

How Faculty Advisers and Counselors View their Role in the SWE Organization

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Abstract

Faculty advisors and counselors play an important role in establishing and sustaining a successful Society of Women Engineers (SWE) student section. Currently most SWE collegiate sections have both faculty advisors and counselors. A faculty advisor, who is required for student organizations in most universities, serves as the liaison between the SWE section and the university and is responsible for knowing the university's policies. A faculty advisor helps the student section access university resources and ensures the section is meeting all university requirements. A counselor is required by SWE for a collegiate section to remain in "good standing" and serves as the liaison between the SWE section and other SWE professional members and the industry [1]. The relationship between collegiate sections and their faculty advisors and counselors is different at every university.

This paper examines the role of faculty advisors and counselors in SWE collegiate sections. The objective of this study is to determine how faculty advisors and counselors act as liaisons between the SWE sections and their respective universities and local industries to better serve female students. A survey about how SWE faculty advisors and counselors for collegiate sections view their role in the organization was conducted. A total of 76 faculty advisors and counselors responded to the survey. The data were analyzed and our findings show faculty advisors and counselors play an important role in providing continuity to the section, participation in and understanding of the larger organization, and in mentoring students on both general leadership and SWE leadership. The data also show that there is a correlation between the size of the section and the level of involvement of the faculty advisor/counselors. Larger sections have more involvement from both faculty advisors and counselors. Some respondents, who identified themselves as advisors for multiple student organizations, feel that their advising roles are similar. Therefore, the findings represented in this study can be generalized to other student organizations as well.

I. Introduction

The American Society for Engineering Education (ASEE) reported an 80% national average for persistence of engineering students to the second year in 2014 [2]. According to the ASEE report, for students who enter an engineering program or express interest in studying engineering in their first year, the overall four-year rate of graduation with an engineering degree increased from 29% in 2006 to 33% in 2015. The six-year graduation rates were 20% to 25% higher than the rates for students who attained a degree in four years. Retaining students in engineering programs remains a challenge to all engineering educators. Many institutions are increasingly focused on improving retention rates through various programs and services. In 2012 ASEE [3] reported strategies implemented to improve student retention rates in some engineering schools: focus on student learning through tutoring/mentoring, student programs and financial aid, student

academic enrichment programs, student research/work experience, curriculum and class enhancements, institutional/educational research, and changes to institutional/departmental policy. In addition to these strategies, considering the impact of social and cultural factors on student retention would be of value. In fact, according to Hanover research, one key element for retention practices among higher education institutions in the United States and Canada is social connectedness [4].

College students not only develop the knowledge and skills needed to prepare for a professional career after they graduate, but also explore social connections throughout their college experience. Most universities provide many opportunities for students to join various student organizations on campus. For example, some of the engineering organizations include student chapters of professional organizations, including Society of Women Engineers (SWE), American Society of Civil Engineers (ASCE), and Institute of Electrical and Electronics Engineers (IEEE). There are also culture clubs or international student associations, athletic-based clubs such as intramural sports, social clubs, and many others. These organizations provide a unique experience and a variety of benefits to its members and provide opportunities for students to enhance their education through campus involvement and connection with the campus community. The social integration and the bond students develop with other students through community engagement and service strengthen their sense of belonging and increase retention [5]. Tinto [6] determined that social integration and commitment to the institution are major considerations for student persistence. Additionally, several studies have found that students are more reluctant to leave an institution after joining a campus organization [7]. Social connections allow students to “bond with other students to achieve a common goal,” such as completing their degree program [8].

Additionally, non-academic factors like social support (level of social support a student feels the institution provides) and social involvement (extent to which a student feels connected to the college environment, peers, faculty, and others in college, and degree to which a student is involved in campus activities) positively affect student retention [9]. Therefore, it is important that students have a variety of opportunities to engage with peers through campus activities and organizations. This importance is especially true of underrepresented minority (URM) students. Chang et al. [10] found that among aspiring scientists and engineers from underrepresented racial groups, URM students who joined a club or organization related to their major significantly improved their chances of persisting. Clubs such as the National Society of Black Engineers (NSBE) and SWE are examples of undergraduate student organizations that revolve around particular subsets of STEM majors.

There are two considerations when forming a student organization based on a professional society. First, most academic institutions require that the organization has a faculty advisor in order to officially recognize them and allow them to operate. Evans et al. [11] reported seven keys to a successful ASCE student chapter, among which is the faculty advisor. The faculty advisor’s professional experience and contacts allow students access to a huge data and knowledge base for use in their chapter activities, learning processes, professional activities, and personal lives [11]. Somerton and Genik [12] argued that the most critical role of the faculty advisor is in assuring strong student membership, a quality officer group, and continuity of officers. Second, the bylaws of the professional organization need to be considered and some

societies require both a counselor and an advisor for their student chapters, and their roles may vary. For example, currently most SWE collegiate sections have both faculty advisors and counselors. The faculty advisor serves as the liaison between the SWE section and the university, is responsible for knowing the university's policies, helps the student section access university resources, and ensures the section is meeting all university requirements [1]. Although the faculty advisor is not required to be a SWE member, he or she often is. Faculty advisors may attend SWE conferences and encourage students to attend, search for award and scholarship applications, and assist with travel authorization and funding opportunities. The faculty advisor also provides day-to-day guidance for the club, provides insight into university policies, and can provide feedback as to what events may be successful based on past experience [13].

The counselor is required by SWE for a collegiate section to remain in "good standing" and serves as the liaison between the SWE section and other SWE professional members and the industry [1]. The SWE Counselor is selected by the student section and in addition to being enthusiastic about SWE and the university, the counselor must be a SWE member and should have good communication skills and ties to local industry. The counselor may help arrange for volunteering opportunities and outreach events for the student members, as well as inviting speakers from local industries. It is also beneficial if the counselor was a previous student section member [13].

Although the relationship between the collegiate section and their faculty advisors and counselors may differ among universities, both coach the student chapter by providing advice and various resources. Most of the time, they are mentors for students, the final checkpoint for all activities, and play a critical role in section continuity. They provide constant support for students through their collegiate engineering years, helping them develop into successful and accomplished graduates.

This paper discusses the role of faculty advisors and counselors of collegiate sections of SWE, and is organized as follows: Section II describes the method used to conduct the study. Section III presents the survey results with quantitative and qualitative analyses of the data. Section IV comprises a discussion of the survey results. Section V provides a conclusion and implications.

II. Methods

This study was conducted by a combination of a survey of the faculty advisors/counselors community within SWE, and through the analysis of written reflections provided by the authors of the paper, all of whom are faculty advisors and/or counselors. In 2017, this group of eight advisors and/or counselors identified factors that contribute to their level of involvement in running student organizations. Their individual experiences were shared with respect to their role in the section's long-term and short-term goals for the success and sustainability of student organizations.

The survey was developed based on the goals of the study, with several rounds of review and revision to ensure that the questions would be interpreted as intended. A copy of the survey can be requested by emailing any of the authors. The survey was distributed through two methods. In the first round of distribution, paper copies of the survey and consent form were handed out at

the Faculty Advisors/Counselors general meeting at the SWE Annual Conference in October 2018. After the conference, a link to an electronic copy of the survey and consent form was distributed through e-mail to the community, in order to reach those who were unable to attend the Annual Conference.

IRB approval for the study was granted through Kettering University, the home institution of Dr. Peters. All surveys were collected by Dr. Peters, who ensured that the informed consent was properly executed and that all data were anonymized prior to analysis.

A total of 76 faculty advisors and counselors responded to the survey. Out of a total of 420 collegiate sections within SWE, 128 have a counselor listed and 146 have a faculty advisor listed, for a total of 274 listed advisors and counselors. Some of these people are the same (i.e., the same person is both a faculty advisor and counselor); however, using the conservative assumption that the number of faculty advisors that are also counselors is small, the response rate for the survey is 29%.

Survey data were analyzed using standard statistical methods. The written reflections were analyzed using open coding, in order to allow themes to emerge.

III. Results

1. Survey Population

Of the survey respondents, 40 were faculty advisors, 30 were counselors, and six identified themselves as both a faculty advisor and counselor for a SWE section. The respondents ranged in experience from less than one year ($n = 9$) as an advisor or counselor to more than ten years ($n = 16$). More commonly, the respondents had one to five-year experience ($n = 33$) or six to ten years ($n = 18$).

The respondents came from Universities that have no graduate degree programs ($n = 12$), a master's degree in engineering ($n = 10$), and doctorate degree granting institution ($n = 54$). The higher the level of degree offered the larger the SWE collegiate section was ($\alpha = 0.05$) with 18 respondents indicating that their institution had over 100 paid SWE members, 26 with 36-100, and 32 respondents having 35 or less paid SWE members. Additionally, both the level of degree and the size of the SWE collegiate section had a significant positive correlation with the number of graduate students that are SWE members. These correlations make sense since the larger universities would likely have a larger engineering student population, which would lead to more members involved in SWE. Additionally, the larger universities tend to offer a higher level of degree, which results in more graduate members. Of the institutions that have a graduate program, ten of the respondents indicated that there were no graduate students members, 45 had fewer than ten paid graduate members, and nine had 10 to 50 paid graduate members.

2. Advisor & Counselor Involvement

Overall, 92% of the SWE counselors and faculty advisors that responded describe being either "very" or "somewhat" involved (32 respondents are very involved, 38 are somewhat involved, and only 6 are not very or not at all involved).

Advisors vs. counselors. Respondents in a counselor role ($n = 30$) tend to be less involved (20% of the counselors described themselves as “very involved” while the majority, 70%, describe themselves as “somewhat involved”), while respondents in an advisor role ($n = 40$) tend to be more involved (50% are “very involved” and 40% are “somewhat involved”; Figure 1a). Unsurprisingly, respondents who do both roles ($n = 6$) are predominantly “very involved” (83%), although the sample size here is quite small.

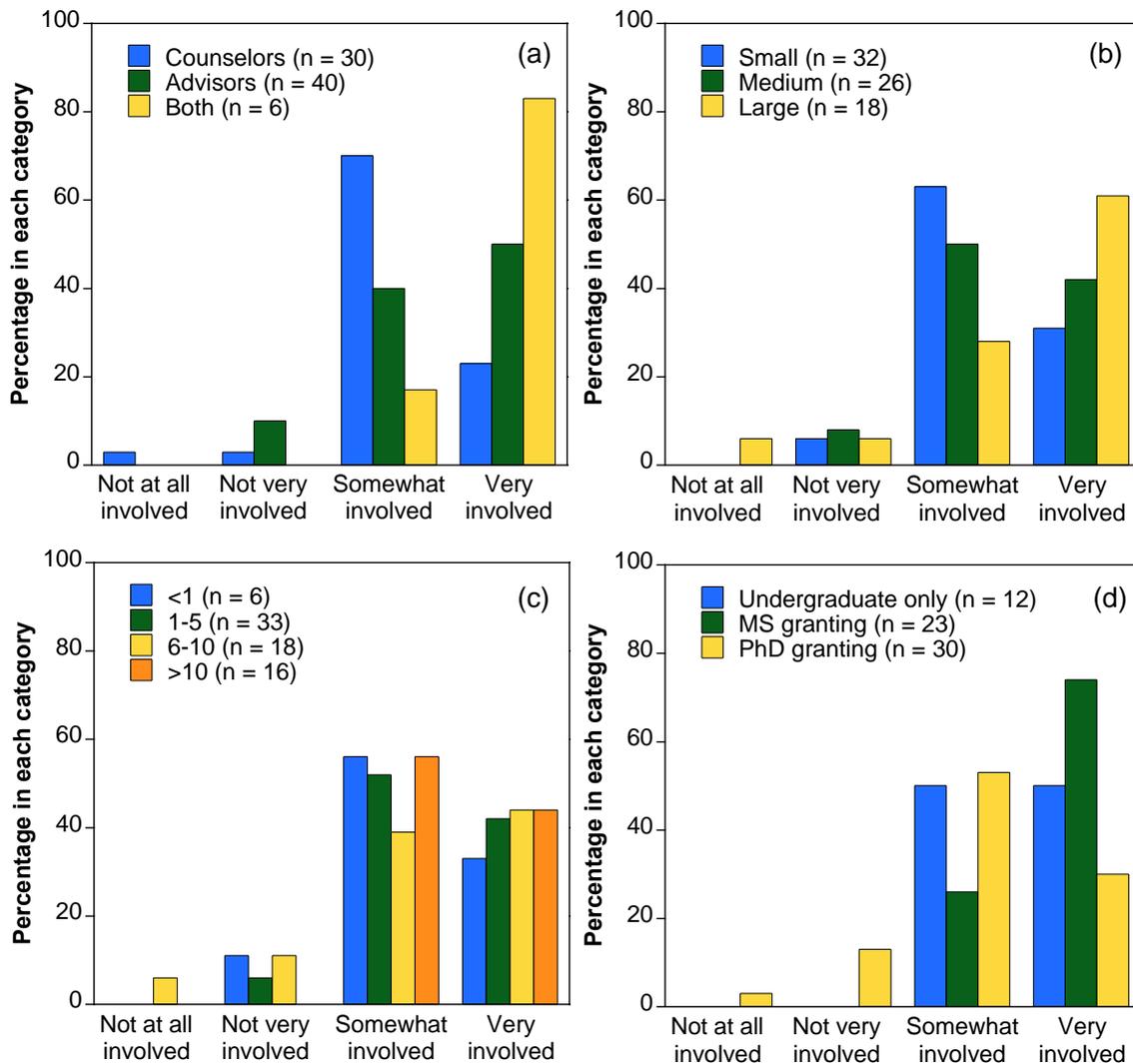


Figure 1. Respondent involvement categorized according to (a) role within SWE, (b) size of SWE section, (c) length of time involved in SWE, and (d) type of institution. The number of respondents in each category is indicated in the figure captions.

Section Size. There is also variability in involvement according to section size (32 small, 26 medium, 18 large; Figure 1b). Advisors and counselors of large sections tend to be more involved than those of small sections. For example, 61% of advisors/counselors of large sections

report being “very involved,” while only 31% of advisors/counselors of small sections are “very involved.”

Length of time in role. There are no obvious correlations between the length of time serving as an advisor/counselor and the level of involvement (Figure 1c).

Type of institution. MS granting institutions report the highest level of involvement (74% are very involved), followed by undergraduate only institutions (50% are very involved) and PhD granting institutions (30% are very involved; Figure 1d). All of the “not at all involved” and “not very involved” responses came from PhD granting institutions.

There are several reasons why SWE counselors and advisors stated they are “somewhat” or “not very involved.” These reasons can be divided up into two categories: 1) limitations of the SWE counselor/advisor: time constraints (5 respondents), living too far away (2 respondents), or being new to the role (1 respondent) and 2) the SWE section already has enough support: the students do not need/want more involvement (11 respondents) or a counterpart is already heavily involved (2 respondents).

Since only a small number of the counselors/advisors responded to this prompt, the data are limited; however, it is encouraging that, in most cases (13/21 responses), the counselor/advisor is not more involved because the SWE section already has enough support/is independent.

3. Other Factors

Length of time in role and Section Size: The highest number of advisors/counselors (n = 33) has been in their role between 1 and 5 years (Figure 2a). Eighteen of the survey respondents have been serving between 6 and 10 years, and 16 have been in this role for more than 10 years. Out of the 76 survey respondents, only 9 have been SWE advisors/counselors for less than a year.

Looking at the length of time serving as advisors/counselors and the SWE section size, no correlation can be inferred for the smaller time length (less than 5 years; Figure 2b). However, 50% of the respondents who have been advising for 6 to 10 years or more have a small section size (less than 35 members), and a 25% of them advise a medium size section (35-100 members), and the remaining 25% have been serving a large SWE section (more than 100 paid members). For those in faculty roles, this may be due to having less options available for other faculty members to take over the role, which means they are in the position longer than an advisor at a larger university.

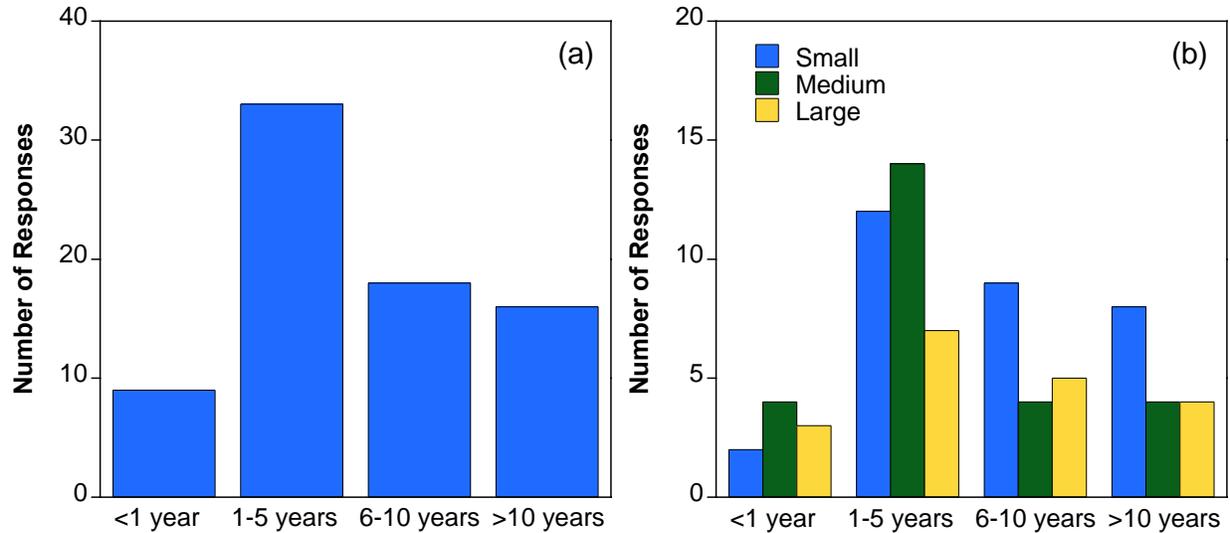


Figure 2. The length of time each respondent has been a SWE counselor and/or advisor for (a) all responses and (b) according to section size.

Advising of Other Organizations

Out of the 76 survey respondents, a total of 25 hold an advisory role of some kind with some other organization, with four of them advising multiple other organizations. The majority of these people are faculty advisors: 16 are only faculty advisors, four are counselors, and five respondents hold both the faculty advisor and counselor role. The majority of them have at least a full year in their role, with the levels of experience shown in Figure 3b.

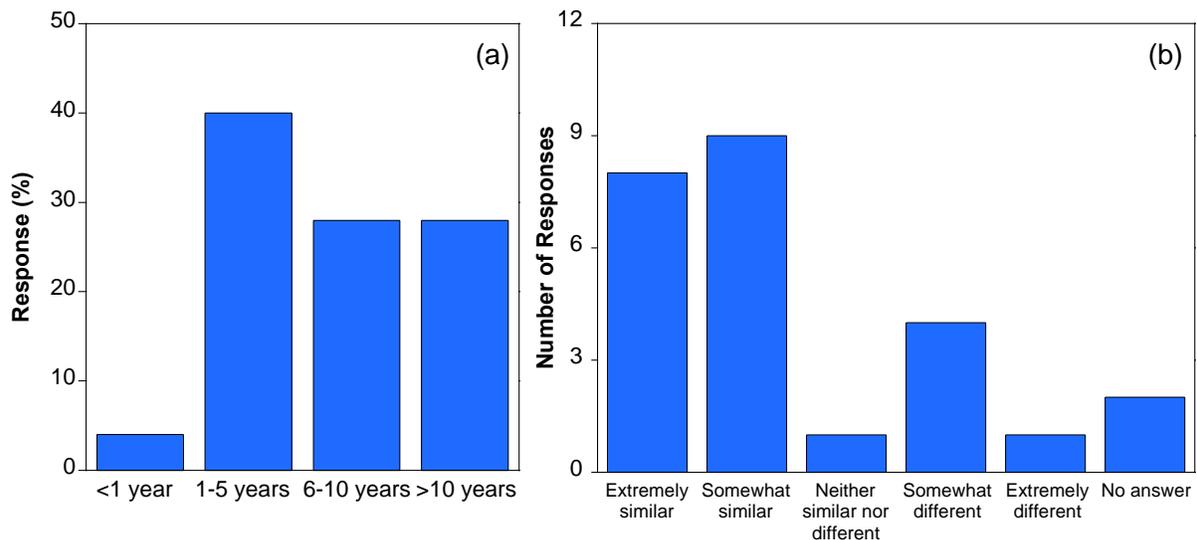


Figure 3. (a) The length of time each respondent has been a SWE counselor and/or advisor for SWE and at least one other organization ($n = 25$). (b) Reported similarity between the advisor/counselor's role in SWE and their role in another organization for advisors and/or counselors who are involved in multiple organizations.

They advise SWE sections of varying size and at different types of institutions; 13 of them advise small sections, 7 advise medium sections, and 5 work with large sections. Five of them are advising sections at exclusively undergraduate institutions, 5 advise sections at master's granting institutions, and 15 advise sections at institutions that offer a doctorate in engineering. Almost all of them are involved with their sections, with 15 stating that they are very involved, 9 are somewhat involved, and only one is not at all involved.

When asked about the similarity of their role in other organizations to their SWE involvement, the majority (68%) indicated that their role in other organizations they advise is extremely similar or somewhat similar to their SWE role, as shown in Figure 3b.

In analyzing survey comments, there was one comment specifically comparing SWE to other organizations, which points out an important difference with many disciplinary societies, as well as a similarity to some other organizations with a similar mission, e.g., NSBE and SHPE. This respondent states:

The other club for which I am faculty advisor is for both men and women across the college and it functions more as a typical club. By contrast SWE has become more of a Program for the College of Engineering. The SWE students cannot learn through failure as the stakes of delivering programming for the college are too high to fail. This is a mixed blessing: on the one hand the students have to step up their game, on the other hand it feels unfair to burden the diversity students themselves with programming and recruitment for students of their diversity group. (The same happens with SHPE & NSBE.)

This participant had indicated that their SWE role was somewhat different from their role in another organization. No other participants cited specific similarities or differences in the general comments field of the survey.

4. Means of Communication

Of the 76 professionals who responded to our survey, 52% of them were faculty advisors, 40% were counselors, and the remaining 8% served a dual role as both faculty advisor and counselor of their SWE section. Of the faculty advisors, 80% personally attend the meetings with section officers and/or the committee chairs. This percentage drops to 50% for the counselors, which given the fact that many counselors are located off campus and many have professional jobs, it is not surprising to see a decrease in the percentage. Of those who serve as both advisors and counselors, 83% personally attend the meetings with section officers and/or the committee chairs.

In terms of communicating with the SWE members, video conferencing is not a popular mean of communication with students, although one might think that the use of technology can be a tool to accommodate more students with their busy schedules. A small percentage of faculty advisors and counselors prefer the option of calling the students as a communication tool, but by far email is the most popular mean of communicating with SWE officers and other members of the section. Only 40% of the faculty advisors use the social media whereas 65% of counselors prefer

using the social media to communicate with their sections. Texting, group chatting, and other means of communication are not as popular among both faculty advisors and counselors, but the survey indicated that those were “other” communication methods that are used.

5. Elements of the advising role and level of importance

The discussion from eight faculty advisors and/or counselors in 2017 included written reflections that described the experiences of faculty advisors and their perception of the most important characteristics of the role. The analysis of these reflections provided a framework to define the role of advisors into five general categories: mentors, advocates, resource and source of information, link to University and communities, and supporter of the college-to-career transformation. Each of the roles were described but no prioritization was performed.

The two main general observations drawn from the reflections were that (1) the level of the involvement of faculty advisors in various events is based on the readiness and engagement of the officers (faculty advisors often do not interfere with day-to-day operation of the section, but rather stay “on-call” for any issues that would require their interference), and (2) the nature of the institutions has minimal effect on the way the faculty advisors see their role in leading the SWE sections. Overall, the analysis of the reflections provided commonalities and indicated that the role of the faculty advisors does not change much from one institution to another one. To continue to understand the role of advisors, the 2018 survey participants were asked to rate the importance of their role as the key functions were outlined (Table 1), which will be discussed further in the next section.

Table 1. Aspects of advising role by levels of importance.

Aspect of the Advising Role	Average Rating	Standard Deviation
Providing continuity to the section over a long period of time	4.461	0.855
Encouraging students to attend the SWE Annual Conference	4.382	0.816
Ensuring that students understand SWE as an organization	4.237	0.978
Mentoring students on general leadership topics	4.145	0.919
Mentoring students on SWE leadership topics	4.081	0.918
Helping students find speakers for section meetings	3.882	1.107
Ensuring that students understand university policies and procedures for student organizations	3.855	1.262
Helping students organize outreach events	3.724	1.150
Writing recommendations for students for SWE scholarships	3.693	1.241

Helping students with fundraising ideas	3.671	1.148
Providing a communication channel between the Society and the collegiate section	3.658	1.195
Providing a communication channel between the university and the collegiate section	3.627	1.383
Writing recommendations for students for SWE awards	3.592	1.256
Accompanying students to the SWE Annual Conference	3.579	1.359
Providing a communication channel between the local SWE section and the collegiate section	3.467	1.388
Accompanying students to Regional/WE Local Conferences	3.189	1.401

IV. Discussion

The data from the 2018 survey present a good cross section of different SWE sections throughout the country. The respondents were diverse in their length of time in the role, type of institution, and size of the section with which they were affiliated. The respondents were not diverse in regard to gender, with only one male respondent, and the remainder female; this was clearly due to the nature of the organization surveyed. While SWE does welcome men as members, and some male members are very active and hold officer positions, the majority of active members are unsurprisingly female. The diversity in respondents was represented both in the general pool of respondents in terms of section size and length of time in their role, and in the subset who identified themselves as holding an advisory role for another organization, which enhances the extent to which the results can be generalized.

There are several important points about the ways in which faculty advisors and counselors approach their role in guiding students. First, it is notable that there was a high degree of agreement on the importance of various parts of the role, as shown in Table 1. Those items which were rated as most important, on average, also had the smallest standard deviation in their rating. The most important aspect of the advising role was in providing continuity to the section; with the constant turnover of students as they graduate and move on, this is a logical role for someone who can, and often does, remain in the role for a significant period of time. Other important parts of the advising role involved participation in, and understanding of, the larger organization, and mentoring students on both general leadership and SWE leadership. Again, these are roles that an advisor or counselor, with more experience in the organization, is well equipped to fulfill. These results correlate to the 2017 faculty advisor's reflections where being a resource and source of information was described as one of the main functions of the advisor role. It was stated that one of the challenges with any campus organization is the fact that most students are on campus for a relatively short period of time, and information can be lost as transitions take place from one leadership team to the next. As a continuous presence over time,

the faculty advisors can fill that gap and help students to bring back information that has been lost.

There was less agreement on the importance of other aspects of the role, such as providing a communication channel between the local professional section and the collegiate section and accompanying students to various conferences. Some of these differences may be due to the different roles of advisors and counselors within SWE, as well as university policies. Some universities require a faculty or staff member to accompany students who are traveling for university-sanctioned events, while others do not, and this is a role that counselors are unlikely to be called upon to fulfill. In contrast, part of the purpose of a counselor is to provide a link to the professional membership and while an advisor may also do this, it is not an explicit expectation of the role. Furthermore, both advisors and counselors' perception of this aspect may be affected by geography; some universities are located in areas where there are few, if any, professional members and no professional section exists.

The results from this study also show that there is a correlation between the size of sections and the level of involvement of the faculty advisor and counselor, with larger sections having more involvement on the part of both the advisor and counselor. It is possible that the involvement of the advisor and counselor contribute to a large, active section, but it is also possible that the activity of the section results in the students proactively seeking out more input from the advisor and counselor, as they need that guidance for their activities. There is an additional factor, in that the larger sections are at larger colleges and universities. This is a logical correlation, as there is a larger population of potential members at those schools. However, the school size may impact the involvement of the faculty advisor and counselor, as well as the section size; students at larger schools could require more guidance in navigating university policies and procedures.

V. Conclusion and Implications

As discussed in the existing literature, collegiate organizations such as professional societies can be valuable to students. Involved and active advisors contribute to the success of student section. This paper provided an assessment of the involvement of SWE advisors and counselors and an overview of their roles. It also explored what aspects of the advising role are perceived as most important by faculty advisors and counselors for collegiate sections of SWE, as well as how they communicate with their students. Faculty who advise multiple organizations generally feel that their advising roles are similar, which supports the ability to generalize these results to other organizations. Additionally, some of the advisors/counselors have been in this role for over 10 years, suggesting they view it as important and receive benefits (such as enjoyment or credit towards tenure and promotion) from doing it.

The results of this study can be used to help new advisors for collegiate organizations understand their role more fully and explain its significance in light of institutional priorities. For potential and current advisors/counselors, this paper is important for showing what kind of involvement is typical (based on section size, etc.) and what their responsibilities might be. Advisors do not communicate with their counterparts at other institutions frequently, so this analysis provides a baseline of what advisors/counselors are doing on a national scale. The results could be used to

impact the recruitment of faculty advisors and provide better orientation into the role by explaining what the job should entail and why faculty should do it.

The results also could have an impact on how universities see the role and importance of faculty advisors. This impact may change how advising fits into universities' workload models and possibly elevate its perceived value, which could affect promotion and tenure criteria. For SWE student sections, this analysis also provides some guidance for what they can expect from their advisor. Better knowledge of the role can help advisors provide better service and can empower students to ask for services they need.

Additional research in this area could follow a few paths. First, while this study explored the importance of various aspects of the advising role, the time commitment of these aspects was not included in the study. An analysis of the amount of time spent on different tasks could more fully describe the advisor's role. Second, while this study explored the advisor's views, the authors did not look at the student perspective. A study of what students want from their advisors and how they see the advisor's role could further enrich our understanding of the role. Finally, while there is some literature on the importance of student organizations, their relation to retention rates is not well understood, particularly for women and minorities. A study on the relation between SWE collegiate membership and retention of female students could be valuable.

References

- [1] Society of Women Engineers. *SWE faculty advisors and counselors training material*. [online] Available at: <http://societyofwomenengineers.swe.org/component/jdownloads/category/276-counselors-and-faculty-advisors?Itemid=-1> [Accessed 3 Jan. 2019].
- [2] American Society for Engineering Education, “Engineering by the Numbers: ASEE Retention and Time-to-Graduation Benchmarks for Undergraduate Engineering Schools, Departments and Programs”, Washington, DC. [online] Available at: <http://aeir.asee.org/wp-content/uploads/2017/07/2017-Engineering-by-the-Numbers-3.pdf> [Accessed 10 Jan. 2019].
- [3] American Society for Engineering Education, “Going the Distance: Best Practices and Strategies for Retaining Engineering, Engineering Technology, and Computing Students”. [online] Available at: <https://www.asee.org/retention-project/best-practices-and-strategies/ASEE-Student-Retention-Project.pdf>, [Accessed 10 Jan. 2019].
- [4] Hanover research, “Strategies for Improving Student Retention”. [online] Available at: <https://www.hanoverresearch.com/media/Strategies-for-Improving-Student-Retention.pdf> [Accessed 10 Jan. 2019].
- [5] Lucy-Bouler, T and Lucy-Bouler, T., “Service Learning Positively Impacts Student Involvement, Retention, and Recruitment” *Journal of Learning in Higher Education*, v8 n1 p19-24 Spr 2012.
- [6] Tinto, V., “Promoting Student Completion One Class at a Time”, *Pell Institute for the Student of Opportunity in Higher Education*. [online] Available at: <https://www.acenet.edu/news-room/Documents/Promoting-Student-Completion-One-Class-at-a-Time--Tinto.pdf> [Accessed 10 Jan. 2019].
- [7] Albert, S. “Student Retention – A Moving Target.” Council of Ontario Universities, p. 2. [online] Available at: <https://cou.ca/wp-content/uploads/2015/07/Academic-Colleagues-Paper-Student-Retention.pdf> [Accessed 10 Jan. 2019].
- [8] Roberts, J. and Styron, R., “Student Satisfaction and Persistence: Factors Vital to Student Retention.” *Research in Higher Education Journal*, March 2010. pp. 3-6.
- [9] Lotkowski, V., Robins, S.B., and Noeth, R. J., “The Role of Academic and Non-Academic Factors in Improving College Retention”, ACT policy Report, 2014.
- [10] Chang, M.J., Sharkness, J., Hurtado, S., and Newman, C.B., “What Matters in College for Retaining Aspiring Scientists and Engineers From Underrepresented Racial Groups”, *Journal of Research in Science Teaching*, VOL. 51, NO. 5, PP. 555–580, 2014.
- [11] Evans, M.D., Evans, D.M., and Sherman, L.D., “Seven Keys to a Successful ASCE Student Chapter or Club: Guide for Student Leaders and Faculty Advisors”, *Journal of Professional Issues in Engineering Education and Practice*, Vol. 127, Issue 2, pp. 65-74, April 2001.
- [12] Somerton, C. and Genik, L., “Advising Student Organizations: The Challenges (and rewards?) for New Engineering Faculty”, *proceeding of ASEE annual conference*, 2008.
- [13] SWE South Ohio Section. (2019). *SWE Counselors & Faculty Advisors*. [online] Available at: <http://southohio.swe.org/swe-counselors--faculty-advisors.html> [Accessed 1 Feb. 2019].