AC 2010-384: PEER MENTORING: IMPACT ON MENTEES AND COMPARISON WITH NON-PARTICIPANTS

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Peer Mentoring: Impact on Mentees and Comparison with Non-Participants

Abstract

Peer mentoring programs are a method often implemented to help address retention in engineering especially during the first and second years of study. This study examines the impact of a well-established engineering peer mentoring program in a large eastern U.S. university.

Peer mentoring programs for women, Hispanic and African American students had been in existence since the 1990's. In fall 2005, the college increased the types of peer mentoring programs offered to include programs for male, transfer student, and general undergraduate engineering program participants. This increase in program offerings substantially increased overall mentor program participation and offered an opportunity for enhanced assessment and analysis.

For this study, we analyzed both pre and post survey data from mentor program participants to look at the impact of program participation on intentions to persist and their feelings of belonging in engineering, and differences in post survey responses by gender, ethnicity and mentor program variations. Finally we report the actual retention / graduation data for this cohort of participants and discuss these figures relative to the overall college of engineering.

Introduction

Research has shown that the first year of an engineering program is critical to students' success and specifically to their ability and decision to stay in an engineering degree program [1]. Peer mentoring programs – where upper division students work with entering students – are a popular way to support the success of first-year engineering students. Mentoring programs are based on theory that proposes the benefits of reducing feelings of isolation and developing a strong sense of self via support and positive role models [2]. Mentoring has been shown to benefit the protégé's sense of confidence, self-esteem and in educational settings, improve retention [3,4].

The mentoring program studied was established in 1992 to support Hispanic, African American and female first-year engineering students at an eastern U.S. university. In 2005 the program was expanded to include *all* first-year students interested in participating [5]. Trained and high performing upper-class engineering students are paired with groups of mentees and participate in welcoming receptions the first two evenings of the fall term. Throughout the fall term,

mentors are required to meet weekly with their mentees (either individually or in groups).

This paper examines the impact of this peer mentoring program on the fall 2005 mentee participants. Specific research questions are:

1. Are there differences in graduation/retention rates between mentor program protégés and the College of Engineering overall?
2. How do mentor participants protégés' responses change on pre / post surveys on program outcomes (feelings of inclusion, persons they identify with, confidence in completing one's degree)?
3. What differences exist on post survey outcomes by gender or ethnicity?
4. What is the relationship between post-program reported mentor program participation and perceptions of mentor effectiveness on intention to persist, program satisfaction, perception of the importance of mentor program features and formative feedback on the program?

Literature Review

Mentoring is a concept under continuous definition and development and takes many forms, ranging from traditional hierarchical, top down to distributed, relational models. As a practice, it gained currency in organizations as they diversified, bringing in women and other underrepresented minorities into educational and workforce environments, where the normal, informal paths to mentoring—identified as integral to success—were often unintentionally, or intentionally, closed to them [6,7,8]. Early inquiry into mentoring was designed to understand these informal paths and institutionalize them in order make these opportunities available to all employees or students. In STEM, fields in which women and ethnic and racial minorities are particularly underrepresented, mentoring is seen as an important tool to increase both recruitment and retention of underrepresented students.

Mentoring is often defined in terms of hierarchical mentoring relationships in which the mentor, a more experienced and/or more senior person, and the mentee or protégé, someone less experienced and less senior, provides information and support for professional and personal development [3,9]. Wadsworth [10], who worked in an undergraduate student environment, emphasizes the passing of experience "during a time of transition "(pg. 2). Mentoring takes place both formally—organized, with stated goals and mentor training—and informally.

Early work looked at mentoring as focusing on either career development—providing career and advancement guidance—or psychosocial development—emphasizing social adaptation and role modeling [2]. The mentoring theory derived from this work provided the conceptual framework for much research and concrete program development, and implies close one-on-one relationships, or mentoring programs based upon the traditional, hierarchical model, in which a senior or more experienced colleague mentors someone lower down the food chain, one-on-one. Many studies indicate that women and underrepresented

minorities derive greater benefit from models that involve social and networking information in addition to more mechanistic career development information (e.g., Learning to negotiate the politics of an organization as well as understanding the steps to advancement) [11,12,8].

Ongoing research on mentoring identifies and investigates a broader range of models. Chesler and Chesler [6], a team comprising sociology and engineering expertise, investigate how existing gender roles and dynamics impact the creation of effective mentoring programs. They report that a prevalent model, the Heroic Journey, emphasizes organizational and technical information and guidance but neglect psychosocial issues such as self-efficacy or sense of belonging. This is important because STEM is white male-dominated, so that the default methods of mentoring tend to address the needs of young men. "Thus, the mentoring model that emphasizes technical and instrumental issues is well suited to the preponderance of traditionally-socialized men in these fields; at the same time, it does not fit well with the ways in which most women were socialized" (pp. 50-51)[6].These relationships may also focus on male socialization stressing competition or challenges to determine whether a mentee can make it in a difficult discipline or are candidates for weeding out and not the development of productive networks [8]. Emphasizing relational models for mentoring, which emphasize mutuality and support, is a way to ameliorate these problems [13].

Potential problems with the hierarchical, one-on-one model are exacerbated by the fact that there are few available same gender or same race mentors or role models available in upper levels of industry, government and academe. Much research indicates that cross-gender or cross-race/ethnicity mentoring can be effective, with the kind of mentoring received and the longevity and robustness of the mentor-mentee relationship being more important elements than the sex or race of either [14,15]. Also, such relationships can provide access to the power structure within an organization and aid in career advancement. In fact, rank within an organization can be a predictor of how effective a mentoring relationship is [16] and how effective a mentee perceives the relationship to be in terms of job satisfaction and career development [17]. Possible drawbacks are that cross gender or cross race mentoring with a majority male in the mentoring role, can facilitate the continuation of unexamined, poor or discriminatory policies and practices in an organization [18]. Also, organization-based notions of mentoring that rely on established practices do not generally encompass the experiences of underrepresented minorities, who have more recently entered the workforce, particularly in STEM [19].

Because of this, people from underrepresented groups began to identify and develop a variety of mentors and mentoring relationships to meet their developmental needs [20,21,22], casting light on new models for mentoring relationships. The Chesslers [6] identify three types of alternative mentoring relationships—multiple (the board of directors model), peer-to-peer, and collective, in which senior colleagues and institution itself "take responsibility for

constructing and maintaining a mentoring team." (p. 52). Collective mentoring requires organizational support and recognizes the need to develop incoming people [23]. It also requires an organization to review overall approach and practices.

Ensher, et al, [17] promote social exchange theory as a contribution to the emerging framework for measuring the impact of mentoring. Social exchange theory builds on the idea that people engage in and maintain relationships based on perceived benefits to costs ratio. Viewing mentoring in this light and using the theory to construct effective mentoring programs could help to amend some of the institutionalized inequities inadvertently embedded in mentoring activities using traditional models and methods. The authors compare traditional (hierarchical one-on-one), step-ahead (a person in the next organizational level) and peer mentoring and three types of support identified by Foa & Foa [24]: social, role modeling and vocational. This theory also takes into account the impact of role modeling support, which is valuable because mentoring and role modeling are often confounded. In a quantitative study, the team found that mentees with hierarchical mentors expressed greater job satisfaction, possibly because successful colleagues have more experience and more political capital to offer. They also found that vocational support was most effective for self-reported job satisfaction and career development.

Universities frequently use the peer mentoring for students in transitional situations to address several challenges—effectively deploying low numbers of women and minorities, providing role models, and building a sense of community [25, 26,27,28]. It should be noted that in a university context, the peer mentoring more closely resembles a step-ahead model. Peer mentoring also addresses the relative dearth of women role models and mentors for engineering students at both the student and faculty level, offering the opportunity for 'people who look like me' to share experiences and strategies that can help students find a place in a majority culture [2]. Potential drawbacks of peer mentoring include poor training, sparse pools of mentors to draw from, and the possibility of hierarchical practices persisting. [29].

The value of formal mentoring programs to both individuals, whether mentee or mentor, and to the organization is well documented. Mentees potentially learn what mentors know—gain knowledge in how to negotiate organizations, specific knowledge base that will help in advancement and increase self-efficacy and sense of belonging. Good mentoring relationships increase retention, improve knowledge and skill sets, aid in career advancement, and can enhance self-esteem [30,31,22]. Effective mentoring also introduces mentees to the organizational values and practices, thereby increasing productivity and commitment to the organization [21].

Studies indicate that mentoring can improve student retention in STEM [25, 32,33,12] and group identity or sense of belonging [28]. Others highlight institutional

challenges: while it is agreed that there is measureable benefit gained from a mentoring relationship, the benefits may be psychosocial, or personal, rather than career or achievement-based [9,34]. In other words, the mentoring experience may have helped mentees clarify career goals and better parse and meet the challenges of their own study or work situations, but did not lead them to choose careers that were consistent with the goals of the mentoring program. Mentoring can also impact the career development of mentors, who gain from passing on their own knowledge and experience. Mentors reinforce their own skills, gain gratification from creating a 'legacy' and find validation in seeing their advice implemented [35]. The value of mentoring to the organization is an inherent component of formal, and even informal, mentoring used to orient, socialize and maximize the talents of new members [9,23,3]. Other benefits include succession planning, lower job turnover, better understanding of the organizational values and practices and overall job satisfaction [25,19,3].

In summary, mentoring can be an effective developmental tool for both individuals and organizations when the mentoring goals are well defined and mentors are supported by the organization, gain self-benefit and are well trained. Providing access to multiple sources of mentoring recognizes the complexities of the modern university and workplace and also addresses the specific needs of individuals underrepresented within an organization.

Methods

Mentor Program Description

Peer mentoring programs – Academic Hispanic OutReach Alliance (AHORA), Black Engineering Support Teams (BEST), and Women in Engineering Support Teams (WEST) – were established in the 1990's at the institution being studied to assist in the high school to college transition of first-year students from underrepresented populations enrolled in the College of Engineering (CoE). Building on the success of the original programs, the peer mentoring programs were expanded during the fall semester 2005 to include all interested first-year students admitted to the CoE. The specific programs introduced are the General Undergraduate Engineering Support Teams (GUEST) and Network for Engineering Transfer Students (NETS). We refer to these different groups within the overall mentor program as "teams" through this paper (e.g. AHORA teams, etc.).

Patterned on the design of AHORA, BEST, and WEST, GUEST employs a group of upper-class CoE students from all backgrounds to be program mentors. For the NETS program, administrators recruit upper-class students who themselves had transferred from another higher education institution into the CoE. All mentors were screened by GPA, full-time student status, and participated in group interviews to gather data on social skills and leadership styles.

Mentees were recruited from all prospective CoE students to the programs using a variety of methods including paper brochures and mass emails. When possible, mentees were assigned to a mentor team in their same residence hall, or in a nearby one. Because not all NETS students lived on campus, mentors were assigned to the NETs team based on major. Mentors and mentees met each other during welcoming receptions sponsored by the college's diversity office. From that initial meeting time until the end of the Fall semester, all mentors – with the exception of those for NETS where the teams were too large to do so – were required to meet with their mentees once weekly as a team or individually, depending on the individual mentee's needs. Requirements for the structure and contact of weekly meetings were left to the mentor and mentees choosing. As an alternative, NETS mentors used emails and and/or phone contact with their mentees each week. Many of the NETS mentees also had classes with their NETS mentor allowing them to see and interact in person despite not being required to hold a face-to-face meeting weekly. Besides the weekly contact, two large scale events were implemented during the term for mentors and mentees – one focused on learning about potential engineering majors and choosing spring semester courses, and the other an evening social following a college of engineering event. For further details on the program refer to AuthorC et al. [5].

Subjects

With the addition of the new mentoring programs, the number of first-year students participating as mentees increased from 126 in 2004 to 381 in 2005. Of the original 381 participants, 61 chose to not participate – resulting in 320 participants. Of the 320 mentees, 310 were first-year students accounting for 26.8% of the entering first-year CoE population.

Table 1 shows demographic data for the mentees from the Fall 2005 entering first-year engineering cohort ("Post response") and the 114 who completed both the pre and post surveys. The representation of female and African American participants (approximately 29 and 5 percent respectively) is higher than the college's averages of approximately 16 and 2 percent [5] in the fall 2005 first-year cohort and can be accounted for by mentoring teams targeted for women engineering students, WEST, and African American students – BEST. Additional survey data also indicate that nearly all (92%) of participants are traditional college students who had just completed a high school degree.

Table 1.Description of Mentee Participants

	Post Only Responses		**Pre & Post Responses**	
Gender	**N**	**%**	**N**	**%**
Male	204	63.6	72	63.2
Female	92	28.7	42	36.8
No Response	25	7.8	0	0.0
Ethnicity/Citizenship				

African/Black American	17	5.3	7	6.1
Asian American & Pacific Islander	17	5.3	3	2.8
Latino/Hispanic American	6	1.9	4	3.5
Caucasian/White American	222	69.2	86	75.4
Other	17	5.3	6	5.3
No Response	42	13.1	8	7.0

Instruments and Procedures

Mentees completed the Assessing Women and Men in Engineering (aweonline.org) pre and post surveys to ascertain the impact of the program. The Undergraduate Engineering Mentee surveys measure the impact of peer mentoring (or similar peer support activities) on the undergraduate students who are the recipients of the mentoring – the "mentees". Specifically, the survey assesses the following topics that are the most common objectives of mentoring programs:

- Feelings of isolation/inclusion,
- Impact of role models,
- Influence on Academic/social behaviors and
- Participant satisfaction with the activity.

The Mentee Post Survey also collects formative data designed specifically to determine the extent that the respondent participated in the activity and her overall satisfaction with the program. Formative items on the mentee surveys address mentee perceptions of the mentor, the extent of contact with the mentor and suggestions for improving the activity.

The pre survey was administered early during their first semester and the post after the mentor program activities had been completed. Assessments were administered electronically. Mentees were individually emailed the pre-participation survey link in early October leading into fall break. Mentees were again emailed individually the post-participation survey link during the second week of December at the conclusion of the program and heading into final exams.

Results

1. Are there differences in graduation /retention rates between mentor program protégés and the college of engineering overall?

We examined the retention / graduation rates of the mentor program participants as compared to the overall college of engineering. Results as of spring 2009 show 80% of participants were retained in or had graduated from the college of engineering. This rate is higher than the overall college combined 4-year graduation and retention rate, which is approximately 72%. We conducted a Chi

Square analysis between the frequencies of the mentee participants who were retained as compared to the rest of the college of engineering and found that there is a significant difference between the two rates of retention; thus we can say that there is an association between retention rates and participation in the mentor program.

2. How do mentor program protégés responses change on pre / post surveys on program outcomes (feelings of inclusion, persons they identify with, confidence in completing one's degree)?

We analyzed matched pre and post survey results for five pairs of survey items addressing students' sense of belonging to the engineering community, and four items addressing plans to persist and graduate. Specifically these four items asked for respondents' confidence in being enrolled in engineering during the next term, confidence in graduating from engineering in their current major, graduating with any engineering degree, and confidence in graduating with *any* degree from the institution. The engineering community item used a four-point scale ranging from "not at all part of the engineering community" to "very much" part of the community. For the persistence items, responses were made on a five-point scale ranging from "not at all confident" to "very confident". T-test analysis on these five pairs of items for matched responses from pre to post (response frequencies ranging from 91 – 95 for the items), however, showed no significant differences from pre to post administration.

3. What differences exist on post survey outcomes by gender or ethnicity, or mentor teams?

We examined differences amongst participants' responses to post survey items based on key demographic variables including gender, ethnicity and the different mentor teams (e.g. BEST, WEST). For this analysis we conducted exploratory factor analysis of related survey questions that were continuous in nature (e.g. Likert scale type items) to reduce the number of individual analysis. Each of the four sets of related items produced a single factor with acceptable reliabilities ranging from 0.79 to 0.90. Table 2 shows the named factors, the items for each factor and the internal reliability for that factor.

Table 2. Post Survey Factors

Factor Name / Reliability	Items and Scale
Confidence in retention 0.79	How confident are you that .. a. you will be enrolled in any major in the college or school of engineering in the next academic year? b. you will graduate with your current or expected engineering major? c. you will complete any engineering degree d. you will complete any degree (any major) at this institution Five-point scale ranging from "not at all confident" to "very confident".
Satisfaction with	e. Your mentor's ability to answer your questions about the

Mentoring program .85	engineering curriculum. f. The frequency of contact with your mentor. g. The opportunities for contact with other mentees in the program h. The quality of the formal program activities conducted as part of the mentor program i. Your overall satisfaction with your assigned mentor j. Your overall satisfaction with all aspects of the mentor program Five-point scale ranging from "strongly dissatisfied" to "strongly satisfied".
Mentoring program features .82	Same items as "satisfaction" factor; respondents use a different scale. Five-point scale ranging from "very unimportant" to "very important".
Program formative feedback .90	k. My experience as a participant in this activity met my goals for participating. l. If I needed help, it was readily available. m. The information I received about the activity before it began helped me to participate successfully. n. This activity was well organized. o. This activity should be continued. p. My participation in this activity led me to a better understanding of engineering. q. My participation in this activity led me to a better understanding of my own career goals. r. My participation in this activity makes me more confident in my ability to succeed in engineering. Five-point scale ranging from "strongly disagree" to "strongly agree".

T-tests between males and female factor responses showed no significant differences nor did a t-test on Caucasian as compared to non-Caucasian respondents. A MANOVA analysis using the mentor team types (e.g. AHORA, BEST) as independent variables and the four factors *plus* the engineering community item as dependent variables did show significant differences for the "mentoring program features" factor ($p < .05$). Post hoc analysis showed that both AHORA and BEST participants reported significantly more importance in mentor program features than did GUEST program participants ($p < .05$). There was also a trend towards significance between AHORA and WEST with AHORA participants again reporting more importance in mentor program features ($p < .07$).

We also analyzed two other post survey items regarding the respondents' perception of how the mentoring program or their mentor impacted decisions about their major; these were categorical items and we conducted Chi-square analysis to examine post survey differences. There were no differences for these items by gender. Due to small cell sizes, we could not use all the ethnicity categories shown in Table 1; however when we divided respondents into three groups: African American, Asian and Caucasian we found that there is a significant difference in these groups' responses to the impact of the program on decisions regarding majors. Specifically, 64 percent of African American

respondents indicated that the mentor program had an impact on their major decision as compared to 23 and 25 percent of Asian and Caucasian respondents.

4. What is the relationship between post-program reported mentor program participation and perceptions of mentor effectiveness and the four mentor program outcome factors listed in table 2?

We conducted regression analysis between two post-survey variables that may help predict how participants would respond to the four mentor program outcome factors from Table 2. The input or independent variables were the extent to which the participants participated in the mentor program (five-point scale from "no participation" to "very active"), and participant ratings of the effectiveness of their mentor and the overall mentor program (four-point scale from "minimally effective" to "very effective"). Several relationships were significant ($p < .05$) and are summarized as follows by the four mentor program outcome factors:

Program Satisfaction

- Students who perceived the mentor or mentor program as more effective tended to have higher levels of satisfaction with the overall mentor program.

Program formative feedback

- Students who perceived the mentor or overall mentor program as more effective tended to provide more positive feedback on program experiences than students who perceived their mentor as less effective

Feature Importance

- Students who reported higher levels of participation tended to perceive mentor program features as more important than students with lower levels of participation.
- Students who perceived the mentoring program as more effective tended to perceive mentor program features as more important than students who perceived the program as less effective

Confidence in retention

- Students perceived the mentoring program as more effective tend to have higher levels of confidence in retention.
- Students with lower levels of participation tend to have higher levels of confidence in retention.

Discussion and Conclusions

Mentoring programs match a more experienced individual with a less experienced person in order to help the "mentee" achieve some desired outcome [10]. The ultimate outcome in an undergraduate engineering program is persistence and graduation. Research question one from this study shows that students who participated in the mentoring program had a higher retention rate than the overall college of engineering for the fall 2005 entering cohort. Although, statistically, we cannot attribute causality to participation in the mentor program with the greater

retention rate, we can say that this relationship exists and provides some support for the effectiveness of the mentor program. Prior research on mentoring programs for STEM undergraduate women only has shown increased retention rates when they participate in a mentoring program [36]. Our current results extend this finding to a broader student population.

The positive retention / graduation rate did not evidence itself, however, in the pre / post survey results. In research question two, we found no statistically significant changes for the items we tested for pre / post significant changes (four concerning persistence plans and the fifth regarding feelings of belonging in the college of engineering). Two explanations are plausible. The first concerns the timeline for administering the surveys. The pre-survey was administered relatively late for these students – several weeks into the mentoring program activities. Thus it is quite likely that the pre responses are not in this case an accurate measure of students' beliefs and plans *before* they began the mentoring program. The expanded program that was implemented that fall proved to be more labor intensive than anticipated and the administration of the pre survey was late for that reason. This has been corrected in subsequent years with mentees receiving an email one to two weeks before the semester starts that welcomes them to the program, introduces their mentor, and provides the link to the online pre survey.

Another explanation for the lack of significant results may be a self selection effect. All those admitted to the college were invited to participate in the mentoring program –about 28 percent of the fall 2005 cohort did participate. Those that chose to voluntarily participate in the mentor programs may have already been highly motivated to complete their engineering degrees. Pre survey means for the retention items ranged from 4.1 to 4.7 on a five-point scale – indicating a high level of confidence. The same was true for the engineering community item where pre responses averaged 3.1 on a four-point scale. Future research using cohorts where the pre survey was administered early in the program can check to see if this trend holds true.

Given the varying demographics of the mentees, we chose to also examine differences in post survey protégé responses; these analyses (research question 3) indicated that post survey responses differ somewhat based on ethnicity and minority status.

Specifically, minority program teams reported finding greater importance in mentor program features. (AHORA, BEST). Further, an individual t test on the mentor program feature item "The opportunities for contact with other mentees in the program" supports these results with non-white students (mean =3.9 on five-point scale) perceiving this feature as a more important one than white students do (mean = 3.58), $p < .05$. The results of the analysis of post survey items the impact the program or the mentor had on the participant's choice of major are in alignment with those just reported. Chi square analysis shows that African

American, Asian and Caucasian groups of students responded in significantly different ways on the impact of the mentor program on their major choice. Sixty-four percent of African American respondents indicated that the mentor program had an impact on their major decision as compared to 23 and 25 percent of Asian and Caucasian respondents. Taken together, these analyses indicate that mentor program features were both more important to minority respondents and may have had a greater impact on them than on their counterparts.

These results for the under-represented minority protégé respondents are consistent with research previously cited indicating that underrepresented groups do derive more benefit from mentoring activities that include psychosocial components such as role models, networking and survival-type skills [6,17,11,8]. The team-oriented, peer mentoring model, with an emphasis on socialization and role modeling may be particularly powerful and important to underrepresented students who may experience more marginalization or isolation than their counterparts.

Further, we see these as encouraging results. Findings that African American students in particular reported high impact of the mentoring activities on their major choice demonstrate a higher level of commitment to engineering majors and, by implication, to engineering. Prior research supports the idea that mentoring programs can be particularly important for under-represented populations [25,26,17,27,12]. Work on self-efficacy in engineering has shown that African American women engineering students experience more of a drop in "feelings of inclusion" than their peers [37]. This is an indicator of the importance of the role that programs addressing engagement and inclusion, such as those described, have to play. It is also consistent with research findings that lack of belonging, a beliefs-based, psychosocial factor, is a major component of students' decision not to persist in engineering [37].

Finally, in research question four we examined how the extent of mentee participation and mentee ratings of mentor and overall program effectiveness were related to the four mentor program outcomes factors. With one exception, the results provide support for the idea that mentees who are more active in the mentor program and feel the program is effective provided better self-reported results. In particular we see the importance of students' experience with their mentors; those perceiving their mentor as more effective reported higher levels of overall satisfaction with the program, provided more positive formative feedback and viewed the program features as more important. Additionally those that viewed the overall program as more effective, reported higher intentions to persist.

Although the finding of *lower* levels of participation being associated with *higher* levels of intentions to persist is somewhat perplexing, examining theories on college student development, in particular Schlossberg's Transition Theory and Chickering's Theory of Identity Development, may help to provide some

explanations. The adjustment to college is a huge transition faced by first-year freshmen and transfer students. In Schlossberg's Transition Theory, a student's ability to effectively cope with a transition will be based on four factors, two of which include self (commitment to goals) and support (access to institutional programs, family, and friends) [38]. Those students who participated less but intended on persisting may have not needed the help from mentoring due to numerous reasons including a strong commitment to the goal of attaining a college degree in engineering; access to other support programs needing mentoring less than others; etc.. Similarly, one of the seven vectors of Chickering's Theory of Identity Development is the notion of developing competence: intellectual, physical, and interpersonal[39]. If a mentor stressed study skills as the main focus of weekly team meetings, a team member having a stronger sense of intellectual competence may have participated less but planned on persisting due to her perceptions of her strong academic abilities. She may realize she does not need the support of the mentoring program (and thus participate to a lesser extent) and yet still realize high levels of intentions to persist.

This work points to many new areas for research and investigation. With the exception of the lower participation relationship to persistence, these results overall support the positive impact of the mentor programs being implemented at this institution with data showing the potentially greater impact on under-represented students and that more participation and more effective mentors is related to better mentor program outcomes. As researchers and program directors, we will continue to monitor the results of this program to see if the improved pre and post survey administration schedule produces different results and to also continue to examine the programs' impact on retention, and if varying impacts on minority students continue to be seen. Additionally, understanding the experience and attitudes of students not participating in mentoring activities would help to understand the real impact of mounting mentoring programs.

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