



A case study of college student participation in a peer mentorship program within STEM disciplines

Rebecca L. Hapes, Kim E. Dooley & Summer F. Odom

To cite this article: Rebecca L. Hapes, Kim E. Dooley & Summer F. Odom (2024) A case study of college student participation in a peer mentorship program within STEM disciplines, *Mentoring & Tutoring: Partnership in Learning*, 32:5, 633-653, DOI: [10.1080/13611267.2024.2396474](https://doi.org/10.1080/13611267.2024.2396474)

To link to this article: <https://doi.org/10.1080/13611267.2024.2396474>



Published online: 05 Sep 2024.



Submit your article to this journal [↗](#)



Article views: 330



View related articles [↗](#)



View Crossmark data [↗](#)



A case study of college student participation in a peer mentorship program within STEM disciplines

Rebecca L. Hapes ^a, Kim E. Dooley ^b and Summer F. Odom ^b

^aDepartment of Entomology, College of Agriculture and Life Sciences, Texas A&M University, College Station, TX, USA; ^bDepartment of Agricultural Leadership, Education & Communication, College of Agriculture and Life Sciences, Texas A&M University, College Station, TX, USA

ABSTRACT

Peer mentoring programs have been shown to assist students with their college transition, and this study sought to understand the effects of peer mentorship participation of students in a STEM major. Using a semistructured interview method, six participants of a student-run, volunteer, peer mentorship program within the [Undergraduate STEM Program (USP)] provided participant feedback in one-on-one interviews. Using the constant comparison method, program outcome categories were identified based on participant responses. Participants were positive about the program and its benefits, including personal growth, development of a sense of responsibility for others, and learning from those who had gone through the program previously. However, issues with consistent engagement were identified that may be addressed through modifications to program structure and clarification of role expectations. Recommendations are included to address participant concerns.

ARTICLE HISTORY

Received 13 March 2024
Accepted 13 August 2024

KEYWORDS

Student success; peer mentoring; STEM; thriving; forensic science

Introduction

Student success literature regularly cites peer mentoring as one of many strategies for increasing the persistence of undergraduate students in a higher educational setting (Alcocer & Martinez, 2018; Colvin & Ashman, 2010; Terrion & Leonard, 2007; van der Zanden et al., 2018; Venegas-Muggli et al., 2023). Studies have found higher retention and graduation rates for students who receive peer mentoring and in underrepresented groups the numbers were higher (Dagley et al., 2016).

Student persistence within the science, technology, engineering, and mathematics (STEM) fields has been a concern for higher education institutions (Dagley et al., 2016). In fact, national data suggest that less than half of undergraduate students entering STEM fields as a freshman ultimately

CONTACT Rebecca L. Hapes  rhapes@tamu.edu  Department of Entomology, College of Agriculture and Life Sciences, Texas A&M University, 0100 TAMU, College Station, TX 77842, USA

Author note: The institutional review board at Texas A&M University (IRB 2019-0006 M) approved this study on 4 March 2019.

graduate from those fields (National Science Foundation, 2014; Wilson et al., 2012). Other data suggest that 60% of students entering STEM fields will change their area of study or even drop out of school (Hayes, 2007; Schneider et al., 2015). Also troubling are inequities related to the persistence within STEM for certain populations, as the U.S. Department of Education, National Center for Education Statistics (2023) on degrees awarded in 2020–2021 indicate 39.3% of STEM bachelor's degrees were awarded to females (U.S. Department of Education, National Center for Education Statistics, 2023).

Peer mentoring is one student success strategy cited for increasing the persistence of undergraduate students in higher education (Alcocer & Martinez, 2018; Asempapa et al., 2021; van der Zanden et al., 2018; Venegas-Muggli et al., 2023). Peer mentoring is a specific type of mentoring where individuals who share similar demographics (i.e. age, academic program status) work together. Peer mentoring offers opportunities to learn and grow for the mentee as well as their peer mentor (Stigmar, 2016).

Institutions can foster positive educational climates through the creation of mentoring programs, and Stromei (2000) suggests paying particular attention to the needs of populations underrepresented in higher education when doing so. Asempapa et al. (2021) found mentees were more likely to seek assistance from peers and faculty and Rodger and Tremblay (2003) found the level of student interaction and engagement within the peer mentorship partnership is of paramount importance, as higher levels of student participation yielded significantly higher grades. Venegas-Muggli et al. (2023) found a positive and significant association between being mentored and retention rates, while Milem and Berger (1997) found students persisted at a higher rate when they engaged in early involvement with both other students and faculty.

Texas A&M University announced a goal of 95% retention for first-time-in-college (FTIC) students into their second year. Within the Forensic and Investigative Sciences major specifically, retention is an area of programmatic and departmental concern. The historical retention numbers for this program's first year to second year are 25% (fall 2015 to fall 2016), 34% (fall 2016 to fall 2017), 44.6% (fall 2017 to fall 2018), 34% (fall 2018 to fall 2019), and 46% (fall 2019 to fall 2020). In fall 2018, 41.9% of FTIC students in the program were identified as first-generation students. That number increased to 44.6% in fall 2019 and decreased slightly to 42.6% in fall 2020.

To increase student connectivity, engagement, and understanding of the program expectations, rigor and persistence, the Forensic and Investigative Sciences Director created an optional peer mentorship program in fall 2016. The director conceptualized this program; however, the implementation of the peer mentor program was a combined and coordinated effort between program personnel and the recognized student organization affiliated with the

undergraduate major. The director intended for students to feel ownership of, lead, and coordinate the peer mentorship program.

The students within the upper division portion of the program had the option to serve as peer mentors for both incoming first-year students and those in their second year in the program. The students serving as mentors are those who have successfully completed their required prerequisite courses with appropriate grades and met the cumulative grade point ratio threshold of a minimum 3.0 and are typically classified as either juniors or seniors within the university system. Information about participation in the peer mentor program was delivered to all students through departmental communication (emails, announcements in classes, social media outlets) early in the fall semester, and the director of the Forensic and Investigative Sciences program attended the undergraduate student organizational meetings to encourage participation. Once students indicated their interest in participating in the peer mentorship program, either as a mentor or mentee, the undergraduate student organization leadership team matched mentors with mentees and communicated those matches. Meeting frequency and communication among the mentor and mentee matches was up to the discretion of the individuals within the mentorship pairing.

The peer mentoring program transitioned in fall 2019 to a program administratively coordinated by the Director of the Forensic and Investigative Sciences major in conjunction with the Texas A&M University Career Center Mentorship Coordinator. Students received information about this peer mentorship opportunity and self-selected for participation. They were then matched with an upper-level student (junior- or senior-level classification), who assisted in answering their questions and provided them transitional support.

There have been some improvements in the retention of students since implementation of the peer mentorship program in fall 2016; however, we believe there is still much to be understood from participants of the peer mentorship program that can inform and assist with future retention efforts not only in this academic program, but more broadly within STEM fields. Understanding the student motivation and their choice to participate in the peer mentorship program, as well as its impacts on student participants, will aid in student academic success and persistence.

Previous research demonstrates positive results from mentor programs (Asempapa et al., 2021; Crisp, 2010; Leidenfrost et al., 2011; Markle et al., 2022; Sanchez et al., 2006; Venegas-Muggli et al., 2023; Zevallos & Washburn, 2014), showing mentoring can assist in minimizing the impact of barriers to college transition and participation through the establishment and fostering of an intentional relationship with an individual with previous experience navigating those systems (Wallace et al., 2000). Holland et al. (2012) found 'Students who experience the benefits of mentoring from friends and classmates may feel more comfortable in their major and confident in their abilities' (p. 351).

Further studies are needed to understand these peer mentor relationships and their impacts within undergraduate STEM programs. Understanding the motivation behind the behavioral decision to act and engage, with respect to student involvement in the peer mentorship relationships is an essential component to the student success puzzle. Though there is literature to support the benefits of peer mentoring on student persistence in STEM fields, most research focuses on the outcomes of the mentees and not on the peer advisors themselves (Page & Hanna, 2008). This research sought to provide insights into a peer mentoring program for students in a STEM field and examine the perspectives of both mentor and mentee.

Purpose and research objectives

The purpose of this research was to understand the experiences, impacts, and potential benefits of participation in a voluntary peer mentorship program offered for students enrolled in the peer mentoring program. The study was guided by the following research questions:

- (1) How do peer mentors and mentees in a peer mentorship program perceive its impact?
- (2) How do STEM majors participating in a peer mentorship program feel about their program experience?

Review of literature

Participation in university peer mentor programs has been shown to have varying levels of positive effect on achievement, with higher levels of student participation yielding success across multiple measures. For instance, Venegas-Muggli et al. (2023) found a positive and significant association between being mentored and retention rates, while Rodger and Tremblay (2003) found the level of student interaction and engagement within the peer mentorship partnership led to significantly higher grades. In a study of a comprehensive scholar's program for STEM students that included a mentor component, Kendricks et al. (2013) found 'mentoring stood out to students as the program attribute that had the most impact on their success' (p. 38). Furthermore, Milem and Berger (1997) found students persisted at a higher rate when they engaged in early involvement with both other students and faculty. Snowden and Hardy (2012) recruited third-year students to mentor first-year students and found the mentorship process had positive impacts with respect to student participation and engagement and 'upon the assessment performance for each mentee and mentor's assessed work' (p. 80). In a study with business students, peer mentoring was significantly related to satisfaction with the university but unrelated to time to graduation in the specific major or university (Sanchez et al., 2006).

Some literature has found that STEM peer mentors have changed their epistemological beliefs of mentors regarding teaching and learning and have improved their communication, organization, and leadership skills (Amaral & Vala, 2009). One large scale study examined 304 peer mentors through a survey and found overall positive outcomes with development in leadership, study, presentation, and time management skills because of being a peer mentor. These peer mentors also reported a stronger connection with others in the college and agreement with topics related to increased knowledge of subject matter, greater motivation to be successful, and being better able to cope with stress (Spaulding et al., 2020).

Conceptual framework

Schreiner (2010a, 2010b) thriving model encompasses the inductively determined themes generated and served as the conceptual framework for this study. Schreiner's thriving conceptual framework is holistic in nature, considering traditional student success models and their qualitative measures of grade point, graduation and retention rates, and various non-cognitive factors such as student belonging, classroom engagement, and emotional maturation (Picton et al., 2018). The resulting three primary areas (academic, intrapersonal, and interpersonal), incorporates five key factor components including engaged learning, academic determination, positive perspective, diverse citizenship, and social connectedness. Other factor components included are sense of community and spirituality. Based on positive psychology, which focuses on positive experiences, traits, and well-being, the thriving framework also encompasses integration and engagement with campus and attention to spirituality as additional components as well (Schreiner, 2014).

Encompassed within the academic area include the engaged learning and academic determination factor components. Engaged learning relates to the student and their ability to relate to and interact with their educational environment. This factor deals with the understanding of instructional context, and student willingness to work to make meaning of the course content, integrate, synthesize, and apply material, environmental inputs, and other perspectives to create knowledge (Schreiner, 2010b, 2010b, 2013). Academic determination relates to the student and their level of self-efficacy, as well as their task completion and self-regulation commitments. Much emphasis in this factor component relates to application of strengths to academics, goal setting, and individual learning processes (Schreiner, 2010b, 2010b, 2013).

The intrapersonal area includes the positive perspective factor component, which relates to an individual's level of optimism and 'represents the ways in which thriving students view life' (Schreiner, 2013, p. 43). Individuals with positive perspective see opportunity around them and can identify the long-term effects of actions and activities (Schreiner, 2010b, 2010b, 2013).

Encompassed within the interpersonal area are the diverse citizenship and social connectedness factor components. Diverse citizenship relates to the student's desire to engage and positively contribute within their community. This includes the belief their impact will make a positive difference, prompting their devotion to contribution efforts. Social connectedness relates to the engagement and interaction of the student to others for social support. This support network includes friends who should provide validation for the student (Schreiner, 2010b, 2010b, 2013).

Thriving students are ones who make the most of their college experience (Schreiner, 2010b, 2010b, 2014). These are the students with a positive outlook, the ability to reframe negative events and see the best in situations, who are engaged in academic and social contexts, and appreciate diverse perspectives of a wide array of individuals (Schreiner, 2014). Thriving students commit to their academics, understand they can persevere through challenging circumstances, and connect to others for emotional and academic support (Schreiner, 2014). Students with high thriving levels have a higher likelihood of persistence in institutions of higher education (Schreiner, 2010b, 2010b, 2014). While students may have varying levels of thriving exhibited within the component areas, this model holistically looks at the elements involved with thriving in the higher education context.

Methods

Case study research was employed in this research because it involved a description and analysis of a bounded system (Merriam & Tisdell, 2016; Yin, 1998). Participant observation including interviews of participants were the focus of this study. Interviews helped to better understand the experiences of participants and make meaning from them (Merriam & Tisdell, 2016).

Sample

The bounded system for this case study was the volunteer peer mentorship program in the Forensic and Investigative Sciences major and included students enrolled within the Department of Entomology as primary majors in a STEM discipline who were participating in the volunteer peer mentorship program in the spring term, 2019. The inclusion criteria for participants included classification as an undergraduate student within the degree program and a participant (either as mentee or mentor, regardless of student classification) in the optional peer mentor program available to students, offered within the department. Participant recruitment emails were sent to the potential participants' official, university-provided student email to solicit participation. Following a modified Dillman (2007) approach, there were a minimum of five recruitment contacts to solicit participants throughout the study. Emails were sent to solicit participants

a minimum of four times, over a period of two weeks. Additionally, a faculty member within the program announced the research project and allowed the researcher to discuss the research opportunity at the conclusion of a class period, recruiting participants at that time. The student coordinator of the peer mentor program (also an upper-level student) contacted all current mentors, requesting they and their mentees participate in the project on at least two occasions. The researcher obtained authorization for subject recruitment through the Office of the Registrar as part of the institutional review board (IRB) authorization process (IRB2019–0006, reference number 086832). Of a possible 123 participants, there were six who consented and were interviewed for this study. There were four mentors, one mentee, and one who identified as both a mentor and a mentee.

Data collection

Semistructured interviews were chosen as the data collection method. The one-on-one interviews with program participants utilized an eight-question, semistructured interview protocol. Each participant was asked the same eight questions, unless answers to the pending questions were covered in the interview without the need to ask the question. The length of the interviews varied greatly in length, ranging from approximately fifteen to sixty minutes. The average interview length was about thirty minutes.

The interviews were audio recorded using Otter.ai, then transcribed by hand, and sent to participants for member checking as a form of triangulation. Hand notes were taken during the interview process to supplement the audio transcripts. The participant-confirmed transcripts were used as the primary source of data.

Data were collected from six participants through one-on-one interviews. Interviews were conducted until data saturation occurred (Merriam & Tisdell, 2016; Saunders et al., 2018). From these respondents, one participant had participated in the peer mentorship program both as a mentee and mentor, one had participated as a mentee only, and four had participated in the mentor role only. Two respondents were first-generation students. The respondent demographic information is summarized in [Table 1](#).

Table 1. Participant demographic summary.

Participant Code	Classification	Gender	Ethnicity	Role	First-Generation
1	U4	F	White	Mentee & Mentor	No
2	U4	F	Hispanic	Mentor	Yes
3	U4	F	White	Mentor	No
4	U4	F	White	Mentor	Yes
5	U4	M	White	Mentor	No
6	U3	F	White	Mentee	No

Two additional interviews were conducted. An interview with the Program Director was conducted to provide background context with respect to the inception and development of the peer mentorship program. Both the Director and the upper division, student peer mentorship coordinator were interviewed in their respective roles related to the peer mentorship program and were asked to provide information related to the program goals, structure, application and matching process, and review/assessment procedures.

Archival program records, including information on peer mentors and mentees, and their responses to the peer mentorship application, were also reviewed. To ensure rigor of this study, trustworthiness criteria of credibility, transferability, dependability, and confirmability (Dooley, 2007) were addressed. Credibility was established through prolonged engagement with the participants, peer debriefing and multiple sources of data, including interviews and archival program data. Transferability was established through criterion-based, purposive sampling and contextual participant responses were quoted throughout the findings to adequately portray participant meaning. Dependability and confirmability were established through maintenance of a reflexive journal, maintained throughout the research process, and an audit trail.

Data analysis

Interview transcripts were sent to each participant for member checking as confirmation that the conversation was transcribed correctly and accurately portrayed the interview. Data were analyzed using the constant comparison method (Merriam & Tisdell, 2016) to develop categories. Participant statements were sorted into categories and themes using inductive reasoning (Merriam & Tisdell, 2016). Coded data, including categories and themes, were sent to participants for member checking and respondent validation to ensure the researcher interpretation of the participant communication was accurate.

Positionality

At the time of this study, the primary researcher was one of two primary-role academic advisors who worked with the undergraduate students from their entry into the STEM undergraduate major at their new student conference until exit or graduation. Merriam and Tisdell (2016) recommend that researchers 'need to explain their biases, dispositions, and assumptions regarding the research to be undertaken' (p. 249). The researcher acknowledges she may be biased with respect to the overall merit of peer mentorship program; however, she utilized bracketing to minimize bias (Tufford & Newman, 2012).

Furthermore, she believes her prolonged engagement with this peer mentorship program provides additional insight not otherwise available to other researchers.

Results

Several categories emerged from the data that can inform peer mentorship programs, including voluntary or more formal programs, in the future. Included below are descriptions, taken from the participant interviews and confirmed through member checking, which help to describe the various categories. The categories developed from the data are largely consistent with Schreiner (2010a, 2010b, 2013) conceptual framework of thriving, including its identified three primary areas (academic, intrapersonal, and interpersonal) and the five key factor components within those, including engaged learning, academic determination, positive perspective, diverse citizenship, and social connectedness.

This study was concerned with the experiences of these individuals during their time within the peer mentorship program. Data provided insight to the three research objectives for this study related to: (a) the impact of the peer mentorship program on its participants, and (b) how they felt about their program experience. Summary information is included for each of these research objectives in the section to follow.

Peer mentorship outcome categories

Data emerged resulting in the development of several outcome categories because of participation in this peer mentorship program. These outcome categories can inform peer mentorship programs, including voluntary or more formal programs, in the future. Included below are descriptions, taken from the participant interviews and confirmed through member checking, which help to describe the various categories. The categories developed from the data are largely consistent with Schreiner (2010a, 2010b, 2013) conceptual framework of thriving, including its identified three primary areas (academic, intrapersonal, and interpersonal) and the five key factor components within those, including engaged learning, academic determination, positive perspective, diverse citizenship, and social connectedness. While inductive reasoning (Merriam & Tisdell, 2016) was used to determine categories and themes within these participant responses, their fit to the conceptual framework was examined. Table 2 summarizes the categories developed and provides a brief description.

Engagement

This category includes both positive and negative comments dealing with mentees and mentors' interactions and continued interaction with each other and involvement with the peer mentorship program. This is the action-oriented

Table 2. Peer mentorship outcome categories.

Category	Description
Engagement	Action-oriented program aspect related to mentor/mentee interaction
Exhibited Care	Demonstration of physical support within mentor/mentee interaction
Connection	Emotional support within mentor/mentee interaction
Demands	Responsibilities associated with role
Model	Learning from others and understanding how others learn from them
Identification with major	Extent to which major is part of self-identity
Motivation	Motivation and persistence
Investment	Internal desire to make choices that increase likelihood for academic success
Self-efficacy	Student belief in their ability to achieve their goals
Program structure	Infrastructure and organization of peer mentorship program
Belonging	Sense of acceptance and fitting in
Changed character	Participant personal growth and development

aspect of the process. Referencing disengaged members, one participant noted, 'I noticed after the halfway mark, so in the spring semester is when people stop replying to messages, stop making the effort to go out of their way to meet with each other on both sides. Both the mentee and mentor.' Another participant remarked, 'As a mentor, don't take it personally if they don't respond. Just keep going at it. Don't feel like the annoying older sibling, like they might not want . . . they might not show that they need help with that, they want your help.' Another reflected, 'It's really hard to try and get people to do something that's good for them.'

Exhibited care

This category, while seemingly related to engagement, deals more with the demonstration of support for the mentee-mentor relationship. Comments related to demonstration of care included, 'I had a mentor who always kept checking and she was great.' One mentor noted a feeling of responsibility, indicating, 'It's your job to be there for them and make sure that they know that you're there for them.' Another noted of their mentor:

Yeah, she was, like, definitely understand(ing) that like, she's like, you know, that are willing to work with you, they want to work with you. They want you to succeed in this program so like don't be afraid to talk to them . . .

That same participant went on to talk about how the mentor interacted with them in the building where classes were held, introducing them to other students, noting, 'She would say hello, we would meet, I would meet them, and then I got to, you know, really get to meet some of the older kids.'

Connection

This category, while seemingly related to both engagement and exhibited care, deals more with the emotional support between the mentee and mentor. This includes both positive and negative comments related to recognition and feeling appreciated. One participant noted, 'So as a mentee, it was hard for me to feel comfortable, reaching out to my mentor.' Other participants

remarked of developing relationships with their mentees: 'The best that can happen is they'll come out, asking you for help when they actually need it.' Another participant realized how much their interaction impacted their mentees, reflecting with, 'At least that's what I saw my mentees, because they would like tell me, "thank you." And I can really appreciate it, or I just like seeing that they felt so much better.'

Demands

This category deals with the responsibilities associated both with being either a mentee or a mentor, and with the demands of the academic program. One participant remarked, 'I had a mentee who like had me sit down with her and go through ... lab reports that was very time consuming, so I don't know if that's something that we can really simply ask every mentor to do.' Another discussed the amount of pressure they put on themselves to be an appropriate role model, remarking, 'I started stressing myself.'

Model

This category deals with learning from the positive and negative lived experiences of others. This includes what an individual who participated in this program could learn from others. One participant noted of their participation, 'It showed me all my options within the department, because it helped me go with people who had already done all those things.' Another participant actively worked to use their experiences and intentionally found ways to share with others: 'I would always use my mentor ability or, like, unique position to send [advice] out to others' Another reflected and summarized the essence of what many participants echoed: 'Kind of you know apply what I've learned throughout my four years in this program, to those students who are coming in and probably don't know how to handle the, like, bucket load of courses and hard classes.'

Identification with major

This category relates to comments of affiliation or lack thereof with the Forensic and Investigative Sciences major through participation in the peer mentorship program. This category references activities that strengthen one's affiliation with a chosen major and speaks to the distinct lack of major affiliation as well. One participant noted, 'Oh, it's definitely made me feel more grounded in my major.' Another noted, 'Like, it made it feel like I made the right choice, in being a forensics major.' Another, who felt grounded in their major choice, reflected and compared their experience with those they knew who had taken a different direction, 'I have a friend who has changed her major eight times. We're sophomores.'

Motivation

This category relates to impact on increases or decreases in motivation. In speaking about program participation, one participant noted that it ‘helped me stay motivated, so that maybe that’s something that helped me very much feel motivated to keep on going. So, I never felt like I needed to quit.’

Investment

This category relates to students who are internally motivated to participate in activities that will academically assist them. Additionally, this relates to how participants intentionally chose to invest their time, including participating in volunteer activities and choices related to friend groups. One participant observed that the peer mentorship program was good at ‘identifying those students who are already very invested.’ Another participant noted that ‘mentors and mentees jump at volunteer opportunities.’ When discussing social involvement with their peer group, another indicated

I wasn’t super invested in meeting kids in my major until at least a year into it because there was such a high drop rate . . . And that’s just the nature of how this program is, and I knew that going into it. I kind of didn’t invest myself all that much, but I definitely got to know the older kids when I got the chance.

Self-efficacy

This category relates to both positive and negative comments regarding student beliefs in their ability to achieve their goals. One participant described initially not wanting to ‘ask stupid questions’ but then noted, ‘I’m not afraid anymore’ of interacting with support personnel. Another remarked,

It made me feel more inclined to do other things besides the mentorship program. So, it helps me feel like I could apply for the Department of Entomology Scholar’s Society. It helped me feel like I could become a vice president of AFIS and then further to President of AFIS.

Program structure

This category relates to all comments regarding how the peer mentorship program is currently structured, as well as any recommendations related to the program. A few participants commented about program administration, with one noting, ‘I think if we can make it [peer mentor program] more of a department thing instead of a, like a volunteer club thing, since not everybody’s in the club who’s in the department.’ Participants referenced opportunities to ‘talk to the upper level kids’ and ‘really get to know kids.’ Another participant referenced ‘those lunches every month’ as an impactful event during their first year: ‘Every single one of the freshmen from my class who moved up [*advanced from lower level to upper level within the academic program*] went to those.’ This participant felt it allowed an opportunity

to connect with their mentor, staff, and faculty within the department, 'and I feel it's because of those lunches.'

Belonging

This category relates to positive or negative comments from participants related to their sense of acceptance and fitting in. One participant noted that participation 'made me feel like I belong,' While another noted, 'It was like I should be here.' Another remarked, 'the peer mentorship was just a way for me to feel comfortable.'

Changed character

This category relates to growth of the participants, including reflection related to the growth, development, and use of leadership skills. One participant noted, 'I guess I think this has changed my character.' Another remarked, 'I started realizing like how I like my life to be in order, like what I like to do things I started noticing more about myself, like how organized I am.' Still another said of their participation, 'It's taught me to be a better leader' and 'helped me grow as a person to understand what is expected of me as being, like, an upperclassman.'

Peer mentorship program impacts

Participants of the peer mentorship program were asked to describe how their involvement in the program had personally impacted them, including whether their participation had impacted their ability to meet the program requirements. Additionally, they were asked to provide examples of these impacts.

Participants had an array of predominantly positive responses to these questions, indicating, 'The peer mentorship was just a way for me to feel comfortable.' This participant further stated, 'So, I never felt like I needed to quit.' Another participant discussed their personal growth and development as a result of program participation, indicating, 'I guess I think this has changed my character,' further noting, 'I was able to improve my social skills, like my leadership skills ... And it was kind of, it just felt really great that I was helping out these people.'

Some participants indicated that either they themselves or their counterparts were not fully engaged in the program. Specifically, they drew attention to the need for continued back-and-forth communication. One participant indicated,

I just reach out to my mentees and say, 'Hey, I'm here if you ever need anything. I'm a point of contact to you if you ever need anything.' And for the most part they haven't. They haven't been super keen on it.

That participant went on to note, 'And I'm not reaching out, you know, it wasn't just them. I definitely didn't follow up on things.' Many of the participants

interviewed indicated that continued and consistent engagement between mentors and mentees across the program was an area of concern. 'Last year, I didn't really hear from my mentee, at all.'

Other participants noted their participation helped them to fully comprehend the rigor of the program, stating, 'It's helped me see how difficult it is. Also, how it's achievable.' This same participant went on to indicate the program allowed them the ability to share their successes with others: 'You take what you've learned, and you get to pass it on to people and also it helps build your confidence.' That student continued, 'Like, oh yeah, I was able to do this.'

Participants were asked to reflect on the experience within the program and give advice to their former selves if they were to repeat that experience. They were asked to give advice, if any would be different, to someone just beginning in the program.

It was during this phase of the participant interviews when respondent answers varied a great deal due to their individualized experiences. Responses ranged from, 'What do you want to do, and figure out a time to do it. And then go from there' to 'To really utilize your mentor, ask them, you know, academic life . . . utilize them, if you have a problem, let them be the first person you text.' Another participant noted, 'I would tell myself to push a little bit more and try to be a little bit more involved with them. Whether that be just social and hanging out or checking in on them more often.' Still another indicated to, 'Keep going to the meetings' further explaining that attending more meetings along with interacting with people during those meetings would allow for more opportunities to meet people, making connections for potential study groups and engagement opportunities. One participant said, 'Be prepared for a lot of tears' and remarked, 'It's like an emotional process' then went on to explain a situation in which they had assisted their mentee. They described a sense of responsibility for their mentee and indicated (when speaking about the mentee), 'know that I'm your mentor, and I want what's best for you to get through this program.'

Participants demonstrated realization of personal growth and leadership development because of their participation in the peer mentorship program. 'You are someone people look up to, or not look up to in some sense, but come to when they need help.' With that knowledge came a new-found sense of responsibility. 'Because I know that like I'm now someone who they looked at, like, not look up to, but are going to for advice and everything.'

Implication of peer mentorship program on ability to meet academic requirements

Participants were asked whether they perceived their participation in the peer mentorship program as having an impact on their ability to meet the academic requirements of the Forensic and Investigative Sciences major, which has

minimum program guidelines (minimum 2.75 GPA for students with 0–29 credit hours; 3.0 GPA for students with 30+ credit hours; no course grade below a 'C'; successful completion of a minimum of one required science course per semester; completion of prescribed coursework prior to accumulating 75 credit hours). The participants were generally positive in their responses, indicating that participation in the peer mentorship program had a positive impact on their ability to meet or maintain program requirements. Enthusiastic responses to that question included, 'Oh absolutely, absolutely.' Another noted, 'I think it's for me, personally, it's brought those standards to the forefront of my attention' Yet another participant commented they were motivated to study after corresponding with their mentees, noting, 'sometimes you like forget, and peer mentor program helps you get back on track. Like, oh, I should probably be studying for a test, too.' Participants who felt as though participation assisted with the academic component of their major felt there was benefit, both for the mentor and mentee, within the relationship.

In contrast, two participants felt the program was geared less toward academics and more toward social engagement, responding to whether they perceived their participation in the peer mentor program as having an impact on their ability to meet the academic requirements with, 'Not really, I mean ... I've done a lot of other mentor things in the Corps ... and for the forensics academic requirements, not really.' The second participant indicated, 'Whereas, it didn't really help me with my grades I feel, it helped me with ... the outside opportunities to stay on track.' For these participants, they viewed the peer mentorship program to connect socially rather than a way to assist in meeting or maintaining the requirements of the academic program.

Program strengths and weaknesses

Strengths of the peer mentorship program largely centered on having the opportunity for mentees to learn from the recently lived experience of someone who has been through the program from which they can relate. As one participant noted, 'A mentorship program sets you up with people that are going to teach you that (who you are as a person), and help you with that, and help you learn who you want to be.' Furthermore, when discussing class structure and professor recommendations, one participant remarked, 'You can really only get that with current students who have taken them recently.' Yet another participant indicated the program strength was 'There's something being done to help freshman year.' Other program strengths identified were, 'that the rigor of the forensics major was identified.'

Weaknesses discussed by participants included perceived lack of social opportunities for lower-division students to interact with upper-division students. 'I definitely just think meeting other kids more than one-on-one thing would be really useful.' Another participant indicated there is no participant

guidance or follow up. Other identified weaknesses were lack of mentor/mentee engagement, 'like this year my mentor and I did not talk' and '... the hardest part is trying to keep that contact and communication with your mentee.' Yet another noted, 'I do notice that there is just a lack of communication sometimes between mentors and mentees. And sometimes, you know, the fault comes from both ends. And it's a voluntary program.' Another indicated a potential weakness could be a match between individuals with no commonalities or different program pathways and career interests.

Conclusions

Throughout the interviews, participants reported predominantly positive responses regarding their participation within the peer mentorship program. They noted it helped them feel motivated and capable, academically engaged, and connected with the major. These findings are in line Schreiner's thriving component model (Schreiner, 2010b; Schreiner, 2013), specifically the engaged learning and academic determination within the academic area. However, it was apparent that commitment and engagement to the peer mentorship program was essential – from both the mentor and mentee – for the mentor pairing to be successful. Individuals interviewed took responsibility for their lack of commitment and engagement, or commented on this issue on behalf of others they knew within the program.

Findings related to student understanding of the need for connection, care, and engagement with other individuals for support and encouragement aligns with Schreiner's thriving component model (Schreiner, 2010a, 2010b, 2013), specifically the social connectedness factor within the interpersonal area. While most of the student participants reported perceived academic gains from their participation within the peer mentorship program, two of the six participants felt that participation in the peer mentorship felt their participation was more social than academically focused. The Schreiner thriving model (Schreiner, 2010a, 2010b, 2013) includes both social connectedness (as a factor within the interpersonal area) and the academic area (factors of engaged learning and academic determination) as necessary components for thriving. Both areas were identified within the findings by participants. Findings related to strengths of the peer mentorship program related to the opportunity for mentees to relate and learn from their peers, who had only recently lived what the mentees were currently experiencing.

Implications and recommendations

According to the peer mentorship outcome categories that emerged from the data, several implications and recommendations for the current peer mentorship program available to students within the forensic and investigative

sciences major have been identified. However, caution should be used when considering these findings and recommendations outside of the context in which they were gathered and are being recommended. The data analyzed within this project were collected from participants in a volunteer, student-run, peer mentorship program in a highly rigorous, undergraduate bachelor of science program in a STEM field.

First, data indicated confusion about whose program this is, so clarifying program ownership, if it exists, would be helpful. Participants interviewed indicated confusion about whether the peer mentorship program was a AFIS program (student organization) or Department of Entomology program. As such, the researcher recommends clarification of program administration and oversight. Furthermore, since not all students enrolled within the forensic and investigative sciences major participate in the AFIS organization, some of the participants recommended centralizing program administration through the department to ensure communication to all students, including those who may not choose to participate in or attend the AFIS organization.

Secondly, the researcher recommends incorporating agreed-upon minimum expectations for engagement and other appropriate matching criteria for the mentor/mentee pair. This can be accomplished either program-wide or through utilizing a question in the application process to ensure individuals are paired according to their engagement goals. Rose (2003) determined relatively standard qualities for graduate students seeking faculty mentors, but it is yet unclear what qualities each member of this study peer mentorship partnership is seeking from the other. Regardless, it is important that mentors proactively and consistently engage with mentees to which they are paired. Early fall involvement for students has been found to positively predict spring involvement, with significant impacts on social and academic engagement as well as persistence (Milem & Berger, 1997).

Third, the administrators of the peer mentorship program should consider minimum expectations for training and providing a list of university resources to all individuals serving in a mentor capacity within this program. Training will provide correct and consistent information to individuals serving within the peer mentor role within the peer mentorship program, thereby supporting both the dissemination of information and utilization of university resources, as appropriate to the situation.

The final recommendation is to consider department or programmatic social events to foster engagement and connectivity between not only the mentor and mentee pair, but to increase the engagement between the students in the lower level of the program with those in the upper level of the program. Many participants noted disconnect between students within the lower level and upper level, so activities in a relaxed atmosphere would allow opportunities for interaction and foster collegiality between the students. Additional

department-wide social events, including a welcome or kick-off event at the onset of a new academic year, would allow opportunities for students to engage with faculty and staff, which is strongly related to student satisfaction of their institutional involvement (Astin, 1984; Woosley, 2003). This recommendation supports the social connectedness factor component, within the interpersonal area of Schreiner's thriving theoretical model (Schreiner, 2010a, 2010b, 2013).

Further studies are needed to explore why some students chose to connect, engage, and invest in this type of experience while others do not. Would changes in program structure impact the peer mentorship outcomes in the categories of connection, engagement, and investment? Do students with a strong identification with the major utilize the peer mentorship program at a similar rate than their peers and are their reasons for participation similar? These questions related to peer mentorship categories outcomes need further exploration.

Based on the findings of this study, further studies are recommended to determine the motivation and value added for individuals who choose to participate in the peer mentorship program in the peer mentor role. Peer mentors are a valuable connection point for their mentees and can assist them with institutional transition, academic success, and persistence (Alcocer & Martinez, 2018; van der Zanden et al., 2018). Understanding the motivation for and outcomes from the role will be beneficial to inform future programing and practices. Personal satisfaction regarding helping mentees and observing mentee growth have been identified as motivations for peer mentorship service (Bruno et al., 2016; Davies & Rutherford, 2012; Foy & Keane, 2018; Lim et al., 2017). Further studies are recommended to explore whether differences in outcomes exist for various populations involved in peer mentorship programs.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Rebecca L. Hapes  <http://orcid.org/0000-0001-5333-6286>

Kim E. Dooley  <http://orcid.org/0000-0002-5654-5988>

Summer F. Odom  <http://orcid.org/0000-0002-3820-7301>

References

- Alcocer, L. F., & Martinez, A. (2018). Mentoring hispanic students: A literature review. *Journal of Hispanic Higher Education*, 17(4), 393–401. <https://doi.org/10.1177/1538192717705700>

- Amaral, K. E., & Vala, M. (2009). What teaching teaches: Mentoring and the performance gains of mentors. *Journal of Chemical Education*, 86(5), 630–633. <https://doi.org/10.1021/ed086p630>
- Asempapa, R., Morales, A., & Agili, S. (2021). A quantitative analysis of a customized peer mentoring program with STEM underrepresented students. *Journal of Research in STEM Education*, 7(1), 1–20. <https://doi.org/10.51355/jstem.2021.94>
- Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Personnel*, 25(4), 297–308. http://chawkinson.pbworks.com/w/file/fetch/122997693/Student_Involvement_A_Development_Theory_for_Highe.pdf
- Bruno, P. A., Love Green, J. K., Illerbrun, S. L., Holness, D. A., Illerbrun, S. J., Haus, K. A., Sveinson, K. L., & Sveinson, K. L. (2016). Students helping students: Evaluating a pilot program of peer teaching for an undergraduate course in human anatomy. *Anatomical Sciences Education*, 9(2), 132–142. <https://doi.org/10.1002/ase.1543>
- Colvin, J. W., & Ashman, M. (2010). Roles, risks, and benefits of peer mentoring relationships in higher education. *Mentoring & Tutoring: Partnership in Learning*, 18(2), 121–134. <https://doi.org/10.1080/13611261003678879>
- Crisp, G. (2010). The impact of mentoring on the success of community college students. *The Review of Higher Education*, 34(1), 39–60. <https://doi.org/10.1353/rhe.2010.0003>
- Dagley, M., Georgiopoulos, M., Reece, A., & Young, C. (2016). Increasing retention and graduation rates through a STEM learning community. *Journal of College Student Retention*, 18(2), 167–182. <https://doi.org/10.1177/1521025115584746>
- Davies, J. W., & Rutherford, U. (2012). Learning from fellow engineering students who have current professional experience. *European Journal of Engineering Education*, 37(4), 354–365. <https://doi.org/10.1080/03043797.2012.693907>
- Dillman, D. A. (2007). *Mail and internet surveys: The tailored design method* (2nd ed.). Wiley.
- Dooley, K. E. (2007). Viewing agricultural education research through a qualitative lens. *Journal of Agricultural Education*, 48(4), 32–42. <https://doi.org/10.5032/jae.2007.04032>
- Foy, C., & Keane, A. (2018). Introduction of a peer mentoring scheme within biomedical sciences education—easing the transition to university life. *Journal of Further and Higher Education*, 42(6), 733–741. <https://doi.org/10.1080/0309877X.2017.1311994>
- Hayes, R. (2007). *The retention and graduation rates of 1999–2005 baccalaureate degree-seeking freshman cohorts entering in science, technology, engineering and mathematics majors in 190 colleges and university*. University of Oklahoma Center for Institutional Data Exchange and Analysis.
- Holland, J. M., Major, D. A., & Orvis, K. A. (2012). Understanding how peer mentoring and capitalization link STEM students to their majors. *The Career Development Quarterly*, 60(4), 343–354. <https://doi.org/10.1002/j.2161-0045.2012.00026.x>
- Kendricks, K. D., Nedunuri, K. V., & Arment, A. R. (2013). Minority student perceptions of the impact of mentoring to enhance academic performance in STEM disciplines. *Journal of STEM Education: Innovations & Research*, 14(2), 38–46. <https://www.jstem.org/jstem/index.php/JSTEM/article/view/1783/1524>
- Leidenfrost, B., Strassnig, B., Schabmann, A., Spiel, C., & Carbon, C. C. (2011). Peer mentoring styles and their contribution to academic success among mentees: A person-oriented study in higher education. *Mentoring & Tutoring: Partnership in Learning*, 19(3), 347–364. <https://doi.org/10.1080/13611267.2011.597122>
- Lim, J. H., MacLeod, B. P., Tkacik, P. T., & Dika, S. L. (2017). Peer mentoring in engineering: (un) shared experience of undergraduate peer mentors and mentees. *Mentoring & Tutoring: Partnership in Learning*, 25(4), 395–416. <https://doi.org/10.1080/13611267.2017.1403628>
- Markle, R. S., Williams, T. M., Williams, K. S., deGravelles, K. H., Bagayoko, D., & Warner, I. M. (2022, May). Supporting historically underrepresented groups in STEM higher education:

- The promise of structured mentoring networks. *Frontiers in Education*, 7, 674–669. <https://doi.org/10.3389/feduc.2022.674669>
- Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation*. Wiley.
- Milem, J. F., & Berger, J. B. (1997). A modified model of college student persistence: Exploring the relationship between Astin's theory of involvement and Tinto's theory of student departure. *Journal of College Student Development*, 38(4), 387–400.
- National Science Foundation. (2014). *Who earns bachelor's degrees in science and engineering? STEM education data*. <https://nsf.gov/nsb/sei/edTool/data/college-14.html>
- Page, D., & Hanna, D. (2008). Peer mentoring: The students' perspective. *Psychology Learning & Teaching*, 7(2), 34–37. <https://doi.org/10.2304/plat.2008.7.2.34>
- Picton, C., Kahu, E. R., & Nelson, K. (2018, May 30). "Hardworking, determined and happy": First-year students' understanding and experience of success. *Higher Education Research & Development*, 37(6), 1260–1273. <https://doi.org/10.1080/07294360.2018.1478803>
- Rodger, S., & Tremblay, P. F. (2003). The effects of a peer mentoring program on academic success among first year university students. *The Canadian Journal of Higher Education*, 33(3), 1–17. <https://doi.org/10.47678/cjhe.v33i3.183438>
- Rose, G. L. (2003). Enhancement of mentor selection using the ideal mentor scale. *Research in Higher Education*, 44(4), 473–494. <https://doi.org/10.1023/A:1024289000849>
- Sanchez, R. J., Bauer, T. N., & Paronto, M. E. (2006). Peer-mentoring freshmen: Implications for satisfaction, commitment, and retention to graduation. *Academy of Management Learning & Education*, 5(1), 25–37. <https://doi.org/10.5465/amle.2006.20388382>
- Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2018). Saturation in qualitative research: Exploring its conceptualization and operationalization. *Quality & Quantity*, 52(4), 1893–1907. <https://doi.org/10.1007/s11135-017-0574-8>
- Schneider, K. R., Bickel, A., & Morrison-Shetlar, A. (2015). Planning and implementing a comprehensive student-centered research program for first-year STEM undergraduates. *Journal of College Science Teaching*, 44(3), 37–43. https://doi.org/10.2505/4/jcst15_044_03_37
- Schreiner, L. A. (2010a). Thriving in community. *About Campus*, 15(4), 2–11. <https://doi.org/10.1002/abc.20029>
- Schreiner, L. A. (2010b). The "thriving quotient": A new vision for student success. *About Campus*, 15(2), 2–10. <https://doi.org/10.1002/abc.20016>
- Schreiner, L. A. (2013). Thriving in college. In P. C. Mather & E. Hulme (Eds.), *Positive psychology and appreciative inquiry in higher education: New directions for student services, number 143*, 41–52. Wiley.
- Schreiner, L. A. (2014). Different pathways to thriving among students of color: An untapped opportunity for success. *About Campus*, 19(5), 10–19. <https://doi.org/10.1002/abc.21169>
- Snowden, M., & Hardy, T. (2012). Peer mentorship and positive effects on student mentor and mentee retention and academic success. *Widening Participation and Lifelong Learning*, 14(1), 76–92. <https://doi.org/10.5456/WPLL.14.S.76>
- Spaulding, D. T., Kennedy, J. A., Rozsavolgyi, A., & Colon, W. (2020). Outcomes for peer-based mentors in a university-wide STEM persistence program: A three-year analysis. *Journal of College Science Teaching*, 49(4), 30–36. <https://doi.org/10.1080/0047231X.2020.12315637>
- Stigmar, M. (2016). Peer-to-peer teaching in higher education: A critical literature review. *Mentoring & Tutoring: Partnership in Learning*, 24(2), 124–136. <https://doi.org/10.1080/13611267.2016.1178963>
- Stromei, L. K. (2000). Increasing retention and success through mentoring. *New Directions for Community Colleges*, 2000(112), 55–62. <https://doi.org/10.1002/cc.11205>

- Terrion, J. L., & Leonard, D. (2007). A taxonomy of the characteristics of student peer mentors in higher education: Findings from a literature review. *Mentoring & Tutoring*, 15(2), 149–164. <https://doi.org/10.1080/13611260601086311>
- Tufford, L., & Newman, P. (2012). Bracketing in qualitative research. *Qualitative Social Work*, 11(1), 80–96. <https://doi.org/10.1177/1473325010368316>
- U.S. Department of Education, National Center for Education Statistics. (2023). *Integrated postsecondary education data system (IPEDS)*. https://nces.ed.gov/programs/digest/d22/tables/dt22_322.50.asp
- van der Zanden, P. J., Denessen, E., Cillessen, A. H., & Meijer, P. C. (2018). Domains and predictors of first-year student success: A systematic review. *Educational Research Review*, 23, 57–77. <https://doi.org/10.1016/j.edurev.2018.01.001>
- Venegas-Muggli, J. I., Barrientos, C., & Álvarez, F. (2023). The impact of peer-mentoring on the academic success of underrepresented college students. *Journal of College Student Retention: Research, Theory & Practice*, 25(3), 554–571. <https://doi.org/10.1177/1521025121995988>
- Wallace, D., Abel, R., & Ropers-Huilman, B. (2000). Clearing a path for success: Deconstructing borders through undergraduate mentoring. *The Review of Higher Education*, 24(1), 87–102. <https://doi.org/10.1353/rhe.2000.0026>
- Wilson, Z. S., Holmes, L., Sylvain, M. R., Johnson, L., Batiste, M., McGuire, S. Y., Warner, I. M., Pang, S. S., & Warner, I. M. (2012). Hierarchical mentoring: A transformative strategy for improving diversity and retention in undergraduate STEM disciplines. *Journal of Science Education and Technology*, 21(1), 148–156. <https://doi.org/10.1007/s10956-011-9292-5>
- Woosley, S. A. (2003). How important are the first few weeks of college? The long term effects of initial college experiences. *College Student Journal*, 37(2), 201–208.
- Yin, R. K. (1998). The abridged version of case study research. In L. Bickman & D. J. Rog (Eds.), *Handbook of applied social research methods* (p. pp. 229.259). Sage Publications.
- Zevallos, A. L., & Washburn, M. (2014). Creating a culture of student success: The SEEK scholars peer mentoring program. *About Campus*, 18(6), 25–29. <https://doi.org/10.1002/abc.21141>