A Promising Prospect for Minority Retention: Students Becoming Peer Mentors

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The study examined academic and interpersonal growth of peer mentors (N = *19) by analyzing comments in journals written during the mentors' first quarter of tutoring and mentoring within a minority engineering program at a large land-grant university in the Southeast. Although the intent of the program was to improve retention rates for the participants, the mentors experienced both academic and interpersonal growth. In addition, preliminary data regarding grades and retention status also indicate that the mentors benefited academically from the mentoring experience. The findings of the study suggest that, although the upper-class peer mentors are not the target population of the minority engineering program, they were positively impacted from their roles as mentors within the minority engineering program.*

Mentoring—"an intensive, one-to-one form of teaching in which the wise and experienced mentor inducts the aspiring protégé into a particular, usually professional, way of life" (Parkay, 1988, p. 196). Such was the definition adopted by the participants of a minority engineering program which encouraged relationships between freshman pre-engineering students and upper-class division mentors at a predominantly White land-grant university in the Southeast. The intent of this program, as is typical of many other support programs, was to improve retention rates of minority students within a given area of study and hopefully, capitalize on the benefits of the program for marketing purposes and recruiting of additional minority students into a college of engineering. The program encompassed many components, from formal tutorial instruction to informal dinners and celebrations, in which peer mentors played a vital role and, as suggested by Parkay's (1988) definition, inducted their fledgling students into the engineering "way of life."

Part of the impetus for including a mentoring component into the minority engineering program from the program's inception was the results of a qualitative study in which engineering students recommended the need for networking with upper-class mentors to ease the transition of freshman students into the university environment (MacGuire & Halpin, 1995). In this particular minority engineering program, African American students were targeted as at risk of possibly leaving the engineering program and potentially the university. Gainen (1995) reported that the greatest attrition among collegiate students occurred between the freshman and sophomore years of study with students who chose to major in science, mathematics, or engineering. In addition, "among students of color, attrition is much higher" (p. 5). Seymour and Hewitt (1997) asserted that African American

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students contend with four broad areas of difficulty when entering engineering, science, and mathematics fields: "differences in ethnic cultural values and socialization; internalization of stereotypes; ethnic isolation and perceptions of racism; and inadequate program support" (p. 329). These areas of difficulty, particularly internalization of stereotypes, ethnic isolation and perceptions of racism, can be exacerbated when African Americans enter predominantly White institutions as opposed to historically Black institutions. Thus, the inclusion of mentors as an integral component within this support program was hoped to ameliorate some of these difficulties.

Peer mentoring and tutoring gained popularity as an intervention over two decades ago. Researchers (Cloward, 1976; Maxwell, 1994; Pickens & McNaughton, 1988; Strodtbeck, Ronchi, & Hansell, 1976) have concluded that the tutoring process has academic and psychological benefits to the tutor as well as the tutee. For instance, Cloward (1976) stated that "the tutor was the major beneficiary of the tutorial experience" (p. 227) in terms of academic gains. Although research exists regarding the effect of tutoring on the tutor, little research has explored the effect of the mentoring relationship on the mentor. Can the same conclusions from the literature regarding tutors be drawn for peer mentors, an intensified relationship, compared to that of tutors? Are the gains limited to academic gains or do they extend to the interpersonal domain as well?

Because peer mentoring appears to be a viable approach to providing role models and leadership for underrepresented groups within higher education, it has been adopted in university settings as a means to assist entering freshman students as they transition into the university environment. For instance, in order to improve minority retention, Brawer (1996) supported the use of peer mentoring in order to develop social support networks among new students. Because of a lack of minority role models on many campuses and a lack of encouragement from White university faculty, Henrickson (1995) asserted that peer mentors provided the support systems necessary to improve campus climates. Specific to the needs of minorities within the engineering discipline, Highsmith, Denes, and Pierre (1998) concluded that successful mentoring relationships made a significant difference in engineering interests and retention. Willemsen (1995) summarized the importance of encouraging peer interaction in quantitative courses:

> Peer support and connection can be a powerful boost to learning, and its absence can become a major barrier. When students feel different from and distant from other students in the room, thoughts of "They can, I can't" can easily create a barrier. (p. 20)

Santovec (1992) concurred and stated that programs which incorporate "upper-division minority students involved in peer support and counseling—show positive retention results" (p. 5). Thus, the research indicates that peer mentoring assists the mentee, but what of the mentor?

As suggested by Gehrke's (1988) definition, if mentoring extends beyond mere gift giving to an actual exchanging of gifts, exactly what gifts do the mentors receive through the mentoring experience? The purpose of this study is to explore the academic and interpersonal gains that the mentoring relationship has provided for the mentors in a minority engineering program, gains which ultimately could affect the mentors' motivation to remain within a college of engineering.

Method

Participants

The mentors ($N = 19$; 4 females and 15 males), all upper-class division, undergraduate, African American engineering students, were assigned specific freshmen minority pre-

engineering students with whom they worked regularly in a variety of settings. For instance, the mentors acted as tutors to the freshman students in an interactive learning laboratory where the students honed mathematical and scientific skills common to their core studies. The mentors also met regularly with the same freshmen to advise them in structured, weekly problem solving workshops, suggesting alternative methods for defining and analyzing problems related to their engineering course of studies. During these sessions, they also shared conversations concerning freshman-year experiences, trials, and challenges. In addition, the mentors met with the freshmen to share meals, enjoy movies, bowl, and participate in study sessions at homes and apartments—whatever suited their particular likes and dislikes.

Procedures

The mentors were selected according to demonstrated interest in the program and interviews with the program director. After being selected, the mentors attended a 2-hour training session at the beginning of the quarter addressing roles, responsibilities, and program procedures. During this time, the peer mentors role-played through various scenarios. Ongoing training and evaluation occurred throughout the duration of the study: the program coordinator was always on site to observe tutoring sessions and, on occasion, team-teach with the peer mentors. In addition, the program coordinator met weekly with mentors to discuss progress of students and development of their mentoring roles.

One of the program procedures was that the mentors were required to respond to program evaluation prompts in a mentor journal. Weekly prompts were posted on a bulletin board in the interactive learning laboratory and the mentors wrote in responses to these prompts at their convenience. The prompts focused on issues of program organization, organizational development, student development, and personal development. Only the program coordinator would read and respond to the journal entries on a weekly basis in order to encourage discourse regarding program development and improvement with each mentor. Otherwise, in order to encourage honesty of responses, the journal entries were not made public. Qualitative data, in the form of these journal responses from the mentors, regarding the evolution and program development of the minority engineering program were collected throughout the entire academic year of program involvement. In addition, grade point averages of the mentors were collected for the entire academic year prior to program involvement and the academic year during program involvement. Trends in grade point averages were analyzed as was retention status of the mentors compared to the general student population.

Although the intent of the journal prompts was to garner information regarding program development, an unintentional side effect occurred within the journals. Numerous unsolicited comments regarding personal and academic development throughout the mentoring experience were also included within the mentors' journals. The researchers completed a content analysis of these particular comments, coding comments into three areas of academic growth: study skills, improved understanding of engineering concepts, and improvement in critical thinking and problem solving; and three areas of interpersonal growth: development of responsibility and leadership skills, ease of social interaction and communication, and personal self-satisfaction.

Results

Academic Growth

Thirteen (over 70%) of the mentor journals included comments regarding some form of academic growth as a result of involvement in the minority engineering program. The

TABLE 1
Weekly Prompts for Mentor Journals

WEEK	JOURNAL TOPIC
One	Now that you have completed mentor training, define what you see as the primary goals of the program. What goals need to be added, addressed, changed, or adjusted? Do you feel the students you work with have a sense of the purpose of the program?
Two	After completing a full week or more of work, how would you describe your role as a mentor in this organization? What kind of relationship do you wish to achieve with your mentees?
Three	What do you sense are the mentees' primary learning needs? Do you feel these needs are being addressed in the lab and the workshops? How can we better meet the needs of your mentees?
Four	Do you feel your mentees are comfortable in communicating their needs and concerns to you? Explain. How do you feel we can improve communication between administration, staff of mentors, and students?
Five	Now that we are at mid-quarter, please respond to the following general themes of program evaluation: What do you like most about this program? What do you like least about this program? What changes are necessary for the program to be a success?
Six	Do you feel your progress as a mentor and the progress of the students are being adequately monitored? What would could be done to improve in this area?
Seven	As we approach the end of the quarter, tell me if you think this program and your involvement in this program has been worthwhile to you as a mentor, to the students and to the College of Engineering. Explain your response.
Eight	What do you think you have gained from being a mentor in this program? What do you think your students have gained as a result of their program involvement?
Nine	What have you learned about yourself through your participation in this program? What have you learned about the learning process and needs of other minority engineering students? How do you think the program could be improved next quarter?

Note. Many of the themes for the questions were suggested by the author in the following work: Block, P. (1981). *Flawless consulting: A guide to getting your expertise used.* San Diego: University Associates.

predominant pattern that emerged, found in 10 (over 50%) of the mentor journals, was the improvement of the mentors' study skills that occurred as a result of their tutoring experiences. For instance, one mentor stated, "I know other ways to study so that if my way was not effective, then I had alternative measures to use." Another mentor noted that she transferred workshop information into her study strategies: "After our test-taking workshop, I used some of the tips to help me relax for the test. It was great. I have learned a lot." Similarly, another mentor noted that he "had taken some of the skills learned during the workshops and implemented them" in other areas of his personal study. Yet, another peer mentor made the following comment:

> I have noticed that I use the suggestions given in the critical thinking lab in developing my own study habits. I also feel that I must "practice what I preach" because the students will look at me as an example.

It appeared as though the suggested learning strategies emphasized in the weekly workshops transferred to the mentors as readily as it did to their freshman mentees. The upperclass mentors were as likely to incorporate suggestions and implement study skills, which

they had learned as a result of their involvement in the minority engineering program, into their own personal study sessions as were the pre-engineering students.

A second predominant theme emerging in 5 (27%) of the journals revolved around the self-reported growth of critical thinking and problem solving abilities. For instance, one mentor wrote that he had become a "better problem solver" because he had learned to "think consciously about [his] problem solving technique"—one of the primary objectives of the weekly workshops for the pre-engineering freshmen and an unintentional side effect for the regularly attending mentors. Similarly, another mentor stated the following: "I think more openly than when I started. I'm considering all aspects of the problem besides the one I believe in." And, yet another peer mentor wrote about this self-analysis of his problem solving processes:

> I feel that the program has made me reevaluate some of my common practices and viewpoints. I take as many good ideas, strategies, and concepts from the workshops and try to incorporate them into strategies and techniques that I am presently using. . . . I have noticed a change in my thinking schema when I am ready to approach a problem.

Another mentor commented that he was stretched to "think more about the process to a solution instead of just getting the solution," a central tenet emphasized in the weekly workshops and interactive learning laboratory. The comments consistently suggested that the mentors were open to the suggestions of modifying their own problem solving processes and adapting these processes to fit their own upper-level courses in which they were enrolled.

The third academic gain, noted again by 5 (27%) of the peer mentors, pertained to a better and deeper understanding of core engineering concepts. The constant questioning by the freshman students in the tutorial sessions encouraged mentors to review some fundamental concepts from their earlier academic careers. For instance, one mentor commented that he was "forced to review previous subjects," which he thought inadvertently helped him in his current studies. In another comment, a mentor stated that the program had "provided him with much needed review of key concepts in order to provide adequate assistance to the students." Another student remarked that "it [felt] good to be able to work out problems on material that [he] felt [he] had long forgotten." Yet, another mentor stated that he had become more proficient "in the way [he] explain[ed] concepts to students at different levels and methods of learning." The simple and constant review of fundamental principles common to the engineering core of study helped the mentors in their own academic pursuits. Through the constant process of clarification of ideas and varying of teaching methodologies during tutoring sessions, the mentors were able to look at seemingly simple problems from multiple perspectives. This educational process helped the mentors to gain a thorough understanding of fundamental concepts in their engineering studies.

Thus, because the mentors realized that they were acting as role models for the freshman students, the minority engineering program also provided incentive or motivation for the mentors to incorporate learning strategies learned and emphasized through the minority engineering program into their own work and study sessions. The mentors experienced an increased awareness of their own strategies because they wanted to ensure that they were role modeling the most effective techniques for their mentees in and out of the workshop and lab settings. The mentors were motivated to succeed academically by refining their own study habits and problem solving techniques and honing their own cognitive skills in order to illustrate effective strategies to their mentees. The tutoring component of the minority engineering program had a two-fold effect—academic assistance for the freshmen and unintentional academic assistance to the mentors. Possibly,

this academic assistance could have as much of an impact on grades and retention for the mentors as it is intended to have for the mentees.

Interpersonal Gains

Another unintentional side effect of the minority engineering program was that 17 (almost 90%) of the mentors experienced and noted in their journals was the development of personal skills—communication, confidence, and identity. Again, three predominant themes emerged within this particular area of growth: ease of social interaction and communication, development of responsibility and leadership skills, and a sense of self-satisfaction and belonging.

According to Seymour and Hewitt (1997), many students perceive the engineering major as an isolating field of study—competitive and unsupportive. Students of color experience a heightened sense of ethnic isolation on predominantly White campuses:

> On campuses where there were very few Native Americans, Blacks and Hispanics in S.M.E. [science, mathematics, and engineering] majors, these students experienced doubt that they belonged, wondered if others judged them as incompetent, held back from seeking help or asking questions and were miserably lonely without a peer group with whom to share their experiences. (p. 362)

In contrast with these standard experiences, according to 17 (89%) of the journal responses from the mentors, their experiences within the minority engineering program helped to alleviate feelings of isolation by providing opportunities for social interaction with students who share cultural and career values. For instance, one mentor wrote the following:

> Personality-wise I think it helped me meet people. For them [the freshmen], it helps them to know they are not alone. There are people here to help. It makes their jobs as students easier. Plus, they get to network to meet people.

This constant networking appeared to help the students develop better communication and social skills. One student commented on the following: "I have developed my 'people skills' since I have been working in the program. I have learned or am learning how to better communicate with individuals everyday." Another mentor commented on the same theme:

> I feel that I have developed better "people" skills. Before I came here, I really didn't care if I met anyone. Now that I have been here a while, I actually care whether the person is actually improving academically and socially. I guess what I am trying to say is that I have become more open.

Potentially, the sense of openness expressed by this mentor could help him to succeed during the rest of his academic career in the engineering program. Would he have experienced this growth in interpersonal skills had he not been engaged in a mentoring relationship?

One third of the mentors also mentioned that they had improved their personal leadership skills, particularly the ability to "better balance more responsibilities." For instance, one mentor noted that he had "become a more responsible person," while another mentor noted the following:

> MEP [minority engineering program] placed a lot more responsibility on me than I had previously had which caused me to be a better person. I say this because, not only was I responsible for my part as the tutor, I was also responsible for my mentee's part as a student.

Similarly, another mentor made the following comment regarding his leadership skills:

> I feel I have become a better leader because being a mentor, it is expected of me to know what's going on in detail so that I can relay it to my mentee. It has really helped my interpersonal skills.

The constant and fluid interaction between mentors and mentees allowed one mentor to note that he was "involved in the development of future leaders."

The final theme that occurred in 4 (21%) of the mentor journals centered around the sense of self-satisfaction that emerged as the mentors developed relationships with the

mentees. For instance, one mentor stated that she had gained "self-enjoyment by helping the freshmen do well in their classes and stay in engineering." Another mentor commented:

> As a mentor, I have gained a lot by being involved with the MEP. I enjoy helping the younger students, and it makes me feel like I'm giving something back to the engineering program.

The previous comment demonstrated the sense of purpose acquired by this mentor and his self-professed sense of inclusion in the engineering community that he experienced as a result of his involvement in the minority engineering program. Thus, from all of the comments it appears the minority engineering program provided an opportunity for the upper-class minority students to meet and mentor other younger minority students who would become part of their network of peers. It also provided them with a role and sense of identity within a predominantly White university setting, which may otherwise have left them feeling isolated.

Frequently, mentors would make casual comments while in the interactive learning laboratory and problem solving workshops, indicating that they wished a similar mentoring program had been in place when they were freshmen. In addition, they would visit the laboratory during non-working hours and seek academic help in upper-level courses from other mentors. In action and casual spoken word, the mentors seemed to indicate that the opportunity to engage in professional relationships with freshman mentees as well as the opportunity to be called upon as a member of a staff of mentors within the minority engineering program was affecting their sense of identity and academic success. The collected written responses from the journals were consistent with this informally intimated attitude. Observations of the mentors in the laboratory revealed the themes that emerged in the journals. The data suggested that the mentors gained as much, both academically and emotionally, as their freshman counterparts.

Grade Point Averages and Retention

If involvement in the minority engineering program affected the mentors as much as their self-reported comments from their journals tend to suggest, then other outcomes, such as grade point averages and retention, should experience positive trends as well. Because no comparison group existed, program effect on grade point average cannot be concluded. However, the quarter grade point averages of the mentors for the three quarters prior to program involvement and the three quarters during program involvement were collected and analyzed in order to discern consistency in trends across the various data. In addition, the retention rate of the mentors within the engineering field was determined. If these data also demonstrate an improvement trend, then possibly the mentors' self-reported claims of academic and interpersonal gains possibly carry over into other domains and outcomes.

Interpreting these grade data from a descriptive perspective, the mentors' grades increased observably after completing the initial fall quarter of minority engineering program involvement. Certainly, this trend tends to parallel the statements made by the

TABLE 2

Mean Quarter Grade Point Averages for Nineteen Mentors Prior to and During Minority Engineering Program Involvement

YEAR	FALL	WINTER	SPRING	MEAN
Pre-MEP	2.66	2.59	2.61	2.62
During-MEP	2.62	2.86	2.80	2.76

mentors in their journals. Whereas the grades appeared to be stable throughout the year prior to acting as mentors, it appears as though the mentors began to earn higher quarter grade point averages and experience greater degrees of academic success once they completed a quarter of program involvement. In addition to this positive trend in grades, retention status also followed a similar pattern. In terms of retention status, Seymour and Hewitt (1997) reported that across the nation "only 35.6% of the students of color entering engineering complete degrees in that field" (p. 319). Of the 19 mentors followed in this study, only 4 (21%)of them did not remain in the engineering field. Thus, with almost 80% of the mentors remaining in engineering, the retention rate for this particular sample of mentors far exceeds the national average. Given that the grade data and retention status findings are consistent with the journal comments, these results lend credence to the notion that mentoring has a positive effect on the mentor as well as the mentee.

Conclusion

MacGuire and Halpin (1995) noted that African American students who selected to drop out of this particular engineering program sought a sense of identity and belonging within the engineering community, factors which were difficult to find as a member of the minority population on a predominantly White campus. However, the role of mentor in this minority engineering program appears to fulfill that need partially. Landis (1995) suggested the networking and the realization that minority students were not alone when confronting academic difficulties ultimately helps retain minority students in engineering programs, whether as freshmen or as upper-class mentors. Certainly, the journal comments suggested that the mentors were highly aware of the importance of the networking within the engineering community and the retention data appears to confirm this. Possibly, these networking skills could ultimately carry into their future professional careers, helping the students to learn to collaborate in engineering teams.

This exploratory study suggests further avenues for future research. Ideally, a comparison group of peer mentors could be followed longitudinally in order to discern quantitatively the actual effect of mentoring on outcomes such as grades and retention. In addition, focus group interviews could be completed with the mentors in an attempt to garner a complete portrait of the mentoring experience. Thus, further defining and clarifying of the expectations and responsibilities of the mentors within the program could be possible, serving to offer a greater degree of purpose and belonging for the mentors within the engineering program. Because of the tangible benefits to both mentors and mentees, similar mentoring programs could be initiated at other universities to capitalize on the interpersonal and motivational gains experienced by the students in this study. If mentoring programs were implemented at other universities, the effects of mentoring across different settings could be researched in greater detail, allowing for greater generalizability of this study.

Certainly, the study suggests that mentors have gained in numerous ways as a result of their role in the minority engineering program and their relationship with their mentees. Although this exploratory study provokes further research in this venue, it appears that some positive gains have emerged for the mentors, which initially appear to encourage their own retention within the college of engineering. They have gained academically by striving to find new ways to clarify fundamental concepts in an engineering course of study. They have gained professionally by meeting the next generation of colleagues with whom they will work closely in future courses and on future projects. They have gained personally by becoming better communicators and achieving a sense of identity. They have gained a sense of self-satisfaction by becoming leaders and role models for other

minority engineering students. Although the purpose of assuming the role of mentor is to assist someone new to a profession or undertaking, in truth, the relationship provides an exchange of benefits. The mentors are more likely to remain active and interested in their engineering program because they have formed a relationship that they value. Indeed, being a mentor is part of a "gift exchange" (Gehrke, 1988).

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