

NAE Engineering Societies Study – Survey Results

This document provides highlights of the NAE Engineering Societies survey data collected by Inverness Research in the spring and summer of 2016.

Method

After developing and implementing a pilot survey that included 10 societies, Inverness Research drafted a final survey that was reviewed and approved by the project committee. The NAE and IR then drafted an email invitation that was sent to 121 societies, in some cases to multiple people at a given society. The email asked for societies' participation in the study, and in particular, for recipients to decide who was the best person to complete the survey for their society.

After NAE sent two reminder emails, a total of 58 surveys were completed, for a return rate of 48%. There were eight cases in which two surveys were completed for a single society. In these cases, we decided to either contact the individuals and ask which survey to include in the study, or opted to include the survey of the individual who also participated in an interview, if applicable.

The Sample

The surveys were completed by a range of leaders within the organization, with the most prevalent position being the Executive Director or the President. Respondents with other roles included:

- Board of Directors member
- Director (various areas, such as education, outreach, etc.)
- General manager
- Vice President

The breakdown of responding societies, according to number of members was:

| | | |
|-------------------------|----|-----|
| less than 1,000 (small) | 10 | 17% |
| 1,000 - 9,999 (medium) | 15 | 26% |
| 10,000 - 49,999 (large) | 21 | 36% |

| | | |
|--------------------------------|----|-----|
| more than 50,000 (extra large) | 12 | 21% |
|--------------------------------|----|-----|

Because there was a relatively even spread of societies in these initial size groupings, we conducted sub-analyses of the survey questions based on the size bands above. We also conducted sub-analyses according to whether a society was discipline-focused, or an affinity society. In the following summary, we indicate where there were statistically significant differences between these groups.

After an initial review of the survey findings, we conducted an additional sub-analysis to explore the relationship of societies' priority education goals, activities, and audiences, and their rating of education as a priority weighed against other society priorities.

General Findings

- Overall, engineering (or engineering-related) societies are engaged in a range of education activities that target a range of audiences. Nearly every category of goal, activity type, and audience is represented in the work of the societies who responded to our survey.
- Supporting and growing membership is a high priority goal for all of the societies, which means that activities that both increase membership numbers and contribute to the professional growth of (practicing) members are important. Societies are less concerned with influencing policies related to engineering education, or in addressing pre-college engineering (for the most part). A sub-analysis revealed that discipline-based societies are more apt to focus on improving curricula and materials than affinity societies. Further, affinity societies are more apt to focus on culture change than discipline-focused societies are.
- The sub-analysis by membership size did not reveal many significant differences. One notable exception is level of investment in education endeavors, where small- and medium-sized societies are more apt to say their level of investment has stayed the same, while larger societies say their funding for education has increased in the past two years.
- The majority (87%) of societies face some kind of barrier in their engineering education work. The most common barriers include: communication; improving engineering curricula; incentives; as well as issues related to time, resources, and funding. A sub-analysis revealed that affinity societies are more apt to report facing barriers than discipline-focused societies.
- About ¾ of all respondents are engaged in partnerships with outside organizations, and 86% use connections to at least some extent with other

engineering societies. Over half believe these connections to other engineering societies are useful to a good or great extent. There is a wide range of organizations and societies that are engaged in these partnerships.

- Societies' investment in engineering education has not decreased in the last two years. Annual budgets, industry, and university-based faculty are counted as resources for engineering education work for most societies. Further, 77% of respondents said that engineering education is just as or more important than other society priorities.
- A majority (85%) of societies consider themselves leaders in the field. However, half of the societies rated their overall capacity to plan and implement education work as either low or some. 38% rated their capacity as high, and 12% rated it very high.
- Leadership Development is a higher priority for participants who said engineering education was "more or much more important" in the scope of their society's goals and activities compared to those who said engineering education was "less or much less important." The same holds for Continuing Education and Engineering Education Issues/Trends Research - these activities are high priority for those who said engineering education is more or much more important than other society activities. There were no statistically significant differences for target audiences.

Education Goals

Over half of all societies count supporting professional development, leadership development, and increasing diversity as high priority goals. Professional development leads with 90% of societies reporting it as a high priority. Fostering policy changes, and improving curricula and materials are lower priority goals.

A sub-analysis revealed differences between discipline-focused societies and affinity societies. Discipline-focused societies are more apt to focus on improving curricula and materials, even though it is a lower priority overall. Further, affinity societies see culture change as a higher priority than disciplinary societies. There were no significant differences based on society membership size.

In our analysis of the relationship between goals and commitment to education, we found that societies who rated education as important to their society were more likely to identify leadership development as a priority goal.

Education Activities

The majority of all societies are involved in professional development for their membership (82%). Sixty-five percent have student chapters, and 61% provide continuing education. Over half (58%) are working on partnerships with industry,

and 51% are concerned with women in engineering. Strong or medium priority activities include mentoring and academic partnerships. Low priority activities include programs for veterans, fellowships, employability training, and student competitions.

A sub-analysis revealed that affinity societies' priority goals are more apt to include fundraising, programs to promote diversity, and pre-college engineering education than discipline-focused societies. However, discipline-focused societies are more apt to include certification as a high priority goal. There were no significant differences in the analysis by society membership size.

In our analysis of the relationship between education activities and commitment to education, we found that societies who rated education as important to their society were more likely to identify Continuing Education and Engineering Education Issues/Trends Research as priority activities.

Target Audiences for Education

Undergraduate students (63%), graduate students (57%), industry (68%), and government agencies (56%) are high priority audiences for over half of societies' education efforts. University faculty (37%) and high school students (33%) are a close second. Low priority audiences include pre-K teachers and students, elementary school teachers and students, middle school teachers and students, and deans/department chairs. There were no significant differences by size, and there were no significant relationships between their rating of the importance of education and their target audiences.

Partnerships

Just over three quarters (77%) of societies said they are engaged in some kind of partnership with an outside agency or organization for their education work. Professional and technical societies, academic organizations/institutions, government agencies, STEM organizations, and industry were the most commonly cited. At least one society also partnered with the following kinds of organizations:

- Diversity organizations
- International development organizations
- Engineering education organizations
- Accrediting bodies
- Private organizations
- Humanitarian organizations
- Consulting Engineers
- Museums

- Manufacturing Institute
- Mentoring organizations
- Girl-serving organizations
- Non-profit
- Media outlets
- Other standards developing organizations (SDOs)
- State affiliates
- Company that focuses on webinars and other distance-learning for environmental issues and engineering geology

General Program Information

Not all respondents answered all of the following questions. We indicate the number for each question.

Numbers served (N = 54)

41% of respondents did not know how many people were served by their education efforts. Of those who answered, the majority (43%) serves up to 10,000 people.

Numbers of volunteers participating in education work (N=54)

Just under 1/3 did not know how many volunteers participate in education work. Of those who answered, the 50% have up to 500 volunteers.

Annual budget for education (N=50)

34% (17) did not know the annual budget for education. Of those who answered, there was a range of numbers, indicated below:

| | | |
|-----------------------|----|-----|
| less than \$10,000 | 2 | 4% |
| \$10,000 to \$99,999 | 7 | 14% |
| \$100,000 - \$999,999 | 11 | 22% |
| \$1MM to \$10MM | 12 | 24% |
| over \$10MM | 1 | 2% |

Student Chapters (N=41)

Just under ½ of those responding to this question have less than 50 student chapters. Most of the remaining societies have over 50, upwards of 200. Seven societies have over 200 student chapters.

Program administration (N=51)

Societies' central offices administer around 75% of programs for just under ½ of those who answered this question. Local chapters and/or divisions administer up to 50% of programs for just over half of the societies. Student chapters administer up to 25% of programs for just under half of societies. For 33% of societies, student chapters do not administer any of their education programs.

Level of investment in engineering education

The level of investment in education for societies has either increased (51%) or stayed the same (44%) for most societies. It has decreased for 4%, and 2% did not know.

A sub-analysis of the data by membership size revealed a significant difference with respect to recent change in level of investment in engineering education. Small and medium societies' level of investment in engineering education has stayed the same, whereas larger societies have increased their funding for education in the last two years.

Capacity for engineering education

Societies' capacity to plan and implement education work is essentially split – half of the societies rated their overall capacity to plan and implement education work as either low or some. Forty-one percent rated their capacity high, and 9% rated it very high. There were no differences based on membership size.

Resources for Education

The large majority of support for education comes from societies' annual operating budget (93%). Following that, resources include: membership-industry (70%), corporate sponsorship (72%), membership-faculty (67%), membership – college/academic department leaders (52%). Student members (46%), foundations (41%), internal research and/or evaluation results (30%), literature (24%) and NSF funding (24%) are also used. NAE and ASEE publications were resources for just 20 societies of the total sample. There were no differences based on membership size.

Connections with other societies

Eighty-seven percent of respondent use connections with other engineering societies or organizations at least a little. Eleven percent (6 societies) said they use them “a lot.” Of those who use them at least a little, 43% believe that these connections are currently beneficial to some extent. Thirty-four percent believe they are useful to a good extent, and 23% to a great extent. All of those who do not currently use connections to other societies believe they could be beneficial to at least some extent. There were no differences based on membership size.

Barriers

Eighty-seven percent of societies face some kind of barrier in their education work to at least some extent. The majority of examples of barriers described by respondents fell into the following categories:

- communication issues (e.g. connecting members to educators; meetings)
- curriculum related issues (e.g. challenges with changing accepted curricula)
- incentive issues (e.g. getting faculty to change their practice)
- time, resource, funding issues (e.g. lack of resources to be able to scale local programs into a repeatable framework for national level use)

Other barriers were more specific to the discipline or particular mission, such as needing background checks for members to work in schools, lack of identity of a specialty, finding the right partners, improving student access, finding speakers, and the like.

Sub-analysis revealed that affinity societies are more apt to face barriers to their education efforts than discipline-focused societies. There were no significant differences based on membership size.

Leadership in education

Eighty-five percent of societies consider themselves leaders in engineering education to at least some extent, and 17% of those to a great extent. For many of them, this refers to their particular specialty (e.g. conservation engineering). With respect to the relative importance of engineering education in their society, 78% of respondents believe that education is at least as important than other goals or activities pursued by their society, with 36% saying it is more or much more important. Only 23% (12 societies) said education is much less or less important.