2021 ASEE ANNUAL CONFERENCE
Virtual Meeting | July 26–29, 2021 | Pacific Daylight Time
Paper ID #32369

Inform Track: Integrated Teaching and Leadership Development Program for Graduate Teaching Assistants

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Abstract

A team of engineering faculty at the University of Illinois at Urbana-Champaign created an integrated teaching and leadership development program in 2016 after realizing the need for both pedagogical training and leadership education for graduate teaching assistants (GTAs). Training in teaching and leadership at the graduate level are often separated even though the skills needed for good teaching are highly transferable, and many are nearly identical to skills possessed by good leaders. Through this program, GTAs are expected to develop teaching skills as well as leadership skills. Each session in the program provides context in applying leadership skills in their day-to-day duties as a teaching assistant. This program is bringing collaboration across campus with speakers from other non-engineering units, such as the campus-level teaching and learning center, the campus-level leadership center, and the Department of Theatre. Industry speakers are also invited to provide a workplace perspective, with two corporate representatives and a group of local technology entrepreneurs presenting in the past year. Four of the largest engineering departments have since joined the initiative by requiring their new GTAs to complete the program as part of their on-boarding process. With an initial cohort of 13 graduate students in Spring 2017, the program has now grown to over 190 in Fall 2019. To assess the perception of transferability between teaching skills and leadership skills among participants in the program, a comparison group versus treatment group study was conducted in Fall 2018. The comparison group is comprised of new engineering GTAs who did not participate in the program and the treatment group is comprised of participants in the program. This paper will present the result of the study and discuss lessons learned from implementing an integrated teaching and leadership development program.

Introduction

Graduate students in engineering play multiple roles in their degree programs. During their time in graduate school, they should be exposed to opportunities to develop a professional identity that relates to being a researcher, teacher, engineer, manager, team-player, leader, entrepreneur, etc. Among these roles, graduate teaching assistants (GTAs) are crucial not only for their own benefit but also for undergraduate students, as in many cases they are the main contact an undergraduate student has with the course staff. In addition, a teaching assistantship can be a platform for them to harness skills that are valuable for future careers in either academia or industry. As such, we designed a one-credit-hour semester-long course that provides instruction in pedagogy for new GTAs while highlighting how teaching skills can transfer to their future leadership roles. This paper reviews the historical evolution

of leadership programs and teaching assistant training programs for engineering students and rationalizes the approach of combining the two programs, based on the literature of professional identity development.

Early Engineering Leadership Programs

The inception of engineering leadership programs in the United States was prompted by the industry's need for technical leaders and managers. The first wave of programs was created in the 1990s at universities with strong connections to industries[1,2,3]. These programs were degree programs that aimed to train engineering leaders who already possessed technical skills but needed development in managerial and business skills. The Gordon Institute at Tufts pioneered a M.S. program for working engineers with admission through nomination by employers. At the University of Michigan, a five-year B.S./M.S. program was offered with a focus on manufacturing engineering and global perspective. Meanwhile, Penn State developed a new undergraduate minor with an emphasis on teamwork and customer interaction. Despite the differences in degree options and course offerings, these early engineering leadership degree programs shared common goals of developing project management, teamwork, and communication skills for engineers.

While degree programs provide vigorous leadership training for engineers, non-degree programs offer an informal learning experience for engineering students. This alternative can be particularly helpful for graduate students who are focused on the research aspect of their education. Northeastern University started one of the first graduate certificate programs in the United States, which required nomination by employers or the student's degree program. Participants took courses in leadership and engaged in a project-based learning experience with mentors[4,5]. Northwestern University's graduate fellowship program takes a different approach by not imposing any courses. Its five-month program allows fellows to participate in small group discussions, attend a day-long symposium, and have the opportunity to study additional leadership topics[6]. The latest graduate leadership certificate program at MIT, launching in Spring 2020, has a hybrid requirement of both taking the course and attending a workshop[7].

History of Graduate Teaching Assistant Training

TA training programs began appearing more frequently in the late 1970s and early 1980s[8,9]. Universities began to address the fact that although GTAs perform a crucial role in undergraduate education, they generally received little or no formal training as educators.

There are three common models of TA training[10]. The first is a one- or two-day seminar or workshop, given once or twice a year to new GTAs, which is typically administered by a department or a college-wide teaching center. The second common format is a semester-long training course, often developed by a department for their own GTAs. The third is a more intense experience similar to an internship or mentoring program.

The day-long and semester-long training programs tend to focus on pedagogical topics, such as how to run a lab experiment, how to develop a rubric for grading, and how to use inquiry based learning. A few programs explicitly cover professional development topics. One example is the program at the Southern Illinois University at Carbondale, which addresses topics such as how to interview for a job, time and stress management, and creating a CV[11]. Other programs have added topics such as diversity and inclusion[12]. These topics tend to

be interleaved with the teaching topics, so in one lecture the class might cover rubrics and in the next lecture it might cover interviewing skills.

Professional Identity Development

Developing a professional identity is a critical aspect of a training program. Whether at the undergraduate or the graduate level, engineering degree programs are very demanding, and, according to the Identity-Based Motivation theory of Oyserman[13], a student must be motivated in order to earn their degree. A teaching assistantship offers the graduate a student a great opportunity to develop professional identities beyond the primary ones associated with graduate study (e.g. researcher).

In addition to the research and coursework required of them, most graduate students play other supporting roles in their departments, such as teaching assistantships or leadership roles in their research group. It follows that the engineering identity literature describes additional identities possessed by engineering doctoral students (EDSs), such as student, teacher, and researcher. Some students' engineering identity may be "transitional"—which indicates that their engineering identity is not stable, generally due to lacking a social component in their engineering identity—or permanent, which usually accompanies strong role and social identities[14,15]. Perkins finds that EDSs with a transitional engineering identity among engineering graduate students tend to find their graduate studies to be an isolating experience, whereas those with permanent engineering identity tend to make positive engagements and significant impacts to their field during their doctoral studies[15].

Among those GTAs who participate in teaching, Miller et al. and Kajfez identify "strong," "weak," and transitional teaching identities[14,16]. Strong teachers are those who want to teach; they tend to aspire toward teaching in their careers. It is suggested that advanced teaching opportunities be made available to these GTAs so that they can refine their teaching skills. Weak teachers typically have different career goals that do not include teaching. It is recommended that they be educated about the transferability of teaching skills to motivate them to use their teaching duties as opportunities for professional development. Transitional teachers tend to be competent and even passionate about teaching, but have professional aspirations that are unrelated to teaching. They often also have difficulty developing a strong EDS identity. Miller et al. found that EDSs who possess identities ancillary to the engineering identity [student, GTA, researcher] still have a desire to do good research. Their work can result in positive societal contribution, helping them to develop deeper interest and autonomy in their work, which also reinforces their EDS identity. They recommend giving the GTAs with a transitional teaching identity different teaching roles such as lecturer, curriculum developer, or supervisor so that they can investigate multiple contexts of teaching to help to strengthen their teaching identity.

These findings suggest that by offering graduate students who do not naturally possess strong engineering identity the opportunity to develop their identity in a related engineering skill such as teaching, engineering schools may be able to increase the retention of EDSs by giving them motivation to develop identity in a role that supports the engineering education mission, which also provides transferable skills that may be useful in an industry role. In that spirit, our program uses an integrative approach where teaching and leadership topics are presented as mutually reinforcing. In previous work, we described in detail the creation of our program at the University of Illinois at Urbana-Champaign[17]. The perception among

students of transferable skills should be effective in increasing motivation. It is not yet clear whether the students enrolled in the program share the instructors' perception that these skills are transferable. In this paper, we will focus on GTAs' perception of transferability between teaching skills and leadership skills.

Program Evaluation

As a part of a theory-driven program evaluation project which was conducted during Fall '18 and Spring '19, this paper reports on the preliminary results of how the assumptions of program designers—in this case, a group of faculty—are shared or not shared among engineering students by using the pre-survey data before the program implementation from Fall '18. Theory-driven evaluation assesses not only whether an intervention program is effective or not (program outcomes), but also utilizes program theory to frame the evaluation. The program has achieved its intended outcomes of the program—an increase of students' teaching self-efficacy—and an outcome study has been reported[17]. As a next step, the objective of this paper is to understand how a program theory based on the program designer's assumptions are shared or not shared. Program theory as defined in the community of program evaluation incorporates program designers' and stakeholders' assumptions on how the program would work[18]. The understanding of the program theory will be used to explain how and why the program is working or not working to achieve outcomes in a future work.

As discussed in the literature review, traditionally, students are exposed to training on teaching and professional (or leadership) skills separately. In our teaching and leadership program, these two separate practices are combined into one program with two assumptions of the program designers. First, teaching and professional skills share several components, thus allowing for transferability. Skills acquired in teaching settings can be transferred to other professional settings. Second, students' perceptions of the transferability between the two skill sets may play a role in the success of the program. However, while some literature support the ideas of transferability, this concept has not been applied to the connection between teaching and leadership. Additionally, due to the literature discussing the devaluation of teaching as a distraction from their degrees and low motivation among graduate TAs, the question still remains whether students understands the value of transferability between teaching and professional skills. Accordingly, this paper focuses on the first assumption of the program designers and answers the question of how engineering graduate students perceive the transferability between teaching skills and leadership skills. Findings from a quantitative analysis of students' survey responses show a high level of agreement with this assumption. A conclusive interpretation including a qualitative analysis of students' written feedback in the survey is shared at the end.

Methods

Participants and Procedures

The study recruited responses from a broad audience to understand general perceptions among engineering graduate students, including engineering student participants in the program (treatment group) and new engineering students who were not in the program (comparison group) at the beginning of the Fall '18 semester, before the program implementation. Participation in the program is mandatory for majority of the student in the treatment group. This procedure ensures that the perception is not particular to those

students who participated in the program. An approximate total of 330 students (220 in the comparison group and 110 in the treatment group) were invited during Fall '18. The response rates were 57% ($n = 129$) for the comparison group and 63% ($n = 69$) for the treatment group. A total of 198 students participated in the online survey during Fall '18.

Table I: Descriptive of Survey Participants

				Comparison Group		**Treatment Group**	
Variable		***N***	**%**	***n***	**%**	***n***	**%**
Gender	Female	46	23	29	22.5	17	24.6
	Male	150	76	98	76.0	52	75.4
	Other	2	1	2	1.6	-	-
Domestic	International	119	60	74	57.4	45	65.2
	Domestic	79	40	55	42.6	24	34.8
Degree	Masters	100	51	61	47.3	39	56.5
	Doctoral	98	49	68	52.7	30	43.5
N		198		129		69	

Table I shows the demographics of the students who participated in the study. Overall, more students from the comparison group ($n = 129$, 65%) than students from the treatment group ($n = 69$, 35%) participated in the study. There were more male students ($n = 150$, 76%) than female students ($n = 46$, 23%). In terms of students' residency, there were more international students ($n = 119$, 60%) than domestic students ($n = 79$, 40%). For education level, a similar number of students participated at the master's level ($n = 100$, 51%) and the doctoral level ($n = 98$, 49%). These representation patterns were similar both in the comparison and treatment groups.

Instrument

We administered a modified version of the Skills Perception Inventory which was originally developed by Alpay and Walsh[19]. Alpay and Walsh's inventory was initially developed to measure engineering graduate students' confidence levels after attending three-day workshops to enhance transferable skills in four areas: 1) communication, 2) group work, 3) project planning and management, and 4) personal awareness. We selected this inventory because of its emphasis on the concept of transferability underlying the skill definition represented in the inventory. Because Alpay and Walsh's original version asked about confidence levels, we modified the inventory to understand students' perceptions of the transferability between teaching skills and leadership skills. A modified version included eighteen items measured on a 6-point Likert scale (1 meaning strongly disagree and 6 meaning strongly agree). On this scale higher scores indicate that students more strongly perceive teaching as an opportunity to hone skills that are transferable to other professional (or leadership) contexts.

In validating the instrument, we conducted Explanatory Factor Analysis (EFA) using the Principal Axis Factoring method in R statistical software[20]. We used data collected during both Fall 2018 and Spring 2019 with a total of 263 students. As this preliminary report is a part of a bigger study, EFA was performed at the bigger study level, including both Fall '18 and Spring '19. However, analysis of this preliminary report does not include the data

collected in Spring '19 since there was no comparison group in the data set. We treated the survey items as continuous variables since the number of Likert-scales are greater than five[21]. Although the original instrument included four factors, the results from scree plot[22], Kaiser Rule[23], and Horn's Parallel Analysis[24] suggested one factor to be retained. Perhaps this is because the original instrument measures the confidence level of four areas in which student may feel differently, while the transferability perception can point to one underlying structure which views all four areas as transferable to other contexts. Using a cut-off value of 0.30 for factor loadings and 0.40 for communalities, we kept a total of 15 items out of 18 that met the communality values ranging between 0.44 and 0.69. The factor loadings ranged from .66 to .83, and 57.5% of total variance was explained by the instrument. For the construct reliability measure, the Cronbach α was .95 with 95% CI [.94, .96] for transferability scale ("experiences as a teaching assistant improve the ability to describe the facets of positive development of professional/leadership skills"). Appendix A shows the final results of the factor loadings and reliability measure.

Quantitative Analyses and Results

In this analysis, we aimed to examine if there was a statistically significant mean difference between comparison and treatment groups in their transferability perception score, including gender, student's residency, and educational level, using independent t-test through SPSS 25.0. After removing six participants as outliers based on the box-plots, our data did not yet meet the normality assumption based on histograms, $Q-Q$ plots, and the Shapiro-Wilk test ($w = 0.955, df = 192$, $p < 0.001$). Accordingly, we performed an independent t-test using the bootstrapping method suggested by Field[25] with bootstrap sample size of 1000. Additionally, Levene's test results suggested that equality of variance assumptions would hold between comparison and treatment groups for each variable; therefore, we computed all independent t-tests assuming homogeneity of variance.

Table II: Results of Independent t-test with Bootstrapping Method and Descriptive Statistics for Transferability Scale

	Comparison Group			**Treatment Group**			**95% CI for Mean**			
Outcome	***M***	***SD***	***n***	***M***	***SD***	***n***	**Difference**	***t***	***df***	***d***
Overall	5.17	0.59	125	5.14	0.62	67	-0.16, 0.21	0.30	190	0.05
Female	5.18	0.51	27	5.28	0.53	15	-0.43, 0.21	-0.57	40	0.20
Male	5.17	0.62	96	5.10	0.64	52	-0.16, 0.29	0.62	146	0.11
Masters	5.23	0.62	58	5.23	0.55	38	-0.28, 0.21	-0.24	94	0.05
Doctoral	5.12	0.58	67	4.99	0.68	29	-0.15, 0.41	0.94	94	0.22
International	5.29	0.58	71	5.22	0.62	43	-0.16, 0.29	0.60	112	0.12
Domestic	5.01	0.58	54	5.00	0.60	24	-0.26, 0.29	0.07	76	0.02

Note. d= Cohen's d: 0.2 Small effect, 0.5 Medium effect, 0.8 large effect.
$^{*}p < .05$. $^{**}p < .01$.

Table II shows, on average, the difference in students' transferability scores between comparison ($M = 5.17, SD = 0.59$) and treatment ($M = 5.14, SD = 0.62$) groups was not statistically significant at alpha level of .05, t (190) = 0.30, $p = .78$ (two-tailed). The non-significant difference was also the case regardless of the gender (female students at t (40) = -0.57, $p = .58$ (two-tailed), male students at t (146) = 0.62, $p = .53$ (two-tailed)); educational levels (master's level at t (94) = -0.24, $p = .82$ and doctoral level at t (94) = 0.94, $p = .37$ (two-tailed)); and residency (international students at t (112) = 0.60, $p = .54$ (two-tailed), domestic students, t (76) = 0.07, $p = .95$ (two-tailed)). Additionally, the students view the transferability between the two skill sets at a relatively high level, approximately 5 out of 6 on the Likert scale.

This result was desirable given that the objective of this study is to understand whether or not the assumptions of program designers are shared or not shared among engineering students. In other words, students in the treatment group and the comparison group similarly tend to agree with the potentials of transferable skills, that skills acquired in teaching settings can be transferred to other professional settings, with 5 meaning moderately agree and 6 meaning strongly agree on the Likert scale.

Qualitative Analyses and Results

Our preliminary qualitative data analysis of the written feedback in the survey of students (both in the treatment and comparison groups) indicates that students articulated four skill sets that they viewed as transferable skills that can be applicable from teaching to their future professional context: communication, leadership, project management, and teamwork. The qualitative analysis was done independently from the quantitative analysis to understand emerging themes from students' feedback. The survey data was imported into NVivo 11. After cases were created, the empty responses and the incomplete answers were removed. Of 198 students who completed the survey, 70 students answered a question of 'what do you see as the relationship between being a TA and the skills you will need in your professional future?' A qualitative researcher completed line by line open coding.[26] These initial codes were then categorized under various themes and were finalized based on literature, generating a code book. The student responses were coded in multiple themes, as appropriate.

Table III: Descriptive of Participants Who Completed the Written Question

				Comparison Group		**Treatment Group**	
Variable		***N***	**%**	***n***	**%**	***n***	**%**
Gender	Female	19	27.5	12	63.1	7	36.8
	Male	50	72.4	28	46	22	44
N		69		40		29	
Domestic	International	31	44.2	17	54.8	14	45.1
	Domestic	39	55.7	24	61.5	15	38.4
N		70		41		29	
Degree	Masters	35	50	17	48.5	18	51.4
	Doctoral	35	50	24	68.5	11	31.4
N		70		41		29	

As Table III shows, the demographics of the students who completed the written question were similar to the ones who completed in the pre-survey, except the representation of student's residency and education level. More students from the comparison group (n = 41) than students from the treatment group ($n = 29$) completed the written question; more male students ($n = 50$, 72%) than female students ($n = 19$, 28%). For education level, an equal number of master's level students ($n = 35$, 50%) and doctoral students ($n = 35$, 50%) completed the written question. In terms of student's residency, there were more domestic students ($n = 39$, 56%) than international students ($n = 31$, 44%).

Table IV: Themes that Emerged from Coding

		Total ($n = 70$)		**Comparison Group ($n = 41$)**		**Treatment Group ($n = 29$)**	
Themes	**Examples**	***N***	**%**	***n***	**%**	***n***	**%**
Communication	'Conveying ideas and vision clearly is important for any scientist' 'Communication is important for both industry and teaching'	44	62%	27	66%	17	59%
Leadership	'As you mature, your role in your profession changes from being an individual contributor to a person who facilitates change through process and leadership. The role of the TA will help prepare one to lead and facilitate'	24	34%	12	29%	12	41%
Project management	'Leadership, communication, time management, ability to plan/prepare - organize - execute/lead - followup.' 'Mainly interpersonal skills, the ability to work with others on teams and lead teams, ability to communicate effectively and provide clear information'	12	17%	4	10%	8	28%
Teamwork	'A TA position will allow me to develop as a team member and communicate as a superior and to my superiors. Additionally, I will have to be able to switch my perspective and be able to approach a topic from multiple angles in order to help struggling students'	9	13%	3	7%	6	21%

As shown in Table IV, four themes emerged from students' responses in characterizing transferable skill sets that are common both in a teaching setting and an industry setting: 1) communication, 2) leadership, 3) project management, and 4) teamwork. Both comparison group and the treatment group demonstrated these four themes in the order of the frequency listed. 62% ($n = 70$) of survey participants suggested communication as a transferable skill. The comparison and treatment groups were similar in the frequency of communication theme with 66% and 59%, respectively. Characteristics that were cited was the ability to explain

and sell ideas, ask questions communicate to others (both novice and expert), so that they can understand concepts, and to have good public speaking skills so that they are able to give clear presentations.

Leadership is the next frequently suggested theme by the students, this was suggested by 34% ($n = 70$). Characteristics included being a mentor and having responsibility for others„ leading meetings or events, and exhibiting managerial skills and conflict resolution skills. 41% ($n = 29$) of the treatment group made comments suggesting this feature compared to 29% ($n = 41$) of the comparison group.

Overall, project management was suggested by 17% ($n = 70$) of students surveyed. Characteristics that described project management were someone who is confident and can solve problems. Someone who has secure knowledge, good time management and is organized. More students in the treatment group suggested this theme (28% $n = 29$) compared to the comparison group (10% $n = 41$).

The final theme of teamwork was suggested by 13% ($n = 70$) of students who participated in the survey. Again, like leadership and project management more students in the treatment group (21% $n = 29$) suggested this theme compared to the comparison group (7% $n = 41$). Characteristics that describe teamwork included having the ability to work and cooperate in a group.

Conclusions and lessons learned

Integrating the instruction of teaching skills with leadership is a critical feature of our program that makes it fairly unique among GTA training courses. While the findings from the quantitative analysis indicate that students tend to view teaching as an opportunity to hone transferable skills that can be applicable in other professional context (or leadership), qualitative data analysis of students responses in the written feedback show how students conceptualize transferable skills between teaching and their future professional setting. These findings offer an insight to the common practices in which students are trained on teaching and professional (or leadership) skills separately, and provide an alternative model of an integrative approach of two programs.

The principle that we used to design the program was that poorly-performing GTAs were likely unmotivated to do a good job because their career aspirations did not include teaching duties, and that some of them begrudgingly accepted a GTA position when a research assistantship did not materialize. Therefore, the authors believe that the underlying problem may be related to identity-based motivation and professional identity development of these GTAs. If students do not identify with their role as a teacher, they are less likely to be motivated to do the best work that they are capable of doing. Integration of teaching with leadership or other professional skills may help to direct their developing identity in a manner that values teaching for the professional development benefits that accompany effective teaching skills.

The program has benefited by leveraging many university units and resources, such as Leadership, ROTC, Theatre, Education, the college of engineering administration, and the alumni network, to enhance the integrative design in teaching many traditional “soft skills.” For example, our university’s leadership center has provided strengths assessment to our students, and the ROTC has presented an interactive session in the area of leadership, with

classroom examples as well as real-world examples. Our Theatre department has taught our students the physiology involved in establishing stage presence and effective vocal projection, which is beneficial in the classroom as well as the boardroom or factory floor. Our university's teaching and learning center has provided a specialist to teach rubric development and theories of motivation, which can be applied in both academic and non-academic settings. For example, the rubric development presentation covers how rubrics can be used to assess exams, homework, and quizzes as well as to conduct an employee's annual review. A dean from the college of engineering gives instruction on enforcing academic integrity, and our research park and alumni network has provided panelists for panel discussions where questions about professional ethics are deliberated.

Perhaps the single best practice that we employed was holding a weekly meeting to conduct lecture reflection and planning. In these meetings we perform regular checks on our lecture content to ensure that we do not lose sight of the integrative approach. The culture of the team is one that allows experimentation with new guest speakers, panelists, and teaching methods. The team, which comprises of faculty, graduate course aides, and specialists from across campus, is tightly-knit, friendly, and trusting. Every team member is open to new and creative ideas, which are discussed openly for their merits. Team members are comfortable with criticism (usually offering their own self-criticism) and tend to be understanding if one of their lectures or instructional innovations is dropped from the program. We meet with guest speakers before their presentation to ensure that the content is contextualized for both teaching as well as industry, and our team suggests examples that they can include in their lectures to address this goal. We hope that by sharing the inner workings of our program, it would offer some insights on starting and sustaining a teaching and leadership development program for engineering graduate students. A list of topics from the Spring 2021 semester is shown in Appendix B. Interested educators are welcome to contact the course instructors (Blake Johnson, Yuting Chen, and Mattox Beckman) for more details.

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Appendix A

Factor Loadings for Exploratory Factor Analysis of Transferability Scale

Item		Factor Loading	Communality
q10	Experiences as a teaching assistant improve the ability to give constructive feedback to peers and other students	0.73	0.53
q11	Experiences as a teaching assistant improve the ability to use effective strategies to manage time	0.66	0.44
q12	Experiences as a teaching assistant improve the ability to have ideas listened to by others	0.78	0.62
q13	Experiences as a teaching assistant develop a realistic awareness of how one is perceived by others	0.72	0.52
q14	Experiences as a teaching assistant improve the ability to understand the different roles within a team	0.78	0.61
q15	Experiences as a teaching assistant improve the ability to communicate with people one does not know very well	0.74	0.55
q16	Experiences as a teaching assistant improve the ability to coordinate teamwork	0.77	0.59
q17	Experiences as a teaching assistant improve the ability to understand how one's own and others' personality types affect work interactions	0.80	0.64
q18	Experiences as a teaching assistant improve the ability to make use of feedback opportunities in the planning of my work	0.79	0.63
q19	Experiences as a teaching assistant improve the ability to describe the facets of positive team development	0.83	0.69
q20	Experiences as a teaching assistant offer opportunities to network with fellow scientists and engineers	0.68	0.46
q21	Experiences as a teaching assistant improve the ability to develop cooperative relationships	0.81	0.65
q22	Experiences as a teaching assistant improve the ability to receive feedback and handle criticism	0.80	0.64
q23	Experiences as a teaching assistant develop an awareness of one's strengths and weaknessess	0.76	0.58
q24	Experiences as a teaching assistant improve the ability to enthuse a non-expert about science	0.71	0.50
	Percentage of variance explained	57.5	
	Eigenvalue	9.05	
	Alpha	0.95	

Appendix B
Spring 2021 Course Topics

Jan 29: Course Introduction and Interacting with Students (Prof. Blake Johnson)

Feb 05: TA Panel (Esther, Liia, James)

Feb 12: Academic Integrity (Dean Emad Jassim)

Feb 19: Intermediate Bloom's Taxonomy (Prof. Mattox Beckman)

Feb 26: General Rubric Design (Lucas Anderson)

Mar 05: Active Learning (Chris Migotsky)

Mar 12: Informal Early Feedback (Prof. Yuting Chen)

Mar 19: Student Motivation (Lucas Anderson)

Mar 26: Clifton Strengths (Prof. Blake Johnson)

Apr 02: Ethics (Prof. Michael Loui)

Apr 09: Diversity and Inclusion (Prof. Colleen Lewis)

Apr 16: Growth Mindset (Prof. Mattox Beckman)

Apr 23: Imposter Syndrome (Prof. Karin Jensen)

Apr 30: Course Wrap-up and Poster Session (Prof. Blake Johnson)