaching specifically with regard to pedagogy. Like the prior set of literature, these articles tended to be about single programs with specific, targeted, and unique needs. In engineering education, there is currently a need for research that methodically examines GTAs in engineering across programs providing a more holistic picture of the GTA experience.

An additional shortcoming in the literature on GTAs is that very few articles in the engineering literature present results from the GTA perspective. Many engineering articles related to GTAs provide faculty or student views of GTAs (e.g., [5], [6]) or provide wide programmatic perspectives (e.g., [8], [9]). Typically from these articles, we learn about students' views of their GTAs and GTA strengths and weakness in teaching along with information about specific appointment structures. There are some notable exceptions that do present work from the GTA perspective (i.e., they interviewed or surveyed the GTAs directly) including Crede and Borrego [10] and Saroyan, Dagenair, and Zhou [11]. In these studies, GTAs served as the source of direct data opposed to outside parties commenting on GTAs. By having this perspective, we are able to better understand the GTA experience and their reported future aspirations.

To understand the experience a person has it is necessary to consider identity. Identity is fundamental to who someone is and how they live and experience life. . For this study, identity is defined as the answer to the question "who are you?" [12], and it refers to the individual and personal answer to this question. This perspective on identity is different than other approaches to identity that include relational identity, collective identity, or material identity which all define identity from a perspective other than that of the individual [12]. Considering personal identity is fundamentally Eriksonian in nature. Erikson [13] believed "identity helps one to make sense of and to find one's place in, an almost limitless world with a vast set of possibilities" [14]. He also believed that identity developed over time through multiple stages and that individuals only had one identity that captured who they are opposed to multiple identities (i.e., being a different person in a different setting) [15]. Researchers in the fields of psychology and sociology have built on the work of Erikson in many different ways through research projects and theory generation (e.g., [16]).

For this study, the theory of possible selves [2] was used because it specifically targets an individual thinking towards their future possible selves which is connected to their current identity. For this research, we were specifically concerned with the views of GTAs in FYEPs related to their future possible selves.

THEORETICAL FRAMEWORK

PST is an identity theory in which individuals think to the future and envision who they would like and not like to become [2]. PST also requires that the view of the future self be connected with a current identity, be congruent with other aspects and goals of the current self, and be possible to attain [17]. Since PST considers individuals' personal views of their selves in future positions, it is an appropriate framework for this study that examines GTAs' views of their future possible selves including their aspirations.

PST has often been applied to high school settings examining student experiences and aspirations for the future (e.g., [18], [19]). Additionally, PST has been used to study teachers in the academic setting. A recent study by Hong and Greene [20] used PST to understand pre-service science teachers' views of the teachers they wanted and did not want to become. Their results indicated that past experiences in teaching and learning played a great role in their views of their future selves compared to their actual education program. PST has also been used in teacher and education literature to examine graduate students' identification with becoming a researcher and future faculty member [21] and paths towards becoming professional musicians [22]. While in different fields than engineering, these findings are applicable to GTAs in FYEPs in that through this research, we hope to understand GTAs' views towards who they would like and would not like to become.

Overall these studies demonstrate connections between possible selves and the academic setting. Understanding this perspective is important as GTAs are a key component to higher education. Despite considerable research on students with regard to PST, both at the high school and undergraduate level, and a few studies on teachers, little to no work currently exists that uses PST to study graduate students in engineering. The use of PST with graduate students is relevant because while not high school students or undergraduates, GTA still are developing as individuals in the professional sense and may be still deciding on a career path as they balance their roles as teachers, researchers, and students [23]. The information presented in this article contributes to the growing body of PST literature by focusing on GTAs in engineering, but it also contributes in general to engineering education literature.

METHODS

As mentioned above, this paper focuses on the results of a set of survey questions related to PST from a group of GTAs in FYEPs. Due to the small sample size which is discussed in detail below, the analysis methods were mainly descriptive, but they do help in understanding the GTA experience and their envisioned future possible selves. The results from this work aim to answer the following two research questions:

1. What are the future possible selves and aspirations of GTAs in FYEPs?

2. What are the general trends between the future possible selves and aspirations of GTAs and their demographic data?

I. Survey Question Development

The Next Year Possible Selves interview questionnaire [24] was adapted and used in this study by changing the question format to capture information about GTAs' future possible selves and aspirations. As an example, the original Next Year Possible Selves interview questionnaire included the following question related to positive future possible selves:

"Who will you be next year? Each of us has some image or picture of what we will be like and what we want to avoid being like in the future. Think about next year -- imagine what you'll be like, and what you'll be doing next year."

Following this prompt, the questionnaire directs participants in the following way:

"In the lines below, write what you expect you will be like and what you expect to be doing next year. In the space next to each expected goal, mark NO (X) if you are not currently working on that goal or doing something about that expectation and mark YES (X) if you are currently doing something to get to that expectation or goal. For each expected goal that you marked YES, use the space to the right to write what you are doing this year to attain that goal. Use the first space for the first expected goal, the second space for the second expected goal and so on."

This questionnaire is accompanied by a table as it is usually administered in an interview. The table provides space for the participant to write out their answers systematically. Due to the electronic format of the survey developed for this work, this interview based format was unrealistic so the question was adapted to the following two part question:

1. Think about your life after graduation -- imagine what you will be like, and what you will be doing. Each of us has some image or picture of what we will be like and what we want to avoid being like in the future. In the text boxes below, write what you expect you will be like and/or what you expect to be doing after you graduate. Please list up to 5 goals.
2. On the previous page, you identified goals for after graduate (repopulated below). In the small text box to the left of each expected goal, mark NO (0) if you are not currently working on that goal or doing something about that expectation, and mark YES (1) if you are currently doing something to get to that expectation or goal. For each expected goal that you marked YES (1), also write what you are doing now to attain that goal with the goal in the corresponding larger text box.

Similar to the original version, the version used for this survey also had a table-like structure that allowed participants to enter in their results, but it also self-populated their responses so they could answer all the parts of the question marking yes and no and commenting next to their original responses when needed. Formatting the question in this manner, allowed for an exploratory perspective on future possible selves where the participants were allowed to enter any answer they saw fit. Another approach would have been to provide them with choices, but this would have been limiting and not in the open-ended spirit of the Next Year Possible Selves interview questionnaire. The examples provided above demonstrate the conversion of the positive future possible selves question from the original questionnaire. There is also a negative version of the question in the questionnaire which follows a similar format that was also adapted for this work.

In addition to the PST questions in the survey, basic demographic questions were also asked relating to age, race, gender, major, past experience teaching, etc. Additional items were also included the survey, but they are beyond the scope of this paper. The survey was pilot tested with four individuals to ensure validity in the survey.

II. Participants

The results related to the PST questions captured the future possible selves and aspirations of 26 GTAs. The GTAs represent seven different FYEPs. Some FYEPs are only represented by one GTA, but those individuals balance out the sample and provide a more holistic view of GTAs' perspectives. The survey was originally sent out to 134 GTAs, but after removing the incomplete surveys (i.e., removing any surveys where the PST questions were not answered), only 26 useable entries remained. The potential participant pool of 134 was established through the work detailed in a previous publication [1]. In short, the potential GTA participants were contacted via email through addresses provided by their FYEP directors. The directors were identified through a snow ball sampling technique for a study that aimed to gather general information about FYEP across the county [1]. The demographic information for the GTAs who responded to the survey is summarized below in Table 1.

TABLE I
PARTICIPANT DEMOGRAPHICS

Demographic Type	Item	Response	Number Out of 25	Percentage
General Demographics	Gender	Male	16	62%
		Female	9	35%
		No Response	1	4%
	Race	White	15	58%
		Asian	3	12%
		Black/African American	2	8%
		Hispanic/Latino	3	12%
		Other	1	4%
		No Response	2	8%
	Age	30 or Younger	21	81%
		31 to 40	3	12%
		41 or Older	1	4%
		No Response	1	4%
Engineering Demographics	Degree	PhD	17	65%
		Master's	9	35%
	Discipline	Traditional Discipline	15	58%
		Engineering Education	7	27%
		Other	3	12%
		No Response	1	4%
Teaching Demographics	General Experience	Prior Experience	20	77%
		No Prior Experience	6	23%
	FYEP Experience	First-Term in FYEP	12	46%
		Not First-Term in FYEP	14	54%

Based on the data provided in Table 1, the sample, while small, was diverse in terms of different gender, age, race, degree level, experience, etc. It was also diverse in that it captured information from different FYEPs.

III. Analysis

The analysis of the data took place in two stages. The first stage involved open coding the responses to the PST questions following the recommendations of Rossman and Rallis [25]. This type of analysis allowed themes related to future possible selves and aspirations to emerge from the data. The positive PST question data served as the main source for the development of the codes and then the codes was applied to the negative PST question data as appropriate. The second stage of analysis involved comparing the themes generated in the first stage to the demographic information gathered in the survey. For this analysis we were looking for trends related to future possible selves and aspirations and the types of GTAs represented in the sample. Again, due to the small sample size, no statistical analyses were conducted, but the trends do point to areas of future work.

RESULTS

To situate the results, we provide some context about participants' reasons for teaching because very early in the study we noticed that there were trends in the data related to why the GTAs were currently teaching. To capture this information GTAs were asked to select all of the responses (six possible and an "other") that applied to why they were teaching. Out of the 26 GTA participants, 21 cited they

were teaching because "they enjoyed teaching," and only 3 cited they were teaching because "a research opportunity was not available." Additionally, 18 cited they were teaching "to gain experience for their future career." However, 24 GTAs did cite that they were teaching "to receive funding." We believe this information provides context for the findings in terms of motives for teaching as relevant to personal identity...

Based on the first stage analysis, five themes emerged from the data capturing a majority of the future possible selves and aspirations listed by the GTAs. Three were related to the future jobs while two themes were more general. Figure 1 summarizes the major themes.
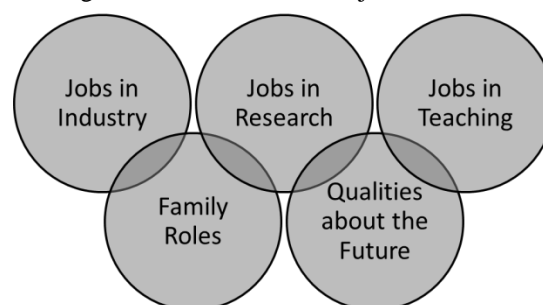

FIGURE 1
FUTURE POSSIBLE SELVES AND ASPIRATION THEMES

While there were five themes that emerged from the data, it should be noted that was overlap between the themes and that any given GTA had the opportunity to list up to five future possible selves or aspirations for both the positive and negative question so these items are not independent of one another. Each theme has been described below with sample quotes provided where appropriate. We start by examining the three job themes and then move into the more general themes.

Based on the survey data, jobs in industry included a range of careers that were both well-defined and vague. For example Participant 1 simply said "get a job in industry first" while Participant 8 said "continue developing my energy research and development company." These quotes show that even for those GTAs who identify working in industry as part of their future possible job there is a variety of goal setting related to that field of work.

In terms of research, a similar variety was observed. For this particular theme, GTAs mentioned research both in academia and in industry which was directly related to the overlap in themes mentioned above. For example, Participant 19 listed "professor at a research university" while Participant 26 specifically said "research in industry." The variability suggests that GTAs view research as something that can be done in different future role settings.

For jobs in teaching there was variety in terms of teaching positions that GTAs saw themselves taking in the near and distance future adding a time element to their views of the future. For example, Participant 5 said "professor at undergraduate teaching focused institution" while Participant 16 said "return to academia at some point to teach in higher education." Here Participant 16 suggested

that he will take another position before teaching but that it is something he is considering opposed to Participant 5 who seems himself having that role as an option right after graduation.

As shown in Figure 1, there were two themes that did not relate to specific jobs but where prevalent in the survey data. The first was family roles. In most cases, this was listed as "get married" or "start a family." These were personal life aspirations that were important to GTAs. The second more general theme was qualities about the future. For this theme participants did not list a specific job or role. They cited qualities related to who they wanted to be or the types of lives they wanted to have. For example, Participant 17 said "I hope to be happy with my lifestyle and situation." Similarly, Participant 24 said "leading by example." These items demonstrate the GTAs may not always have a specific job or role in mind for the future, but they do know who they would like or not like to become in a more holistic sense.

The five themes detailed above captured a majority of the information in the future data, but there were a few items that did not directly fit into the themes that are noteworthy. For example, Participant 4 was the only GTA to list "obtain my professional engineering license." Also Participant 14 said "guest speaking at events that promote STEM fields." While both related to engineering, these examples demonstrate that despite the trends in GTA future possible selves and aspirations, every GTA is different and has unique future plans that may or may not conform to the norm.

Based on the second stage analysis, four observations were made comparing the open-ended coded data and the demographic information. It should be noted that these items are only observations and point to items that need to investigated further in future work. A fifth observation was made between the positive and negative data sets. The five main observations were:

1. Research is a more frequently cited theme for males compared to females (8 occurrences for 16 males compared to 3 occurrences for 9 females).
2. Two males and two females cited a family roles theme.
3. All of the engineering education GTAs listed a teaching specific theme as their first item except for one participant while only one of the non-engineering education GTAs listed a teaching theme item first.
4. All three of the GTAs from civil engineering listed something vague related to just finding a job first while no one else did.
5. Qualities about the future themes were listed more frequently in the negative future possible selves and aspirations (i.e., things to avoid) (21 occurrences) compared to the positive future possible selves and aspirations (9 occurrences).

The five main observations above serve as points of discussion for this paper and suggest areas for future work and exploration. Both have been included below.

DISCUSSION

For the GTAs in this study, a range of future careers were listed that mainly focused on the areas of industry, research, and teaching. The notion of future careers is something that has been explored in PST literature, but it usually relates to K-12 students' views to the future (e.g., [26], [19]). Moving out of the K-12 scope, Hong and Greene [20] explored the details of a future career for science teachers. They hoped to better understand pre-service science teachers hoped and feared selves in the workplace to better prepare them for their upcoming careers. While their research focused on one future career (science teaching), through our work and understanding what the future possible selves of GTAs are, we too hope to better prepare GTAs for their future careers in teaching or other fields.

The idea of future careers was also a key point in the dissertation work by Winters [27] who examined the early career choices of undergraduate engineering students. While her work specifically looked at those who completed an undergraduate degree in engineering, opposed to GTAs as this work did, her research revealed that there are variety of future career options to engineering students and that many factors influence their career choices and goals (e.g., economy, family, interests, etc.). Although different populations were studied, the finding that students have a variety of future career and family-related aspirations is consistent across the two studies. In general based on the results of this work, we believe that participating in teaching as a graduate student opens up more possibilities for future careers for GTAs which could involve teaching.

FUTURE WORK

To further expand this work we can first address the observations in the second stage analysis and then we can look to expand the sample and findings. Both have been discussed below.

In the future, we would like to examine the differences by gender of GTAs and their future possible selves and experiences. The observations suggest that there are similarities between males and females in engineering related to these items, but that there are key differences as well. Before we can make any concrete claims, additional data is needed. Similarly, we would like to examine the differences by major. Even in this small sample we saw initial differences. Additionally work will be needed to truly substantiate these observations, but this research has taken a step towards being able to explore that area.

While we observed trends in the data that can be used to guide GTA programs and serve as direct avenues for future work, we would also like to explore these findings in other contexts beyond the sample. For example, do these

findings hold true outside of FYEPs? This could include major specific courses or it could include investigations outside of engineering all together. Also are different themes prevalent in other majors? Again this could be expanded to other areas of engineering or other areas of higher education in general. By understanding these questions we will be able to continue to support GTAs unique needs both in engineering and beyond. Additionally, this work could be expanded to students and early career faculty to understand their future possible selves and aspirations, but to also track changes over time. This type of analysis would help in understanding how someone reaches or does not reach a desired future and that information would be directly applicable to programmatic changes.

This analysis is one small piece of much larger project. Therefore, there are many avenues and opportunities for future work and exploration related to GTAs in engineering.

CONCLUSIONS

Similar to other studies about GTAs in FYEPs, all GTAs are unique. Here we have examined the future possible selves and aspirations of GTAs and determined that those views are influences by future jobs but also family roles and general life qualities. As engineering educators, it is our job to be cognizant of these future aspirations taking into account the unique needs of each of our GTAs.

REFERENCES

[1] Louis, R. A. & Matusovich, H. M. (2012). *Work-in-progress: Describing the responsibilities of teaching assistants in first-year engineering programs*. Paper to be presented at the 42th Annual Frontiers in Education Conference, Seattle, WA.

[2] Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist, 41*(9), 954-969.

[3] Crede, E., Borrego, M., & McNair, L. D. (2010). Application of community of practice theory to the preparation of engineering graduate students for faculty careers. *Advances in Engineering Education, 2*(2), 1-22. Retrieved from http://advances.asee.org/vol02/issue02/papers/aee-vol02-issue02-p04.pdf

[4] Lewandowski, G., & Purdy C. C. (2001). Training future professors: The preparing future faculty program in electrical and computer engineering and computer science at the University of Cincinnati. Paper presented at the 108th American Society for Engineering Education Annual Conference and Exposition, Albuquerque, NM.

[5] Cox, M. F., Hahn, J., McNeill, N., Cekic, O., Zhu, J., & London, J. (2011). Enhancing the quality of engineering graduate teaching assistance through multidimensional feedback. *Advances in Engineering Education, 2*(3), 1-20. Retrieved from http://advances.asee.org/vol02/issue03/papers/aee-vol02-issue03-p04.pdf

[6] Matusovich, H. M., Lee, W. C., Janeski, J. A., & Winters, K. E. (2011). *How instructors and classroom climate contribute to the motivation of first-year engineering students*. Paper presented at the 118th American Society for Engineering Education Annual Conference and Exposition, Vancouver, BC.

[7] Wenger, E. C. (1998). Communities of practice: Learning, meaning, and identity. New York, NY: Cambridge, UP.

[8] Brannon, M. L., & Zappe, S. (2009). *Preparing graduate students to teach: A seminar on teaching for graduate assistants in engineering*. Paper presented at the 116th Annual American Society for Engineering Education Conference and Exposition. Austin, TX.

[9] Mullin, J., Lohani, V. K., & Lo, J. (2006). Work in progress: Teaching a first semester freshman engineering course: A team effort between faculty and graduate teaching assistants at Virginia Tech. Paper presented at the 36th Annual Frontiers in Education Conference, San Diego, CA.

[10] Crede, E., & Borrego, M. (2009). *Preparing graduate engineering students for academia: Assessment of a teaching fellowship*. Paper presented at the 116th American Society for Engineering Education Annual Conference and Exposition, Austin, TX.

[11] Saroyan, A., Dagenair, J., & Zhou, Y. F. (2009). Graduate students' conceptions of university teaching and learning: formation for change. *Instructional Science, 37*(6), 579-600. doi: 10.1007/s11251-008-9071-8

[12] Vignoles, V. L., Schwartz, S. J., & Luyckx, K. (2011). Introduction: Toward an integrated view of identity. In S. J. Schwartz et al. (Eds.). *Handbook of Identity Theory and Research.* (pp. 1-27). New York: Springer.

[13] Erikson, E. H. (1968). *Identity: Youth and crisis.* New York: Norton.

[14] Schwartz, S. (2005). Identity for identity research: Recommendations for expanding and refocusing the identity literature. *Journal of Adolescent Research, 20*(3), 293-308. doi: 10.1177/0743558405274890

[15] Munley, P. H. (1977). Erikson's theory of psychosocial development and career development. *Journal of Vocational Behavior, 10*(3), 261-269.

[16] Marcia, J. E. (1993). The ego identity state approach to ego identity. In J. E. Marcia, A. S. Waterman, E. R. Matteson, S. L. Archer, & J. L. Orlofsky (Eds.), *Ego Identity: A Handbook for Psychosocial Research.* (pp.1-21). New York: Springer-Verlag.

[17] Oyserman, D. & James, L. (2011). "Possible identities." In S. J. Schwartz et al. (Eds.). *Handbook on Identity Theory and Research*. London: Spring, pp. 117-145.

[18] Oyserman, D., Bybee, D., & Terry, K. (2006). Possible selves and academic outcomes: How and when possible selves impel action. *Journal of Personality and Social Psychology, 91*(1), 188-204. doi: 10.1037/0022-3514.91.1.188

[19] Packard, B. W., & Nguyen, D. (2003). Science career-related possible selves of adolescent girls: A longitudinal study. *Journal of Career Development, 29*(4), 251.

[20] Hong, J., & Greene, B. (2011). Hopes and fears for science teaching: The possible selves of preservice teachers in a science education program. *Journal of Science Teacher Education, 22*(6), 491-512. doi: 10.1007/s10972-011-9247-y

[21] Benishek, L. A., & Chessler, M. (2005). Facilitating the identity development of counseling graduate students as researchers. *Journal of Humanistic Counseling, Education and Development, 44*(1), 16-31.

[22] Schnare, B., MacIntyre, P., & Doucette, J. (2011). Possible selves as a source of motivation for musicians. *Psychology of Music, 40*(1), 94-111. doi: 10.1177/0305735610391348

[23] Louis, R. A. & McNair, L. D. (2011). *Graduate student identity in engineering and education: The creation of an identity construct.* Paper presented at the 9th International ePortfolio and Identity Conference, London, UK.

[24] Oyserman, D., Bybee, D., Terry, K., & Hart-Johnson, T. (2004). Possible selves as roadmaps. *Journal of Research in Personality, 38*(2), 130-149.

[25] Rossman, G. B., & Rallis, F. S. (2012) *Learning in the Field: An Introduction to Qualitative Research*, Thousand Oaks, CA: Sage Publications.

[26] Kerpelman, J. L., Shoffner, M. F., & Ross-Griffin, S. (2002). African American mothers' and daughters' beliefs about possible selves and their strategies for reaching the adolescents' future academic and career goals. *Journal of Youth and Adolescence*, *31*(4), 289-302.

[27] Winters, K. W. (2012). *Career goals and actions of early career engineering graduates* (Doctoral dissertation). Retrieved from http://scholar.lib.vt.edu/theses/available/etd-03292012-111315/

AUTHOR INFORMATION

Rachel L. Kajfez PhD Candidate, Virginia Tech, rlouis@vt.edu

Holly M. Matusovich Assistant Professor, Virginia Tech, matushm@vt.edu