Welcoming and Building Community for Graduate Students Through Remote Tech Environments

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educational outreach that has inspired high school students and college level women to study engineering, the Higher Education Resource Services (HERS) Clare Boothe Luce (CBL) Scholarship Award (2017), and the Chair of Excellence by the Universidad Carlos III de Madrid-Banco de Santander (Spain) (2012).

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Abstract

Creating community among new graduate students in a COVID world prompted the development of a two-week virtual orientation program for engineering and applied sciences graduate students at a research university. Despite the complexity of multiple time zones, technology challenges, and the virtual space, the program sought to accomplish three goals: (1) community building among students; (2) intellectual engagement with faculty in the home departments; and (3) career development as a foundation for their overall graduate school experience. Participants (N=350 MS or PhD students) were introduced to support services (e.g., health and counseling, ombuds) and student organizations, attended workshops on digital literacy and technology tools, gained perspective from alumni and industry panels, and began their personal career development plan. Evaluations were highly positive, with means of 3.5 – 4.4 on a 5.0 scale, with 5 being very satisfied. Additionally, 98 first-year PhD students were also enrolled in a rigorous and comprehensive online asynchronous TA training, with high satisfaction scores from those who completed the training. While virtual delivery may have limitations, this program has clearly demonstrated that a pre-arrival program can add value to the graduate student on-boarding process and improve the welcome culture at educational institutions.

Introduction

Students entering graduate school may display mixed feelings, excitement, and fear about the new adventure that they are embarking upon. This is even more so the case during the current unsettling COVID times. In engineering disciplines, the expectations regarding acquisition of knowledge through rigorous coursework and mastering research proven by publications, together with assisting undergraduate courses, create many times a strong sense of insecurity, especially if support, encouragement, and welcoming are not properly exhibited and made available upon student arrival (Gurvitch, 2005).

At an Engineering School of a Northeastern research institution, an effective new student virtual orientation has been devised to lay the foundation for professional preparation, relationship building, teacher assistant training, and linkages between programs and students to facilitate initial and continued success of incoming graduate students in an era of uncertainty, anxiety, and uneasiness. The piloted virtual orientation program ran in a variety of digital platforms, asynchronously and synchronously, and included several best practices and strategies for a successful graduate student orientation (Almanzar et al., 2016), e.g., exploration of relevant resources (academic platforms, health and wellness, communities of support, etc.), social events, career discussions, and departmental advising and mentoring. This new program also integrated a comprehensive teaching assistant (TA) training component for those students who would be assigned teaching assignments.

Literature

Graduate Student Orientation: Research on transition to college is largely focused on students entering college as undergraduates (Kuh et al., 2006; Terenzini et al., 1994). Offices of Orientation Programs / New Student Programs were created to assist in the transition of traditional aged high school graduates entering college for the first time. Over the years, orientations have taken different forms, depending on institutional context, traditions, history, and resources: half-day programs, single-day programs, or overnight two-day programs. Despite differences in length and delivery, goals are similar: infuse familiarity with the campus to reduce anxiety and become comfortable with the new environment; disseminate information about academic life and support services; encourage socialization and build community; and showcase student involvement opportunities and personal development support services (Robinson, Burns, & Gaw, 1996). Research on these programs is extensive, and best practices for structuring orientation programs are well known. They include a campus-wide commitment to supporting students in transition; engagement prior to the beginning of classes, and extended orientation through first year transition courses (Cambridge-Williams et al., 2013; Robinson, Burns, & Gaw, 1996).

Few empirical studies have focused on graduate student orientation. Prior to the 2000s, orientation of graduate students was program-dependent (Lang, 2004; Pook, 2004) and remains so to this day (Mears, 2015). Reasons for offering an orientation program for graduate students in some respects are similar to those for undergraduates: clarify expectations to reduce anxiety (Barrera, 2020; Benavides & Keyes, 2016; Hullinger & Hogan, 2014; Peters & Daly, 2013); welcome new graduate students to an inclusive and culturally sensitive environment (Benavides & Keyes, 2016; Mears, Peters, & Daley, 2013); foster social integration (Mears et al., 2015; O'Meara et al., 2014); and create a sense of belonging and community (Barrera, 2020; Schimmel et al., 2016). Yet there are also differences. Pook (2004) suggested that one need unique to graduate students is "dual socialization" (p.472), referring to institutional norms as well as to the norms and expectations of the academic department. Several research studies have found that new graduate students want both levels of acculturation - campus level and department level (Barrera, 2020; Mears et al., 2015; Pook, 2004).

Moreover, Peters and Daly (2013) found that new graduate students returning to school after several years of industry experience would require a different onboarding approach, perhaps similar to that provided by corporate orientation programs, which review the mission, goals, history, and traditions of the organization as the contextual foundation for the experience. For graduate students specifically, the informal and formal connections to faculty are very important to feelings of belonging (Schimmel et al., 2016), and services, such as library, technology, and study skills, were reported as very important (Barker et al., 1997). Hearing faculty acknowledge and encourage a variety of career options post-graduate school also validates graduate students' sense of agency (O'Meara et al., 2014).

Teaching Assistant Training: Most graduate students will serve as TAs in their departments, handling many essential components of introductory undergraduate courses, as well as limited assignments to advanced courses. They often work alongside a faculty member with primary responsibility over the course, but also may teach selected courses independently. In STEM disciplines (Science, Technology, Engineering, and Mathematics) in particular, TAs can have an impact beyond the immediate course. Low STEM retention rates are resulting in fewer STEM graduates than what is required to sustain economic need (President's Council of Advisors on

Science and Technology Policy Report, PCAST, 2012). Poor quality introductory courses are cited as reasons why STEM students do not persist in their planned majors (O'Neal et al., 2007; PCAST, 2012). Graduate TAs teach many of these courses, and although they are not cited as a major reason for STEM majors leaving, can certainly contribute to overall success or failure of a course (O'Neal et al., 2007).

TAs may not have prior teaching experience and/or any training to teach, as graduate programs typically focus largely on research training. Furthermore, they may not have opportunities for teaching professional development. This can lead to challenges, not only during graduate school, but for their future careers. Teacher training incorporated into orientation programs can address this issue right away. Quality training programs have been shown to increase TA confidence (Connolly et al., 2018; DeChenne et al., 2012; Pelton, 2014), a dimension of effective teaching (Bandura, 1997). More effective TAs can help to improve the quality of courses at the time they are graduate students and will continue effective practices and related skills in academic positions and other careers. Therefore, a structured TA training program has potential for positive effects for both student retention in STEM majors and overall graduate student professional development (Hardré, 2005).

Evidence suggests that varying short duration TA training programs, as opposed to semester-long or academic year ongoing programs, can be effective in increasing teaching confidence (Reeves et al., 2016; Reeves et al., 2018) and that online training is effective in certain contexts, such as a K-12 setting (Fishman et al., 2013; Russell et al., 2009). However, more evidence is needed for short program efficacy and persistence of effects, particularly in a higher education setting, and moreover, when offered as part of a larger orientation program.

Program Goals & Design

Sensitive to the need for dual-socialization, we created a program that would both welcome students to the university at large, its mission, culture, traditions, and resources, and also to the College of Engineering & Applied Sciences (CEAS), the pilot community for this program. Three objectives guided our planning: (1) create a sense of community and belonging; (2) engage students intellectually with faculty in the discipline; and (3) promote career development as intertwined with the academic experience. Note that prior to this initiative, no college-wide or institution-wide orientation for graduate students existed; we created a new program with no roadmap beyond the literature review.

Paramount to the achievement of our objectives was support from the College and the academic departments within. Funding was secured through the dean's office to pay for a Graduate Program Assistant to coordinate logistics, communication, and social activities. Each department's graduate administrator provided contact information for incoming students and recruited twelve graduate students to serve as volunteer ambassadors throughout the program. Departments enthusiastically supported the inclusion of a general TA training program, which they required for all incoming TAs, and offered as an option to returning TAs, given that returning TAs did not have any such training upon enrollment.

Logistics: The original plan was to host a two-day experience prior to the first week of school, however, COVID-19 restrictions prompted us to revise the program as a remote experience for incoming students to participate from their home countries in a variety of timezones. The final program took place over two weeks and utilized the 9:00am - 11:00am EST slot for formal program engagement (see Table below for the schedule). As a large segment of the incoming graduate student cohort was from Asia, that slot translated into 10:00pm - 12:00midnight in Beijing. Virtual Happy Hours were scheduled each day @ 9:00pm EST / 10:00am GMT+8 and co-hosted by volunteer student ambassadors.

WEEK 1	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
	Monday, Aug. 10	Tuesday, Aug. 11	Wed., Aug. 12	Thursday, Aug. 13	Friday, Aug. 14
9 AM	Welcome	Meet & Greet Your Academic Department	Visa & Immigration Services (VIS) for international students	Meet the Graduate Student Employee Union (GSEU) and Graduate Student Organization (GSO)	Meet the Ombudsman
9:30 AM	Get to know your peers!				Get to Know Graduate Women In Science and Engineering (GWISE)
10 – 11 AM	Division of Information Technology (DoIT)	Optional 2nd hour for departments			
9 – 10PM	Happy Hour	Happy Hour	Happy Hour	Happy Hour	Happy Hour
WEEK 2	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
	Monday, Aug. 17	Tuesday, Aug. 18	Wed., Aug. 19	Thursday, Aug 20	Friday, Aug. 21
9 – 10:30 AM	CEAS Alumni Industry Panel: Where Can I Go with My CEAS Graduate Degree?	CEAS Senior Graduate Students & Recent Alumni in Academia Panel: The Road to Academia	Staying Healthy and Living Well @ SBU	Career Center: Your GPS in an Evolving Job Market	Diversity & Inclusion @ SBU
9 – 10PM	Happy Hour	Happy Hour	Happy Hour	Happy Hour	Happy Hour

The introductory meeting was a large-scale Zoom welcome, attended by faculty, staff, peers, and students from all CEAS departments, and focused on warm welcomes, wide smiles, a bit of silliness, and as much excitement as could be transmitted in a virtual space. Immediately following was exclusive peer-to-peer time, where new students and student ambassadors could network in multiple Zoom breakouts, curated with networking questions and personal connectivity. For example, questions about where in the world students were logging in from, languages they speak, their career intentions, hopes for the coming year, as well as some silliness to keep things light, with questions about pajamas, things they do for fun, and what their desired superpower would be.

Following a break, the formal program on Day 1 was a session with the Division of Information Technology, which was intentionally scheduled for the first day to ensure that students knew about the resources and technology available for Orientation as well as their upcoming virtual semester.

Day Two was dedicated to the academic departments, each of which was free to design their own agenda to share specifics about the curriculum and academic expectations, as well as to provide time for students and faculty to network informally. Department orientations by far drew the best attendance: 500 registrants overall, including new and returning students, faculty and staff. Throughout the rest of the two-week program, students learned about student organizations, social, cultural, and recreational opportunities, and overall graduate student life. Identity-based campus resources promoting inclusion, diversity, student advocacy, and success were shared, and health and wellness services were also introduced. Specialized Zoom meetings were offered to international students led by Visa & Immigration specialists, and graduate student employees led by the Graduate Student Organization and Graduate Student Employee Union.

Career services, a centralized unit at this institution, played an important role in the planning and implementation of the orientation. The head of the department was an integral member of the planning team and provided supervision for the Program Assistant. Staff from the Career Center participated in several of the events and coordinated tailored programming to introduce students to the career development process and career resources most useful to graduate students at the masters and doctoral levels. They also coordinated two separate panels: one with alumni who shared their career journeys and offered advice, and the other with current graduate students, who answered questions about their student experience and shared their lessons learned.

Purely social "Happy Hours" were offered daily @ 9:00pm EST, coordinated by the program staff and involving student ambassadors from each of the academic departments. This social time was scheduled to provide an open forum for any students to ask any questions and begin building their networking skills.

Teaching Assistant Training: The Center for Excellence in Learning and Teaching (CELT), another key partner in the project, designed and delivered a training program for graduate students who would be working as TAs in the Fall 2020 semester. Faculty mandated attendance to ensure that all incoming TAs had the knowledge and support they would need to be successful. Returning TAs also took part this semester, with the shift to remote learning. This was a model also used in the pilot TA training that took place in person, experiences TAs facilitated breakout sessions. They now also got to play a mentoring role, by giving advice to new TAs and participating in additional components of the training.

The training included a mix of synchronous and asynchronous sessions. The asynchronous modules were available in the institution's Learning Management System, Blackboard. Links to synchronous sessions that took place on Zoom were within the Blackboard courses well. The four asynchronous modules were opened sequentially every two weekdays during the Orientation period. Each module offered a mix of videos, interactive slide presentations, and readings, divided into three segments: required, recommended, and additional. Topics included: being a successful

TA; getting started in the classroom; evidence-based teaching practices; and being an effective TA online. The first two introductory modules were optional for the returning TAs. Since there had been no standardized training for all CEAS TAs prior to this offering, they benefited from the modules as well as being able to provide advice in the Blackboard discussion board and Zoom sessions to new TAs. Required segments totaled approximately four hours of work and recommended and additional pieces took approximately two additional hours. At the end of each module, students completed a five-question quiz. Students earned "credit" for completing all required segments and scoring 80% of quiz points for each module.

Supplementing the online components were synchronous Zoom office hours with returning TAs and the CELT instructor. The office hours held the second day of each module. Zoom follow up sessions covered classroom management scenarios and open Q&A. Returning TAs attended an additional Zoom discussion to discuss their experiences, and also provided advice to new TAs in the discussion board, as mentioned above.

Results

Overall Program: Attendance was mixed. While 500 participants logged in to the academic department orientation day, that was far and away the best attended program. The next most popular session was the Division of Information Technology, with 144 students. Other offerings yielded smaller numbers, ranging from 72 for the Graduate Student Organization meeting to 20 who attended the Diversity & Inclusion program. Responses to the post-program survey were largely positive: on a scale of 1 (very dissatisfied) to 5 (very satisfied), mean ratings ranged from 3.5 to 4.4. Comments received included both positive and critical feedback.

Positive comments:
- "I really liked that it included a great variety of programs and centers that will be useful throughout our studies here."
- "It covered a lot of stuff that I wouldn't have known if I didn't attend this orientation."
- "The program was very well organized, particularly considering that it was done virtually."
- "I liked the fact that the school invited graduates working in industry and academia."

Critical Reviews:
- "The time was not ideal."
- "I feel like the alumni panels were very generic. I would prefer to listen to alumni closer to my area of studies, since I have already chosen to pursue a PhD on a more specific topic."
- "I wish the school received questions from students earlier and answered during the orientation."
- "It's just the distancing because of the pandemic, I'm sure in person would have been great."

One surprise outcome was the creation of a "GroupMe" by one of the program participants. All incoming masters and PhD students were invited to engage with each other on this free, mobile messaging platform.

Teaching Assistant Training: A total of 164 TAs enrolled; 98 new TAs and 66 returning, with 67% of new TAs and 86% of returners completing all required portions of training. 76% of incompletes were due to deferrals to admission considering the ongoing pandemic or not having a TA assignment after all.

All four quizzes had a completion rate of 80%. Fifty-two (52) participants completed the evaluation; results showed high satisfaction:

- 84% of respondents were very satisfied or satisfied with all modules
- 87% felt that their confidence toward teaching improved
- 81% felt their enthusiasm for teaching increased
- 90% felt the training met their expectations
- 79% felt the learning objectives were met
- 94% would attend follow-up sessions throughout the term with CELT and experienced TAs

Selected Comments

Positive:
- "The experience was good for a new TA to learn about the available resources to efficiently manage and use them."
- "I think the online training was more convenient than an in-person training would have been since it allowed us to complete the modules at our own pace and look up supporting information as we needed to. I think this type of training should continue to be asynchronous and online in future years."
- "I have a good experience in this online training and learn many skills for the upcoming TA work."
- "The content was well organized and categorized in terms of priority."

Critical:
- "More practical examples should be discussed."
- "I think it has the potential to be more helpful if we did more focused topics or discussion."
- "Mostly review of known concepts for returning TAs but probably valuable for new TAs."
- "It was difficult navigating orientation as well as the TA training during the pandemic."

There were a handful of "disagree" but no "strongly disagree" (or similar negative Likert-scale items) answers chosen. Common issues raised in critical feedback can be met by the existing general Graduate School Orientation (which is available on the Graduate School website and linked within the training), or department/course specific training. For example, there is no lab safety training in the online course, but this is not pedagogy-related and is available through other means.

Limitations/Challenges

This was our first time coordinating a college-wide orientation, and the challenges we encountered were not exclusively technological. We noted variation in the departmental programming. Our initial thinking was to give departments full authority to develop a program for their students; now we will prepare a template so that each department has a ready-made program they could use in its entirety, or extract elements from, if they have ideas for their own program. Moreover, increasing communication with departmental liaisons in the planning stages will create more buy-in and less confusion around who communicates what to the students.

Another challenge was the time-zone differential, that may have contributed to lower attendance at certain events. Energy levels of those participating could have been impacted by time of day or night they were logging in. We did not ask in our assessment if students were feeling "Zoom fatigue" and chose to attend only those sessions they deemed most important. Lastly, we did not have the opportunity to gather feedback from the students at the moment of enrollment about what they would like to learn about, or what aspects of the university they would have wanted to engage with.

Lastly, we note that there was no training provided for the student ambassadors. We originally envisioned these students as being informal peer leaders, and since they were all recruited by their individual departments, the program team did not gather them together in advance to discuss their role or explain our expectations for their participation.

Recommendations

Overall, we were very pleased with the positive results from this pilot program. We present the following recommendations for any institution who wishes to replicate the essence of this graduate student orientation program. Note the following bulleted items only represent changes to the pilot as presented. We will of course be incorporating these learnings and recommendations into next year's version of the program.

General Orientation programming:
- Create a planning committee that includes current graduate students.
- Provide peer leadership training to all student ambassadors.
- Consider new topics for programming, such as mindfulness practice and a campus scavenger hunt.
- Move the alumni and student panels to the first week, to provide a longer-term perspective for the students as they experience the rest of the program offerings.
- Add more student ambassador time, either to another panel, or to the happy hours, to increase peer engagement and support.

Departmental programming:
- Increase communication and coordination between the Program Assistant and the departments.
  - Standardize a template to collect departmental information prior to orientation, including the university e-mail addresses of the incoming students.

- ○ Pre-populate incoming students into the Blackboard LMS system.
  - ○ More involvement in program design and contact from departments and their student ambassadors. Perhaps inviting students to lead Happy Hours with themes.
- Create independent department-sponsored Zoom invitations for Day 2, to eliminate complications and ensure that departments have full control over their programs.

TA Training:
- Build interaction into the asynchronous training with both individual and group activities and discussion forums
- Offer more structured opportunities for mentoring, possibly by pairing up experienced TAs with new TAs for informal meetings 2-3 times per semester
- Increase quality of recorded presentations and incorporate content check quizzes directly
- Collaborate with campus partners/student resources so they can provide video introductions to their services
- Communicate expectations to complete training earlier to the TAs

Post-COVID:
- Consider a hybrid model to leverage accessibility and convenience of technology for information sharing, while reserving face-to-face time for community building activities and getting to know the campus.
- Utilizing a virtual platform to introduce students to services before their arrival on campus is strongly recommended (e.g., tech tools).
- Incorporate more video content in information delivery.
- Work with departments to identify opportunities for pre-arrival virtual sessions, followed by face-to-face follow ups (e.g., a session on research in the departments).
- Face-to-face TA Training breakout sessions for attention to specific course types, deeper discussions, and further opportunities for interaction

Lastly, we will be working more closely with The Graduate School to align any existing programs or supports they offer with our framework to produce a coordinated menu of offerings that can be expanded to departments across campus.

Conclusion

This program is replicable at other institutions because it draws from the resources and expertise of a variety of campus stakeholders. The importance of the piloted program cannot be overemphasized, on the one hand has provided invaluable information and resources to incoming graduate students; on the other hand, it has created a special connectivity between students, their departments, their senior peers and campus offices during very unsettling and anxious times of transitioning to graduate study, let alone in COVID virtual times.

References

Almanazar, R .R., Hapes, R., & Rowe, G. (2018, March). Strategies for a successful graduate student orientation program. *Academic Advising Today, 41*(1). Retrieved from https://nacada.ksu.edu/Resources/Academic-Advising-Today/View-Articles/Strategies-for-a-Successful-Graduate-Student-Orientation-Program.aspx#:~:text=An%20effective%20new%20student%20orientation,graduate%20students%20whom%20they%20advise.

Bandura, A. (1997) *Self-efficacy: The exercise of control.* New York, NY: WH Freeman and Company.

Barker, S., Felstehausen, G., Couch, S., & Henry, J. (1997). Orientation programs for older and delayed-entry graduate students. *NASPA Journal, 35*, 57-68.

Barrera, M. L. (2020). I love how we developed a community already: A graduate student orientation model for minority-serving programs and institutions. *Association of Mexican American Educators Journal*, *14*(3), 47-60.

Benavides, A. D., & Keyes, L. (2016). New-student orientations: Supporting the success and socialization in graduate programs. *Journal of Public Affairs Education, 22*(1), 107-124.

Cambridge-Williams, T., Winsler, A., Kitsantas, A., & Bernard, E. (2013). University 100 orientation courses and living-learning communities boost academic retention and graduation via enhanced self-efficacy and self-regulated learning. *Journal of College Student Retention: Research, Theory & Practice*, *15*(2), 243-268.

Connolly, M. R., Lee, Y., & Savoy, J. (2018). The effect of doctoral teaching development on early career STEM scholars' college teaching self-efficacy. *CBE- Life Sciences Education, 17*(4), 1-15.

DeChenne, S. E., Enochs, L. G., & Needham M. (2012). Science, technology, engineering, and mathematics graduate teaching assistants teaching self-efficacy. *Journal of the Scholarship of Teaching and Learning, 12*(4), 102-123.

Fishman, B., Konstantopoulos, S., Kubitskey, B. W., Vath, R., Park, G., Johnson, H., & Edelson, D. C. (2013). Comparing the impact of online and face-to-face professional development in the context of curriculum implementation. *Journal of Teacher Education, 64*(5), 426-438.

Gurvitch, R. (2005). Congratulations!: A guide for new graduate students. *Journal of Physical Education, Recreation & Dance, 76*(3), 48-52.

Hardré, P. L. (2005). Instruction design as a professional development tool-of-choice for graduate teaching assistants. *Innovative Higher Education, 30*(3), 163-175.

Hullinger, M., & Hogan, R. L. (2014). Student anxiety: Effects of a new graduate student orientation program. *Administrative Issues Journal: Education, Practice, & Research, 4*(2), 27-34.

Kuh, G. D., Kinzie, J. L., Buckley, J. A., Bridges, B. K., & Hayek, J. C. (2006). *What matters to student success: A review of the literature, Volume 8*. Washington, DC: National Postsecondary Education Cooperative.

Lang, M. E. (2004). The need for graduate orientation. *The Journal of College Orientation and Transition, 11*(2), 49-51.

Mears, D. P., Scaggs, S. J. A., Ladny, R. T., Lindsey, A. M., & Ranson, J. W. A. (2015). Successful transitions to graduate school: Using orientations to improve student experiences in criminology and criminal justice programs. *Journal of Criminal Justice Education, 26*(3), 283-306.

O'Meara, K., Eliason, J., Cowdery, K., Jaeger, A., Grantham, A., Mitchell, A., & Zhang, K. (2014). By design: How departments influence graduate student agency in career advancement. *International Journal of Doctoral Studies, 9*, 155-179.

O'Neal, C, Wright, M., Cook, C., Perorazio, T., & Purkiss, J. (2007). The Impact of teaching assistants on student retention in the sciences: Lessons for TA training. *Journal of College Science Teaching, 36*(5), 24-29.

Peters, D. L, & Daly, S. R. (2013). Returning to graduate school: Expectations of success, values of the degree, and managing the costs. *Journal of Engineering Education, 102*(2), 244-268.

Pelton, J. A. (2014) Assessing graduate teacher training programs: Can a teaching seminar reduce anxiety and increase confidence? *Teaching Sociology, 42*(1), 40-49.

Pook, M. C. (2004). Graduate student orientation practices: Results from a national survey. *NASPA Journal, 41*(3), 470 -486.

President's Council of Advisors on Science and Technology (2012). *Report to the President— Engage to Excel: Producing One Million Additional College Graduates with Degrees in Science, Technology, Engineering, and Mathematics.*Retrieved from www.whitehouse.gov/administration/eop/ostp/pcast.

Reeves, T. D., Marbach-ad, G., Miller, K., Ridgway, J., Gardner, G. E., Schussler, E. E., Wischusen, W. E. (2016). A conceptual framework for graduate teaching assistant professional development evaluation and research. *CBE- Life Sciences Education, 17*(8), 1-13.

Reeves, T. D., Hake, L. E., Chen X., Frederick J., Rudenga K., Ludlow L. H., & O'Connor, C. (2018). Does context matter? Convergent and divergent findings in the cross-institutional evaluation of graduate teaching assistant professional development programs. *CBE- Life Sciences Education, 15*(2), 1-9.

Robinson, D. A. G., Burns, C. F., & Gaw, K. F. (1996). Orientation programs: A foundation for student learning and success. *New Directions for Student Services*, *75*, 55-68.

Russell, M., Carey R., Kleiman, G., Douglas Venable, J. (2009). Face-to-face online professional development for mathematics teachers: A comparative study. J*ournal of Asynchronous Learning Networks, 13*(2), 71-87.

Schimmel, C. J., Daniels, J. A., Wassif, J., & Jacobs, E. (2016). Learning the ropes: A creative orientation approach for counseling students. *Journal of Creativity in Mental Health, 11*(1), 27-38.

Terenzini, P. T., Rendon, L. I., Upcraft, M. L., Millar, S. B., Allison, K. W., Gregg, P. L., & Jalomo, R. (1994). The transition to college: Diverse students, diverse stories. *Research in Higher Education*, *35*(1), 57-73.