
AC 2012-3197: EFFECT OF SENIOR-SOPHOMORE MENTORING ON STUDENT-PERCEIVED INTEGRATION IN AN ENGINEERING DISCIPLINE

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Effect of senior-sophomore mentoring on student-perceived integration in an engineering discipline

Abstract

Academic and social interaction between engineering upperclassmen and underclassmen can be limited due to factors such as differences in age and state of progression thorough an engineering curriculum. To address the lack of interaction, a mentoring program was implemented to pair each sophomore with a senior in the same field of study. At minimum, each pairing was required to meet on a monthly basis over the course of an academic year and discuss the academic or social concerns of the mentee. The sophomores reported their assessment on the interaction between the pairing, as well as their assessment on the level of their own integration into the student population of their particular field of study. The results were compared to those of a control group, a previous sophomore class that did not participate in the mentoring program. The self-perceived interaction level with upperclassmen did not significantly differ between the mentees and the control group. The results indicated that requiring interaction between upper and lowerclassmen does not necessarily promote or improve student networking.

Introduction

Mentoring is well documented across a wide variety of disciplines and settings. Mentors exist in corporate culture¹ as well as the entire spectrum of academic environments – spanning secondary, post-secondary, and graduate education.²⁻⁴ Peer mentoring, in particular, pairs the inexperienced individual with a mentor who is more knowledgeable but still of equal status.⁵ Peer mentoring is an approach that slightly differs from traditional mentoring, exchanging certain benefits for others.⁶ The primary benefit gained is that the mentoring relationship will develop more easily since there is no status barrier between the participants.⁷ The primary benefit lost is that of experience; specifically, peer mentoring involves a mentor who is “bound by roughly comparable experiences and perspectives” as the one being mentored and thus the relationship does not benefit from “wisdom gained from hindsight.”⁸

Despite the differences between traditional and peer mentoring, there are many traditional benefits that exist for peer mentoring in an academic setting. Implementing a peer mentoring program for students in a remedial elementary algebra course, Khazanov observed an improved retention rate.⁹ Rodger and Tremblay observed better grades for first-year students who participated in a peer mentoring program.¹⁰ Thorsheim et al. observed an increase in “sense of competence” of basic principles in students whose faculty had attended a peer-mentoring workshop.¹¹ Qualitatively, pairing new students with peer mentors can help new college students navigate the social and cultural adjustments to campus life,¹² providing “shared learning, shared caring, reciprocity, commitment to each other’s personal and professional growth.”¹³

Peer mentoring has a documented effect on social integration. In a study by Yeh et al., adolescents who recently immigrated from China who participated in a peer mentoring program showed higher peer attachment-trust and need for closeness scores.¹⁴ Koppang described a peer mentoring program designed to build relationships and foster interaction between education majors.¹⁵ Peer-mentored individuals “have demonstrated improvements in connectedness to

school and peers.”¹⁶ The purpose of this paper is to describe whether a similar effect on social integration can be observed, specifically, for students in different graduating classes of the same engineering discipline.

Method

Sophomore students entering the chemical engineering discipline were given the opportunity to participate in a peer mentoring program organized and monitored by the faculty. Mentors were senior students in the same discipline who qualified for the respective honor society. At the time of solicitation, sophomores were informed verbally and in writing that the program would require meetings with their mentor on a monthly basis. Fourteen sophomore students opted to participate in the program (heretofore referred to as “mentees”) while ten opted not to participate.

The program responsibilities of the mentors and mentees were outlined in a written document distributed to all participants. It was the mentor’s responsibility to schedule the monthly meetings with the mentee. During these meetings, the pair were free to discuss whatever they wish though, at minimum, they must discuss both the academic progress of the mentee and how the mentee spends time outside of academics. The mentors were instructed to focus on the mentee’s current experiences while providing advice or support based on their own past experiences. To ensure participation and to monitor progress, the mentors were required to submit meeting reports to the faculty after each meeting. The meetings did not have strict time requirements, nor were the pairings restricted from meeting more than once per month.

Pre-mentoring and post-mentoring assessment in questionnaire format was administered once at the time of solicitation and again at the end of the academic year (spanning September – May). The mentees were questioned on their self-perceived levels of interaction with junior and senior students in the department. The responses were on a five-point scale with descriptors ranging from “strongly agree” to “strongly disagree.” In addition, the questionnaire also provided a roster of junior and senior students in the department. The mentees were asked to note which juniors and seniors with whom they have regular academic or social interaction. The end-of-year questionnaire also provided space for any qualitative feedback regarding the peer mentoring program.

For comparative purposes, two groups served as control to the mentees participating in the peer mentoring program. Control group A comprised of the ten concurrent sophomore students who opted not to participate in the program. Control group B comprised of students who were sophomores in the year prior to the establishment of the peer mentoring program. Assessment of group A occurred concurrently with that of the mentees. Assessment of group B occurred in the previous year.

Results

The self-perceived interaction levels of the mentees and the control groups are tabulated in tables 1a and 1b. For the sophomore class as a whole entity (i.e., mentees plus control group A), pairwise t-tests showed the responses between assessments were different ($p < 10^{-3}$), indicating that self-perceived interaction levels between sophomores and upperclassmen increased for

everyone. However, comparing mentees with control indicated that the net changes were not statistically different between the groups.

Table 1a. Self-perceived interaction levels with juniors on a 1-5 scale, with a “5” indicating high interaction.

		First assessment	Second assessment	Net change
Mentees	N = 14	2.1 ± 1.1	3.6 ± 1.2	1.5 ± 1.3
Control A	N = 10	1.8 ± 0.9	3.4 ± 0.7	1.6 ± 1.3
Control B	N = 30	2.0 ± 0.7	3.3 ± 1.1	1.3 ± 1.1

Table 1b. Self-perceived interaction levels with seniors on a 1-5 scale, with a “5” indicating high interaction.

		First assessment	Second assessment	Net change
Mentees	N = 14	1.9 ± 1.1	3.0 ± 1.0	1.1 ± 1.2
Control A	N = 10	1.4 ± 0.5	2.2 ± 0.8	0.8 ± 0.9
Control B	N = 30	2.0 ± 0.7	3.3 ± 1.1	1.3 ± 1.1

Each sophomore also reported the number of upperclassmen with whom he or she had regular academic or social interaction. These numbers are tabulated in tables 2a and 2b. For the entire sophomore class, pairwise t-tests ($p < 10^{-4}$) again showed a statistically significant change between the first and second assessments. This indicated that the number of upperclassmen with whom the sophomores were regularly interacting increased for everyone. Though the average net-change values reported by the mentees seemed higher than those of control (e.g., 6.3 versus 3.5), the results were not statistically different.

Table 2a. Self-reported number of juniors with whom respondent had regular academic or social interaction.

		First assessment	Second assessment	Net change
Mentees	N = 14	0.3 ± 0.5	6.6 ± 5.8	6.3 ± 5.6
Control A	N = 10	0.7 ± 1.3	4.2 ± 4.5	3.5 ± 4.4

Table 2b. Self-reported number of seniors with whom respondent had regular academic or social interaction.

		First assessment	Second assessment	Net change
Mentees	N = 14	0.2 ± 0.6	3.1 ± 3.0	2.9 ± 3.0
Control A	N = 10	0	2.0 ± 1.4	2.0 ± 1.4

In the year-end questionnaire, each mentee was asked to assess the peer mentoring program. On a five-point scale, eleven of the fourteen participants “strongly agreed” or “agreed” that the program was beneficial for them; the three remaining participants responded “neutral.” All fourteen participants responded that they would recommend the program to rising sophomores. Table 3 lists the qualitative feedback from the fourteen mentees when asked about what they liked and disliked about the program.

Table 3. Qualitative responses on what participants liked and disliked about the peer mentoring program.

Liked...	Disliked...
<ul style="list-style-type: none"> * asked all the questions I had * my mentor * getting the chance to vertically integrate * chance to know a senior * interacting with a senior * got a lot of good advice * give insights * mentor gave insight in future of industry / major, details on professors / courses * having someone telling me not to worry too much... it helped me feel a lot better * spending time with [my mentor] and being able to talk to her about school * having someone older to talk to about basically anything * I was able to get help in classes from seniors that already took them * have questions answered by someone who very recently went through the same * advice for things like how to study or how professors grade 	<ul style="list-style-type: none"> * N/A * --- * wasn't too involved * we could have met more / done more * nothing * [blank] * [blank] * did not meet with mentor as many times * time scheduling... that did not fit well * sometimes hard to schedule times to hang out b/c of busy schedules * didn't meet all that much * didn't meet as often as I would've liked * would have liked more joined meetings with more mentors * could have done more meetings with each other

Discussion

The peer mentoring program was originally implemented to achieve two primary objectives. The first objective was to provide an avenue for sophomores entering the discipline to acquire academic and non-academic advice and support from upperclassmen. Implementing a peer mentoring program to provide support during an academic transition is well documented in the literature. For example, Budny et al. used peer mentoring as part of a freshmen engineering seminar to ease the transition from high school to college.¹⁷

There are several reasons why peer mentoring works well to ease academic transitions. One reason is because the lack of a status barrier helps foster trusting relationships. Moslemi et al. elaborated on this theme and found that “students are more willing to explore ideas with peers than with advisers and are more comfortable making mistakes in front of peers.”¹⁸ A second reason is because the pair possess common, shared experiences. In a study examining the effect of different curricula on mentoring, McLean found that “students clearly indicated that it is only when one shares the same experiences and type of learning is one able to provide sound advice.”¹⁹

Achievement of this first objective from the mentees’ perspective was indicated by eleven of the fourteen participants responding that they benefited from the program. Perusing table 3 indicated that the participants liked the academic and social support they received from their mentors, and many of the qualitative comments were consistent with the McLean’s conclusion that the mentoring relationship benefits when both parties possess common, shared experiences. That all fourteen participants were willing to recommend the program to others further indicated the program’s success from the perspective of the mentees.

The second objective of the peer mentoring program was to promote interaction between the students in different graduating classes. Given the nature of a standard pipeline curriculum, students exhibit a natural tendency to interact with others in their own graduating class. Based on peer mentoring studies that evidenced increased social integration,¹⁴⁻¹⁶ it was hypothesized that a sophomore-senior peer mentoring program would increase interaction among students in the department. The results indicated that peer mentoring did not correlate with any statistically significant difference in the sophomores’ self-perceived interaction levels with upperclassmen.

Apart from helping the mentee, the act of mentoring also benefits the mentor. McAleer and Bangert observed that a mentor’s activity level in an online mentoring program correlated to the mentor’s perceived growth in professional knowledge and skills.²⁰ In a peer mentoring program designed to improve retention of minority engineering students, Good et al. noted that the mentors reported a positive development in their personal skills such as ease of social interaction and communication.²¹ Because the intent of the current study was to focus on the sophomores and their perceptions, there was insufficient information to determine how the program affected the mentors. (The meeting reports provided by the mentors did not require self-observations related to their own personal development.) In future iterations, additional feedback from the seniors may be used to quantify possible benefits on the mentors.

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