



Help Me Help You: Building a Support Network for Minority Engineering Students

Mr. Walter Curtis Lee Jr., Virginia Tech

Walter Lee is a PhD student in the Department of Engineering Education at Polytechnic Institute and State University, where he also serves as a program assistant for the Center for the Enhancement of Engineering Diversity. His research interests include student retention & recruitment, diversity, motivation and first-year experiences in engineering. Mr. Lee received an NSF-GRFP Fellowship in Spring 2012 focusing on how student support centers impact the experience of undergraduate engineering students, specifically women and underrepresented minorities. He is working towards a M.S. in Industrial & Systems Engineering and he received his B.S. in Industrial Engineering from Clemson University.

Ms. Kelly J Cross, Virginia Tech

Kelly Cross earned her Bachelor of Science in Chemical Engineering from the Purdue University in 2007. She earned her Master's of Science in Materials Science and Engineering from the University of Cincinnati in 2011. Ms. Cross is currently in the third year of the Engineering Education PhD program at Virginia Tech. She is currently involved with multiple educational research projects with faculty at Virginia Tech. Her research interests include assessment, diversity, teamwork and communication skills, and identity construction.

Help Me Help You: Building a Support Network for Minority Engineering Students

Abstract

Help Me Help You (HMHY) was developed during the 2011-2012 academic year as a group-mentoring program for African-American students in the Virginia Tech College of Engineering. HMHY was based on the VT PACT, a retention program developed during the 2005-2006 academic year for first-year African-American men. *The Pact*, a book written by Drs. Sampson Davis, George Jenkins, and Rameck Hunt, inspired the VT PACT and was used as a framework for the program. Although students found the program beneficial, the program lost momentum and was discontinued after the graduation of the first-cohort and program facilitator. HMHY was developed to be a revamped and updated version of the VT PACT program and was open to both men and women. The focus and goals of HMHY were specifically designed to promote self-sustaining components (i.e. create a culture within the college where helping one another became a social norm and common practice), and prevent the discontinuity from occurring again. The purpose of this paper is to discuss the development and assessment of this innovative retention program. The paper begins with a brief overview of the retention strategy. Next, HMHY is described in detail. Then the assessment strategy will be discussed as well as how the support program impacted the participating students. The paper concludes with advice for others interested in starting a similar program.

Introduction

In an attempt to create a positive environment and provide support to undergraduate students, universities often offer student support in various forms such as mentoring, living-learning communities, and summer bridge programs. This paper will focus on mentoring. Formalized mentoring is a popular form of support^{1,2} and allows individuals to provide undergraduates with career advice, success strategies, academic assistance, counseling, and encouragement³. In situations where students serve as peer-mentors, mentors have been found to benefit academically from these relationships as well⁴. The relationships established through mentoring programs are particularly useful for students from underrepresented populations who have a difficult time adjusting to unfamiliar academic environments. These students are often paired with mentors of the same ethnicity, which has been shown to increase GPA and graduation rate⁵.

While mentoring programs often vary in terms of program goals and the duration and frequency of meetings, the structure of mentoring programs may also vary⁶. Mentoring relationships can be one-on-one (i.e. mentor-to-mentee) or function in the form of group-mentoring (i.e. multiple mentees and mentors). Group-mentoring differs from one-on-one mentoring as it allows participants to receive multiple perspectives: participants can present a problem they are dealing with and group members can offer their point of view and discuss possible solutions. Participants can discuss issues they are having, seek assistance or advice from others, or gain reassurance about decisions they are currently

making. Group-mentoring also provides the opportunity for follow up one-to-one mentoring situations when mentees have personal concerns ⁷.

One such group-mentoring program is the Successful Transition and Retention (STAR) program used to support nurses at a not-for-profit hospital, Lenoir Memorial Hospital (LHM) ⁸. Due to financial constraints and staffing shortages, LHM used a group-mentoring team to support a larger group of nurses than they could have with one-on-one mentoring. Benefits noted by the new graduate nurses included: an easier transition, an introduction to the first year experience, knowing there were people who were willing to help and cared, emotional support, awareness of common experiences, and a place to go with questions. We assert that group-mentoring can similarly benefit engineering students, particularly in situations where students outnumber the available mentors and resources are limited.

The Virginia Tech College of Engineering (VT COE) similarly developed a group-mentoring program, Help Me Help You (HMHY), during the 2011-2012 academic year. HMHY was designed to serve as a support group for both male and female African-American engineering students. The focus and goals of HMHY were specifically designed to create a culture within the college where helping one another would become a social norm and common practice, as the program was developed with the intentions of revamping the VT PACT, a program that was discontinued.

During the 2005-2006 academic year, the VT COE developed the VT PACT ⁹, a retention program for first-year African-American men in engineering. *The Pact*, a book written by Drs. Sampson Davis, George Jenkins, and Rameck Hunt ¹⁰, inspired the VT PACT and was used as a framework for the program. Through the VT PACT, a group of six first-year students: set a pact to obtain a 3.4 grade point average (GPA), met monthly with the director of the VT PACT to update him on their progress, and discussed *The Pact* and how it applied to their lives. Though students did find the program beneficial ⁹, the program lost momentum and was discontinued after the graduation of the first-cohort and program facilitator.

In addition to the structure of the VT PACT and input from a past participant, literature was reviewed to gather suggestions about establishing a group-mentoring program that included both upperclassmen and first-year engineering students. In particular, the Australian Library and Information Association (ALIA) provided an example of a group-mentoring program for HMHY to model. Similar to the situation in the VT COE, a mentoring program already existed prior to the implementation of the ALIA support group. However, the ALIA noticed reluctance from some people to sign up for a mentor and decided to develop a group-mentoring program to expand the existing network. Group facilitators had several specific responsibilities during the program, which included:

- Encouraging participants to join the support group;
- Registering participants in the support group;
- Leading the first meeting and establishing the learning objectives;

- Mentoring individuals in the group;
- Managing the support group meetings;
- Ensuring that the learning objectives were addressed;
- And evaluating the support group upon its completion.

Concurrent to the facilitators functioning as mentors, peer-mentoring relationships also formed naturally amongst participants; it should be noted that the structure of the support group allowed group members to naturally select a mentor from amongst the group as opposed to signing up for a specific mentor in advance. Additionally, participants were allowed (and encouraged) to participate in the planning and facilitating of meetings ¹¹. Both the structure of the ALIA support group and role of the group facilitators informed the development of HMHY, which is further discussed in the following sections.

The purpose of this paper is to discuss the development and assessment of a support network designed to assist African-American engineering students in their pursuit of earning engineering degrees. The paper begins with a brief overview of the group-mentoring retention strategy. Next, the structure and assessment plan of HMHY is discussed. The paper concludes with how the support network impacted the participating students for the 2011-2012 academic-year and advice for others interested in starting a similar program.

Description of the Program

The group-mentoring program, HMHY, was developed to ensure students are aware of the available resources at Virginia Tech and have the access and rapport to encourage them to seek the necessary assistance. The program was completely voluntary and commenced by inviting first-year African-American engineering students to participate. The primary focus of HMHY was building relationships amongst the students; the program was designed as a community-of-practice ¹² to create an environment that would provide first-year engineering students with an academic and social support network of other young black students who are working towards similar goals (i.e. earning an engineering degree). The coordinator envisioned the program as a means to augment the culture within the college where helping one another and seeking support would become a social norm and common practice among student peers or cohorts.

To assist the facilitator, who is also one of the authors of this paper, with shaping the direction of HMHY and establishing formal objectives, a framework was developed to serve as a program theme: getting P.A.I.D. This included students (1) establishing *Priorities*, (2) holding each other *Accountable*, (3) taking *Initiative*, and (4) having *Discipline* regarding their academic choices.



The first component of this framework is *Priorities*. Through this component, students discussed how they had been spending their time since the previous meeting. These discussions provided each group participant an opportunity to reflect on what activities they were prioritizing in his or her own life.

The second component is *Accountability*. Through this component, students were advised to monitor each other's progress and take ownership over their academic career. In addition to holding themselves accountable, participants were expected to hold one another accountable.

The third component is *Initiative*. Through this component, students were encouraged to take action that would better position them to be successful. Students were regularly asked what they were doing to better their chances of being successful and presented with professional, academic, and social opportunities as the facilitator became aware of them.

The final component of the framework is *Discipline*. Through this component, students were expected to carry out actions they said they would complete and show up to meetings they said they would attend. Students were regularly asked about things discussed in previous meetings and provided opportunities to discuss how their behavior and academic performance was matching their expectations for the semester.

The idea was that following *P.A.I.D.* would ultimately result in improved academic performance and an enhanced undergraduate experience, and each component of the framework helped the facilitator plan and guide the group meetings. The facilitator also encouraged participants to recommend meeting topics and request academic assistance as necessary.

In addition to group meetings, which were held every 2-3 weeks when possible, students were also sent emails reminding them of opportunities, campus events, and deadlines they may have overlooked such as exam review sessions, career fairs, and registration dates. Providing pizza at every other meeting encouraged attendance and a poll was sent out to determine availability a week in advance. Though invitations were initially only sent to first-year African-American males, the group gradually expanded to include females and upperclassmen through personal invitations and word-of-mouth. The upperclassmen were encouraged to share their experiences and comment on the advice given by the facilitator as he did not complete an undergraduate degree at the institution and offered a different perspective. Upperclassmen were invited who were actively

involved in the Virginia Tech community and were believed to be good sources of information from the facilitator's perspective. The facilitator and upperclassmen primarily occupied the mentoring role by offering support to the first-year students and one another.

Overview of Retention Programs for Engineering Students

In addition to HMHY, students had access to numerous other avenues of support. In particular, first-year engineering students could participate in several programs offered by the Center for the Enhancement of Engineering Diversity (CEED): Galileo & Hypatia, the living-learning communities for males and females; and several formal mentoring programs where students are assigned an upper-class mentor for a semester. Students could also participate in engineering organizations such as the National Society of Black Engineers or use services offered by the office of academic support or career services. HMHY was not designed with the intentions of replacing any of these services but to provide a supplement to them to increase the likelihood that underrepresented engineering students are engaged.

Assessment of the Program

The impact HMHY on the inaugural group of students was assessed with a combination of quantitative and qualitative approaches including surveys and interviews. The initial implementation and assessment of HMHY were small scale to ensure a high degree of interaction by the participants. For example, the participants included only African-American undergraduate engineering students at Virginia Tech and primarily freshman with similar schedules. A total of 39 engineering students participated in the program in some capacity (i.e. attended at least one meeting) but 8-11 students regularly attended the bi-weekly group meetings. During the academic year, there were a total of 11 group meetings, with seven in the fall and four in the spring. Scheduling issues typically prevented students from attending all meetings. Attendance was recorded and the participants attended an average 2.5 group meetings per semester. Many students also interacted (e.g. formed study groups) with other HMHY participants outside the designated program meeting. After the last group meeting, the assessment survey was completed by 11 students, which included five females and six males.

Methods and Data Collection

In addition to the attendance being monitored, the quantitative approach consisted of comparing the overall GPA of program participants vs. non-participants (or a control group). Other quantitative data was collected through a survey developed to evaluate the participants overall score on the assessment instrument and three additional identity constructs. The survey measured the level to which the participants identified with: (1) HMHY, (2) the engineering discipline, and (3) the fundamental principles of the communities of practice. After procuring IRB approval, HMHY participants were contacted via email to solicit their participation in the program assessment, which including responding to a survey. The survey instrument included 33 items and basics

demographic information (i.e. sex and class) that was administered and maintained electronically through the Qualtrics online survey software. Participants could also self-identify at the conclusion of the survey to participate in a one-on-one semi-structured interview.

The semi-structured interviews were the primary data source for the qualitative approach and six of the 11 survey participants volunteered for an interview. Interviews were conducted to understand the influence (based on survey instrument responses) HMHY had on participants and to identify areas of improvement. An interview protocol was used to guide the discussion about HMHY and provide consistency in the order of participants' responses. Survey participants that indicated an interest in being interviewed were scheduled, and individual interviews were conducted on campus in the Virginia Tech Engineering Communications Center. The HMHY facilitator was not involved in conducting the interviews. Interview participants included four freshmen, one sophomore, and one senior. Interviews typically lasted 20-30 minutes and were audio recorded for transcription at a later time; self-selected pseudonyms are used to conceal the identity of the participants. The interviews were transcribed verbatim and field notes also supported observations made during the interview process.

Data Analysis

The survey and attendance data was analyzed through both Qualtrics and Excel spreadsheet software. The attendance and GPA data were collected and maintained in a secure Excel spreadsheet. The GPA data and attendance numbers were summed and averaged to compare program participants to the control group. Additional data analysis included descriptive statistics as the small number of participants limited the types of statistical analysis that could be performed. Despite the small sample size for the program assessment, multiple steps were taken to ensure that validity and reliability were addressed throughout the assessment process. First, expert review and piloting procedures were performed to ensure the face and content validity of the instrument. Also, the reliability coefficients were also evaluated for the survey response data to ensure an acceptable level of construct validity of the instrument.

The qualitative interview data was analyzed using MAXQDA software. Each member of the research team initially coded the interviews independently. Next, a detailed codebook was developed by the research team to guide the subsequent discussions and reach consensus on coded sections and emergent themes within the interview responses. The research team met several times to reach consensus on coded segments and code themes. The final coding scheme and codebook definitions are a culmination of both priori and emergent themes. The intercoder agreement is one of several steps to establish trustworthiness and authenticity of the qualitative data¹³. The transcripts were reviewed to verify that no obvious mistakes were made during the transcription process. Also, some member checking activities were conducted to specify the accuracy of the qualitative findings.

Results of the HMHY program assessment

GPA

Though there was a slight increase in students overall GPA, not enough participants or large enough difference was present for this result to be statistically significant.

Survey Results

Survey results indicated that identification with the HMHY program and engineering as a discipline was greatest for participants, and Cronbach's alpha values indicate that the scales have an acceptable level of reliability (> 0.7 for social science). The survey results are summarized in Table 1 below. The survey responses ranged from strongly disagree (score = 1) to strongly agree (score = 5). Therefore, each composite score was on a scale of 1-5 and higher composite scores indicate higher levels of agreement with a survey item. For example, Item 16 on the survey states, "Being a good engineer is an important part of who I am". Item 16 was one of four items that measured the level to which the students identified with engineering as a discipline. Also, Item 22 states, "Participating in HMHY has become a significant part of who I am". Item 22 was one of four items that measured the construct of identification with the HMHY program in general. The authors may be contacted directly for a complete list of all 33 items.

Table 1: Assessment Survey Results

Scale:	Program Benefits	Identification with engineering	Identification with HMHY	Identification with Community of Practice
Composite Score	4.21	4.34	4.48	4.09
Standard Deviations	0.38	0.11	0.63	0.52
Cronbach's Alpha	0.92	0.90	0.85	0.82
Survey Items	14	4	4	11

Interview Results

Individual interviews resulted in primary themes that support the survey results. In addition to the general description of the program, participants discussed several benefits of the program. For the purpose of this paper, we will focus on the four most popular benefits cited by the participants: (1) academic support, (2) social support, (3) professional development, and (4) community of practice.

1. *Academic support* included forming study groups, sharing study habits, reflecting on academic experiences, having individual accountability, and learning from students who are performing better academically. Casey and Jacob (both freshmen) provide examples of academic support. Casey believed the small size assisted students with supporting each other academically. During the interview, Casey stated:

“Since there were only so few of us, we became like a close-knit group so we could always check up on each other; make sure everybody was doing fine in their classes and all that; help each other on assignments and stuff.”

Jacob also discussed learning from students who are performing better academically. During the interview Jacob stated:

“If you’re having trouble, you can go get help from those students are excelling or if you’re excelling you can go and tell others why you are or what you’re doing.”

HMHY allowed students to receive academic support in various forms. Though HMHY did not require students to interact outside of group meeting, such interactions were encouraged during each meeting. Over the duration of the year, students formed relationships and used the academic strengths within the group to assist each other.

2. *Social support* included students being able to share their experiences and common struggles, collaborate with and encourage one another, and receive mentorship. Isaac (freshman) explained the social benefits of participating in HMHY by stating:

“I think that it’s a great help session. It’s a focusing event for a lot of the students because...you know you put all of your problems out there and you talk about it... so you can outline clear goals. And it’s just a good network for support... like a good support network... to people who have common backgrounds and goals.”

HMHY provided students with an environment to interact socially with students with common background. Group discussions allowed students to share common struggles, discuss problem, and receive a reminder that they were not going through their experiences alone. Over the duration of the year, students developed trust in each other and became more comfortable with sharing their problems and concerns.

3. *Professional development* included students developing professional skills such as building a resume, attending job fairs, and talking to and working with engineering

faculty. Jacob (freshman) discussed professional development by commenting on how he benefited from HMHY. Jacob stated:

“For me... how to study was one thing. Also [HMHY] taught the stuff like what employers look for... basically like in resumes and things like that... Professional skills all around, just study habits academically. Also how, what are the healthy ways to relax when you're not doing schoolwork.”

The interactions with upperclassman particularly assisted the freshmen with professional development, as upper-class students were able to share their experiences. Charles (freshman) discussed this benefit when he stated:

“I was able to learn that engineering is hard... and that I really have to brace myself. I learned that I have to... especially with Moises; he talked about going to all of the Expos... even though you might not be qualified for a job. Just to go to practice. Learn how to dress. Learn how to talk to people. Even if your resume doesn't match up to what they want, its practice.”

HMHY provided students with the opportunity to learn from the experiences of more advanced students who had experience interacting with employers and seeking employment opportunities in engineering. Participants also encouraged each other to attend events such as career fairs, and the facilitator served as a resource to help students develop resumes and cover letters.

4. *Community of practice* included students developing support networks and encompasses the benefits previously discussed. HMHY facilitated freshmen students developing a peer support group. Moises, a senior who assisted the facilitator with mentoring the freshman, frequently interacted with the students and described the community during his interview. Moises stated:

“There are different groups. So like... just like as with all networks, you have your groups that you study with. So they'll start... and then everyone's kind of part of the underlying studying group but there's also smaller groups of people who say, 'Oh, I need more help with physics so I only go to this group of people because I know they're good with physics.' Or say math, or say calc, etc. And then there's also the network group, like they just go out for social events. There's another small network for social events and they go out and are like, 'Ok, I'm going to this event today. Is everyone coming in our group?' Or you know again, making sure everyone stays on the ball, making sure everyone's safe, following the buddy system, etc. etc. Or they're like, 'Oh, I'm going to get food. I know this group of people can feed me and help me because they [still have money] on the meal plan, etc.'” So there's a lot of different, it's interchangeable, but there's a lot of different groups under the group. And it's all about the same people who just mix and match and zigzag across the room.”

Through HMHY, students were able to form multiple peer groups to serve multiple functions. As Moises stated, students were able to use HMHY to form these groups by mixing and matching different members for different purposes, i.e. academic or social. While one group of students may not have served the same purpose for each students, the structure of HMHY allowed students to reach out to different students depending on what areas they needed support in that the time. As a final summary of the HMHY community, Moises stated:

“I think it’s a community in all aspects. Because most people, like I know when I came to the university I didn’t realize that there were places without a lot of minorities. And it develops a sort of community where... cause you can speak to people in this group in a different way than you can speak to other people. Like I know when I came in, I was a little bit... you know we all tend to drift towards things that look like us or people who look like us, people who talk like us...”

HMHY provided students with the opportunity to join a community of people “who looked like them.” While all students may not be looking for such a community, students such as Moises were able to use HMHY to discuss issues they may not have been comfortable discussing with another group of students.

Conclusion

In conclusion, students identified several benefits of participating in HMHY and expressed intentions to remain in the program and mentor the subsequent freshman class. The benefits of participating included social support, academic support, professional development, and the formation of a community. Additionally, some participants indicated that having mentors near their age was important because they could relate to them better, and were very complimentary of the facilitator’s ability to relate with participants. HMHY also helped students develop and monitor goals, and participants specifically emphasized how accountability was critical to academic development.

Recommendations

The following recommendations have been made for the implementation of a group-mentoring program for underrepresented engineering students:

1. Invite students personally. After initial invitations are sent, encourage students to continue recruiting as several students may decide to join throughout the semester.
2. Invite upperclassman that are performing well academically and familiar with the academic resources and engineering community; these students will assist the facilitator with relating to the students, integrating them into the larger community, and offering advice regarding issues the facilitator may not be familiar with. Upperclassmen also provide freshmen with an example on how to be successful in the specific engineering college.

3. Regularly encourage students to form study groups.
4. Encourage students to remain in the program and mentor the subsequent class of freshmen to promote the sustainability of the program.
5. Offer an incentive for students to attend meeting and have students RSVP for meeting times; this will allow the facilitator to hold students accountable for showing up when they say they will and determine a convenient time to meet.
6. Keep the group reasonably small, as it is difficult to keep up with a large group of students. While the involvement of upperclassman helps, the closeness of the group will be compromised if the group gets too large.

References

1. P. Vesilind, Mentoring engineering students: turning pebbles into diamonds, *Journal of Engineering Education*, **90**(3), 2001, pp. 407-412.
2. G. Crisp and I. Cruz, Mentoring college students: A critical review of the literature between 1990 and 2007, *Research in higher education*, **50**(6), 2009, pp. 525-545.
3. L. Phillips-Jones, Establishing a formalized mentoring program, *Training & Development Journal*, 1983.
4. J. Good and G. Halpin, A promising prospect for minority retention: Students becoming peer mentors, *Journal of Negro Education*, **69**(4), 2000, pp. 375-383.
5. T. Campbell and D. Campbell, Outcomes of mentoring at-risk college students: gender and ethnic matching effects, *Mentoring & Tutoring: Partnership in Learning*, **15**(2), 2007, pp. 135-148.
6. M. J. Karcher, G. P. Kuperminc, S. G. Portwood, C. L. Sipe and A. S. Taylor, Mentoring programs: A framework to inform program development, research, and evaluation, *Journal of Community Psychology*, **34**(6), 2006, pp. 709-725.
7. H. J. Mitchell, Group mentoring: Does it work?, *Mentoring & Tutoring*, **7**(2), 1999, pp. 113-120.
8. E. S. Scott and S. D. Smith, Group mentoring: A transition-to-work strategy, *Journal for Nurses in Staff Development*, **24**(5), 2008, pp. 232-238.
9. T. Waller, S. Artis and B. Watford, The Pact: A framework for retaining 1st year African-American engineering men, *ASEE Annual Conference & Exposition June 24-27, 2007 of Conference*.
10. S. Davis, G. Jenkins and R. Hunt, *The pact: Three young men make a promise and fulfill a dream* Riverhead Trade, 2003.
11. A. Ritchie and P. Genoni, Group mentoring and professionalism: A programme evaluation, *Library Management*, **23**(1/2), 2002, pp. 68-78.
12. E. Wenger, Community in E. Wenger, *Communities of practice: Learning, meaning, and identity*, Cambridge UP, New York, 1998, pp. 72-85.
13. J. W. Creswell, *Research design: Qualitative, quantitative, and mixed methods approaches* 3, 3, Sage Publications, Inc, Thousand Oaks, California 2009.