A NEW GRADUATE-LEVEL SEMINAR TO PREPARE STUDENTS FOR THE NEXT STEP IN THEIR CAREERS

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To would-be employers in academia and industry, a Ph.D. in engineering signifies not only the ability to conduct independent research, but also the skills to communicate the significance of research findings through written publications and oral presentations. Given the central role of a graduate student's advisor in the pursuit of a Ph.D., the acquisition of effective oral and written communication skills is often not addressed at the departmental level. For example, a brief survey of graduate curricula of the 50 top-ranked chemical engineering Ph.D. programs in the United States revealed only eight classes that meet the criteria of professional development of oral/written communication. The importance of addressing these skills and helping graduate students prepare for the transition to professional life has been long noted in other fields, particularly the biological sciences.[1-4] Many Ph.D. graduates want to pursue a career in academia; however, with the increasing number of doctoral graduates, a career in academia has become more competitive and difficult to obtain, therefore more professional development should be provided to graduate students.[5] The National Institutes of Health (NIH) published a report in 2011 detailing areas of need in the development of well-rounded Ph.D. students and post-doctoral researchers.[6, 7] One of the key areas identified is professional development, but the report does not outline a path to reach this goal.[6] This leaves current graduate students in science and engineering with the "usual suspects": seminars, colloquia, and professional societies.

Seminars and colloquia are frequently used tools to help with professional development. Key benefits include exposing graduate students to disparate areas of research found outside their home departments and the opportunity to observe experienced professionals communicate the significance and impact of their research findings. At seminars students often have the opportunity to network and interact with external visitors, which can be beneficial irrespective of the specific research interests of the departmental guest. While the majority

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of speakers at graduate seminars in chemical engineering are faculty from other departments, visitors from industry or national labs are also common, providing the additional benefit of giving students exposure to career opportunities outside of academia. The aforementioned benefits are important components of a holistic graduate education in engineering, yet the nature of the seminar (*i.e.*, a very experienced professional communicating to trainees) ensures that certain aspects will be missed (*e.g.*, a trainee is unable to effectively self-assess her or his own abilities when comparing to someone with a decade or more of professional experience). Furthermore, before their first job interviews most graduate students gain presentation experience only in the form of conference presentations lasting 20 minutes or less or informal group meeting types of presentations. Giving graduate students and post-doctoral researchers the opportunity to prepare for and provide a formal presentation of their research is another area of improvement that needs to be addressed in the professional development of engineers.

In 2011, graduate students at the University of Washington (UW) in the Department of Chemical Engineering developed a new type of seminar to help the department's students as well as well-qualified peers bridge the gap between limited presentation opportunities and applying as a candidate for permanent academic positions or a career in industry or government. The Distinguished Young Scholars Seminar (DYSS) has three major goals: 1) simulate the day-long departmental visit associated with many interviews capped by a one-hour seminar talk given by rising stars in chemical engineering; 2) help our own graduate students at UW become aware of where they fit into the chemical engineering landscape; and 3) expose our own graduate students to the panel-style peer evaluation decision-making process that governs many funding decisions. All facets of the seminar are implemented and executed by UW graduate students themselves to continue to broaden the idea of professional development. The remainder of this article is an overview of our process for developing and running this new seminar, including key changes we have made in the early stages as well as an assessment of the effectiveness of the new seminar.

MOTIVATION

Organization and logistics

To ensure that the seminar has the most value to the graduate students at UW, it has been entirely organized and run by graduate students from its inception in 2011. Each year an organizing team of 3-4 students, including one lead organizer, are selected by a faculty member overseeing the whole process. After the first year, the faculty served mostly in a limited advisory capacity due to the strong feeling of ownership by the students. Participating students are given credit toward departmental requirements for teaching assistantship service. This credit encourages students to apply and helps offset any interruptions in the students' research progress. The organization team is responsible for advertisement, the selection process, and the execution of the seminar. They begin meeting in March to update the website (<http://depts.washington.edu/acesche/dysss>) and update and send out promotional material trying to reach as many eligible trainees as possible. In April a grading rubric is composed and a selection committee is organized. Fliers calling for applications are mailed to many chemical engineering programs around the country and to specific individuals that are presenting at the "Meet the Faculty Candidate" poster session at the American Institute of Chemical Engineers Annual Meeting. The professional networks of our faculty, graduate students, and alumni of the DYSS program are also leveraged in order to maximize exposure.

To amplify the quality of talks and depth of research in the seminars, the DYSS eligibility requirements were set at graduate students within 12 months of defense of their chemical engineering Ph.D., or post-doctoral scholars in chemical engineering. Emphasis is placed on early career post-docs (*i.e.*, people in their first or the start of their second post-doc). Anyone who has accepted a permanent full-time position is not eligible to apply. These priorities establish a foundation of professional development for the DYSS (*i.e.*, the goal is not to further reward those who have already achieved a prestigious position). The application consists of one letter of recommendation, a research abstract, and a two-page C.V. In an effort to keep current graduate students on a level playing field with post-doctoral researchers, we chose to limit the application to a single recommendation letter in consideration of the reality that more experienced post-docs might disproportionately benefit simply by having additional direct research supervisors providing recommendation letters. Seven speakers and one alternate are chosen by the selection committee. In its inaugural year, 2011, there were 85 applicants, with 47 in 2012, and 60 in 2013.

A selection committee of about 15 students is headed by the lead organizer. The organizing team strives for diversity on the selection committee across research groups, background, and experience (although emphasis is placed on allowing more-senior graduate students to serve on the panel). Following the organization of an NSF-style panel the goal is to have each application scored by three reviewers with each committee member needing to read fewer than 10 applications. Each application has one lead reviewer who will summarize the application if/when it is discussed by the full panel. The selection committee has approximately 10-14 days to finish their reviews and enter them into an online system to assist the lead organizer, who is responsible for reviewing and statistically organizing the scores.

At the selection panel the lead organizer facilitates the discussion and describes the panel process. The panel begins with a discussion of the goals for their selection process.

For example, should research area be a factor, or should the quality of their application be the only criteria? Should there be an advantage for a strong presentation history? The sheer number of applicants means that only the top 20-30 applications can be actively deliberated at the panel and reviewed together as a group. However, prior to "retiring" the bottom tier of applicants any reviewer is given the opportunity to bring out an application and make the case that it should be reviewed or further discussed. The deliberation proceeds with a lead reviewer offering a brief summary followed by the entire committee reaching a consensus decision about lumping applications into various categories (*i.e.*, yes/maybe/no). At the end of the first round the "yes" applicants are ranked and the top seven or eight scholars are selected.

After the seven speakers and alternate are selected, the lead organizer plans the week-by-week schedule for the seminar. Each individual visit is focused primarily on maximizing contact between graduate students and the visitors. The day is organized like a typical seminar visit (lab tours and visits with research groups, meals, and a seminar). There are a limited number of meetings with faculty, and the graduate students at UW have the opportunity to partake in all the social and academic activities. One member of the organizing team is responsible for soliciting feedback and organizing the judging of all the talks (all seminar attendees can participate in the judging), culminating in the selection of a winner or best talk award for that year's DYSS.

Improvements on the selection process

Many improvements were made to the DYSS from its inaugural year. The most influential changes were made to the selection process and criteria. The first selection rubric was strongly based on faculty input following similar guidelines to those used in the review and selection of NSF Graduate Research Fellowship Program (GRFP) award winners. Three separate areas were judged: letters of recommendation, a C.V., and an abstract of the proposed research presentation. Originally, each piece was broken into subcategories. For example, the abstract was broken down into the following three categories in the inaugural year:

1. *Topic of interest: does the audience care?*
2. *Introduction to topic: does the author describe why it's important?*
3. *Clarity: is the research conveyed in a way that is easy to understand?*

Each of these subcategories was graded on a scale of excellent, very good, good, fair, and poor. A grade of "good" translated to "This person has a strong application, invite if possible." While this first rubric was a solid foundation, we found it was open to subjective interpretation, resulting in inconsistent scoring between reviewers. For example, we noted that a reviewer with a preference toward biological research might score research on solar cells with a ranking of "good," while a reviewer with a background in solar cells might score it as "excellent." The faculty advisors to the selection committee were able to use this and other similar observations to provide context to the UW grad students about challenges and competitiveness in the selection of fellowship winners and grant recipients.

In its inaugural year, the selection panel of graduate students felt that there was sufficient information contained within the application materials to base the selection of recipients only on quantitative metrics of quality. At multiple points in the first round of selection, the selection panel and faculty advisors discussed the priorities of the selection committee and clarified the mechanism by which applicants would be selected. Because of the strong sense of priority in quantitative metrics, the selection panel was somewhat unprepared with how to resolve an issue that faculty face constantly: How do you resolve or quantify quality to a fine detail with limited information? We do not have record of the exact numbers from the first year but the approximate breakdown was along the following lines: 1) the top three to four applicants were truly extraordinary in every possible metric and there was universal excitement about their selection; 2) the next six applications were excellent and there was near universal excitement about their selection; 3) approximately 10 of the remaining discussed applicants were all very good and the committee was fine acknowledging their worthwhile contribution and passing along the application. Seasoned faculty will be familiar with this concept—namely that there are always too many qualified people for available slots. On the other hand, many graduate students trained in engineering and quantitative sciences are unprepared for this harsh reality. The graduate students, with quantitative evaluation goals in mind, spent a long time passionately discussing the middle tier of candidates and eventually reached a near universal consensus about the slate of candidates to be invited for the summer. An unintended consequence of this process was that other departmental and institutional values (*e.g.*, the value of the DYSS speaker in broadening participation in STEM) were neglected in favor of traditional metrics of quality (*e.g.*, publications or strong letters).

As an example of how the DYSS greatly benefits the students in the home department, we will briefly detail how the selection process went through a dramatic transformation in the second and third years. First, early in the process the student selection committee met with Dr. Joyce Yen, the program/research manager of the UW ADVANCE Center for Institutional Change. The ADVANCE program was resourced to help the student organizers answer two questions: 1) how can we make the rubric less objective and easier to use for the entire panel? and 2) how can we ensure we simultaneously promote core institutional values such as diversity while taking steps to eliminate any unconscious bias in the selection process? As we discuss below, question 1 and part

of question 2 (the institutional values issue) were addressed through improvements to the rubric and panel system whereas limiting any unintended bias was addressed through intervention between our ADVANCE Center and the selection panel early in the selection process.

To improve the rubric and selection process, we have taken the following steps. Committee members now read a document on scoring applications, written by the Women in Science & Engineering Leadership Institute at the University of Wisconsin-Madison.[7] At the first meeting of the entire selection committee, Dr. Yen and student participants in the NSF-Funded UW College of Engineering Promoting Equity in Engineering Relationships (PEERS) program visit with the selection committee to discuss research on the impact of unconscious bias and issues likely to exacerbate such bias, *e.g.*, time constraints, stress, fatigue, and unclear instructions.[8-12] Examples of gender, race, and sexual-orientation bias are shared with the selection committee. For example, UW ADVANCE and the PEERs students presented multiple studies showing both men and women consistently rate women candidates lower than male candidates, even when the credentials (C.V.s, resumes, etc.) are identical.[13, 14] Diving deeper into this issue, the selection committee learned that men frequently are given argentic descriptors (*e.g.*, assertive, confident, aggressive, ambitious, independent) whereas women are given communal descriptors (*e.g.*, helpful, nurturing, agreeable, interpersonal); communal descriptors have a negative relationship with getting hired or receiving awards.[15]

The ADVANCE discussion concluded with the real-life example of the NIH Director's Pioneer Award. In the first year of the award the NIH fell into inherent bias traps and failed to select a single woman for the award. A 2005 paper in the *Journal of Women's Health* discusses biases in the NIH selection process: time pressure on the evaluator, absence of face-to-face discussion with applicants; ambiguity of performance criteria; emphasis on self-promotion; weight given to letters of recommendation; and the need for finalist to make a formal, in-person presentation in which the individual, and not his or her science, was the focus of evaluation.[16] Once this bias trend and procedural shortcomings were brought to light, the evaluation process was modified. Over the next five years, an average of roughly 29% of the NIH Director's Pioneer Award went to women, a percentage that is consistent with the representation of women in the field.

For many (possibly most) of our graduate students, this discussion is their first exposures to these complex issues that engineering professionals will face throughout their careers. While we are not specifically tracking the spread of awareness or changing attitudes on gender, diversity, and bias, it is our strong hope and belief that among our graduate students ideas and attitudes are improving and that these experiences will make a lasting impression. For example, the faculty advisors to the DYSS have noted anecdotally that students not at all involved in the DYSS selection have come to them to speak with interest and passion about many of these issues.

There were two major outcomes from these interventions and investment of the NSF ADVANCE and UW PEERS programs. First, for the second and third DYSS rounds our selection committee unanimously concluded that persons who are underrepresented in chemical engineering (women and underrepresented minorities) should be given preference in tie-breaker situations. This preference acknowledges the effect of implicit bias on the experiences of persons from underrepresented groups—that is, they are more likely experience more barriers to entry, achievement, and recognition due to implicit bias. Thus, what may look like a tie is not. To underscore this strategy, each year the selection committee meets with ADVANCE/PEERS for a presentation on implicit bias in the weeks before the graded rubrics are due. Second, the rubric is now broken into more sub-categories with specific guidelines (the 2013 rubric is shown in Figure 1). Points are allotted to each section, with examples of how many points are deserved for specific aspects that are included in the application. Additionally, panel members are given anonymous previous applications as examples of excellent applications and ones that need improvement. This gives a more broad view of the spectrum of applications, as each scorer cannot review every application received. We wholeheartedly believe that the selection is now more cohesive and consistent in identifying the best candidates that excel both in quantitative metrics and also more broadly represent our departmental and institutional values.

SPEAKER PROFILES: WHERE HAVE THEY GONE SINCE BEING SELECTED?

As of January 2014, of the 2011 cohort of speakers for the Distinguished Young Scholars Seminar, 63% (5/8) have faculty positions. Because the speakers consisted of a mixture of post-doctoral scholars and graduate students, they were in different stages in their careers in terms of finding a permanent faculty position. Some of the graduate students have accepted post-doc positions and will go on to become faculty. Seventy-five percent of the seminar speakers who were post-doctoral scholars at the time of the seminar are currently professors, and 25% are still at the same post-doc position. Thirty-three percent of the DYSS speakers who were graduate students when they gave the seminar are current professors, 33% are full-time researchers, and 33% are post-doctoral researchers.

***Figure 1**, facing page. The 2013 DYSS grading rubric is broken into three categories with clearly defined criteria for each part. Each of these categories is broken down into recommended scoring areas.*

Category	5 - Excellent	3 - Good	1 - Needs Work
Communication One of the most important skills for any successful researcher is the ability to communicate. Rate the application based on how well it shows the applicant is able to communicate. Look for presentations, talks, teaching experiences in the CV and the quality of the submitted abstract. Does the letter of recommendation mention anything special about the applicants presentation skills? Try to rate the applicant in this section based on how good of a presentation you would expect them to give if they were invited.	**CV:** - Has many presentations at different national conferences - Has invited talks - Has teaching awards **Letter of Rec:** - Recommender praises applicant for clarity in presentations, giving specific examples - Recommender praises applicant as a teacher, giving examples of applicants mentorship **Abstract:** - Abstract is excellently written and leaves you wanting to know more - Abstract is clear and easy to follow even for someone not in the field	**CV:** - Has presented at national conferences - Has teaching experience **Letter of Rec:** - Recommender mentions applicant's presentation ability - Recommender mentions applicant's teaching ability **Abstract:** - Abstract is well written and contains no significant spelling or grammar errors - Abstract is easy to follow, but a nonexpert may need to read it more than once to understand it	**CV:** - Has presented at atleast one conferences - Mentions mentoring undergraduate researchers **Letter of Rec:** - Recommender mentions applicant's presentation experiences - Recommender mentions student as a teacher or mentor in lab **Abstract:** - Abstract is well written but contains some errors - Abstract is difficult to understand for someone not in the field.
Scholarship Scholastic achievements are a measure of the impact the applicant has had so far in their career. Primarily this comes about through published papers. How many first author papers has the applicant written? Are they in high impact journals? Have they been cited? Is their research topic significant and of broad interest? Do they have any patents? Try to rate the applicant in this section based on the quality of their research.	**CV:** - Has a papers published in a variety of high impact journals - Papers have been cited numerous times **Letter of Rec:** - Recommender praises applicant as a researcher and highlights their ability to come up with novel ideas **Abstract:** - Abstract communicates the importance of the research which has been done - Abstract show cases its broad impacts on the scientific community	**CV:** - Has atleast one paper published in a high impact journal - Has numerous papers in a variety of journals - Papers have been cited a few times **Letter of Rec:** - Recommender highlights the applicant's research talents in solving problems **Abstract:** - Abstract cites appropriate literature to show it's place in the bigger research picture - Abstract shows the impact it has had and mentions future research directions	**CV:** - Has few first author papers - Majority of papers are published in a single journal **Letter of Rec:** - Recommender praises applicant's technical abilities **Abstract:** - Abstract highlights the important conclusions from the work done - Abstract shows its impact within its own specialty
Achievement What impact has the applicant had so far? How have they been recognized for their success? Do they show a commitment to the broader scientific and chemical engineering community? Look for awards, outreach, and service and recognition to the broader community. Try to rate the applicant in this section based on their success outside of publishing papers.	**CV:** - Has won awards for presenting, teaching, writing, entrepreneurship, etc. - Has outreach activities on CV not directly related to their research - Shows leadership **Letter of Rec:** - Recommender praises the applicant's work ethic and leadership abilities - Recommender highlights extracurricular activities of applicant **Abstract:** - Abstract cites papers from applicant in high impact journals - Abstract mentions any awards won for the work which will be presented	**CV:** - Has won some awards for presenting, teaching, writing, entrepreneurship, etc. - Has many outreach activities on CV - Is actively involved in scientific societies **Letter of Rec:** - Recommender praises the applicant's work ethic and self motiviation **Abstract:** - Abstract mentions papers where it has been cited	**CV:** - Has few outreach activities on CV not directly related to their research - Is a member of atleast one scientific society **Letter of Rec:** - Recommender praises the applicant's work ethic and ability to succeed

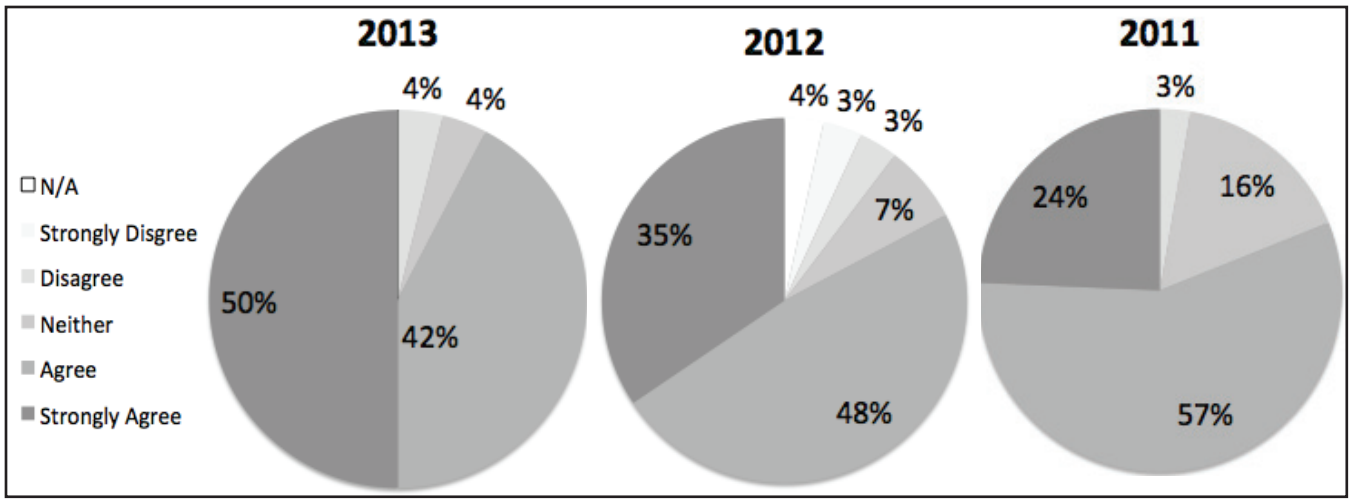

***Figure 2**. Summary of responses the statement: The DYSS helped me to calibrate my own abilities relative to top national candidates.*

As of January 2014, of the 2012 cohort of speakers, 43% (3/7) have faculty positions, with one of them being featured in *Forbes* "30 Under 30."[17] Based on entrants at the AIChE "Meet the Faculty Candidates Session," we note that many of the 2013 participants are currently looking for academic jobs. We believe the success of the DYSS alumni shows the impact a targeted professional development opportunity can have on an early-career chemical engineer, and also that the DYSS organizers have developed an effective series of activities for selecting top scholars in the field.

SEMINAR ASSESSMENTS

To assess the potential impact of the new seminar, different surveys were given to three populations of students and professionals involved in the seminar series.

1. *Graduate students who attended the seminar*
2. *Graduate students who served on the selection committee*
3. *The DYSS speakers from 2011*

The speakers gave short-answer responses to a series of questions about their visits and whether or not they thought the seminar helped them prepare for their future in academia. All seven of the speakers indicated that they thought the seminar was a valuable experience to their faculty-interview process. Similarly, graduate students who served on the committee were given a questionnaire with short-answer responses. The survey indicated that the committee members thought it was a valuable experience to their graduate career and professional development, and all of them agreed that the seminar should be continued the next year.

As a whole, the UW graduate students who attended the seminar found the overall effectiveness of DYSS to be extraordinarily positive and impactful, with over 90% of the 2013 participants registering "agree" or "strongly agree" to all questions. Students who attended also stated that it has helped them prepare for future career steps. One hundred percent of students in attendance indicated that they would like to continue the DYSS in future years. Figures 2-4 show selected results from they surveys given to the UW graduate students who attended the seminar from each of the years that the DYSS has taken place.

CONCLUSIONS: BENEFITS TO UW AND FUTURE IMPROVEMENTS

The University of Washington strives to provide the best opportunities to prepare its students for careers after graduation. In developing this seminar, we hope to provide a competitive advantage for our students when applying for a position in academics or research.

Through a competitive application and selection process, UW students and post-docs attending DYSS see top researchers from their peer group and get exposure to cutting edge research. Additionally they are given examples of effective presentation methods from competitive applicants before they apply for prestigious positions themselves. The applications received annually show a range of students, most of whom have high-impact papers. By serving on the panel, members of the selection committee see impactful research being done outside of UW. This helps to extend knowledge of the chemical engineering field, as well as open ideas for their own research and skills in the immediate future. These benefits are extended to all of the graduate students in the chemical engineering department as well as any researchers from other departments that choose to attend.

DYSS organizers are provided extended professional development opportunities. Students on the selection committee see firsthand the scoring process and its challenges for similar

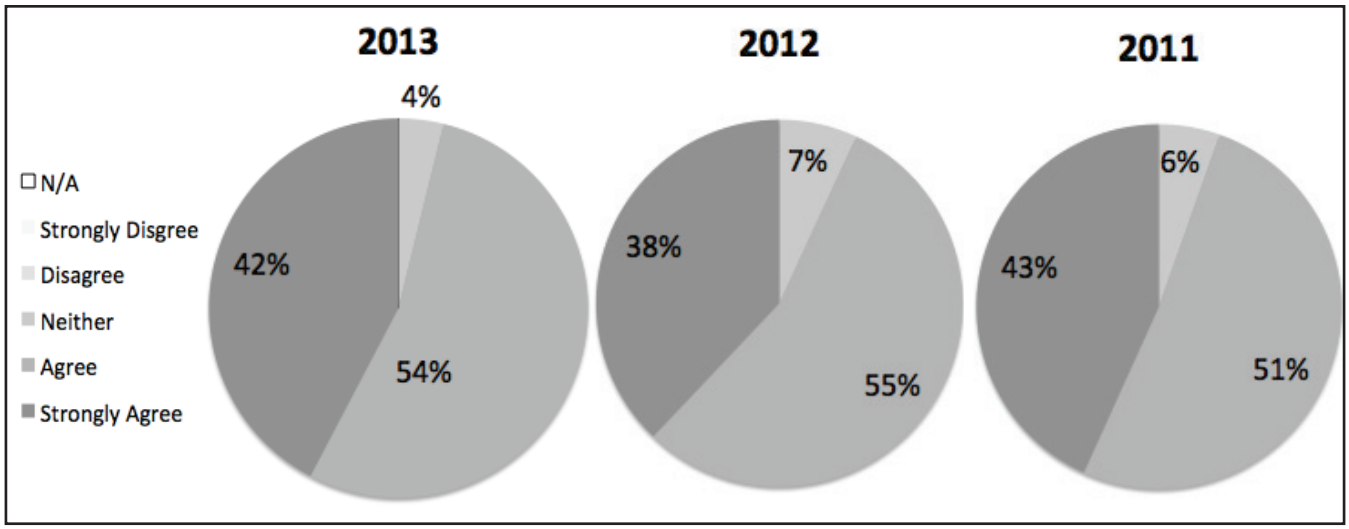

Figure 3. *Summary of responses to the statement: The DYSS was a valuable way for our department to serve the discipline of chemical engineering nationally.*

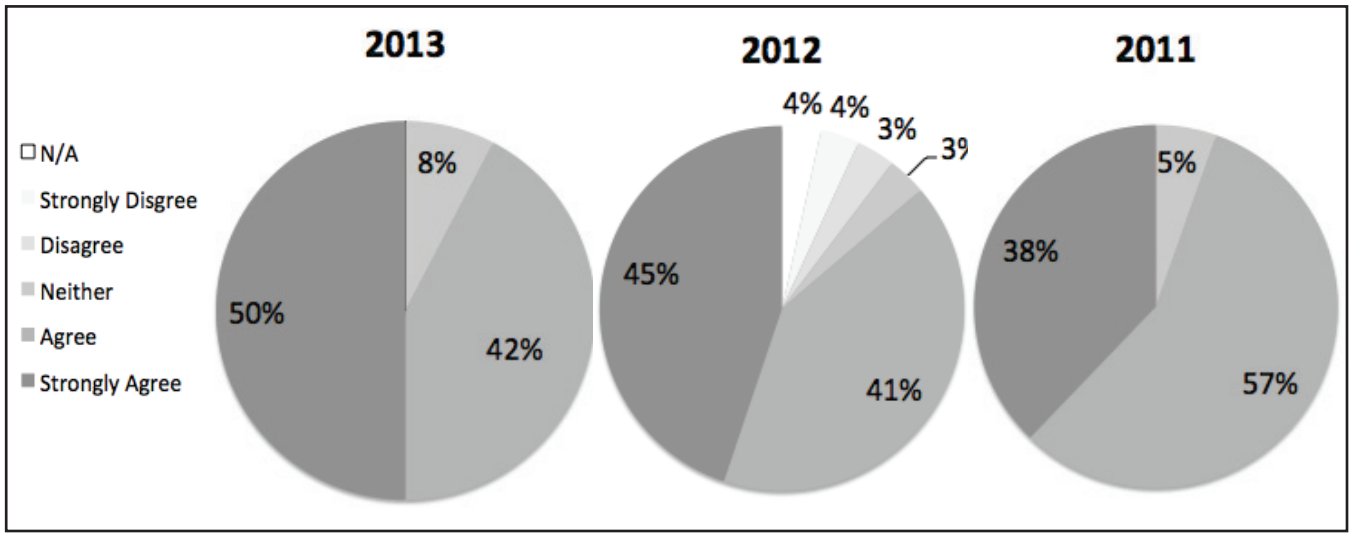

Figure 4. *Summary of responses to the statement: The DYSS was a valuable experience for UW Chemical Engineering graduate students.*

application processes, such as fellowships and job positions. Inside experience will help provide them with knowledge about what increases their own applications' competitiveness.

DYSS teaching assistants who host the seminar speakers during their visits give them laboratory tours and short research talks. This provides an opportunity for the student to talk to the speaker and get personal advice from them on how to become a leader in the chemical engineering field. Host students also get the opportunity to recognize and aide in the professional development for emerging leaders in the chemical engineering field.

Applicants who are chosen as speakers also greatly benefit from the seminar. They gain national recognition as well as invaluable experience to prepare them for faculty interviews. During their visit, they are given critical feedback from the UW faculty about their seminar and the opportunity to ask detailed and candid questions about the job-interview process. They are given an advantage over their competitors when interviewing for any position.

Improvements have been and will continue to be made, in order to ensure the seminar reflects the interests of the UW Department of Chemical Engineering. The scoring process to select the seven speakers continues to evolve to meet the goals of the students. This includes evolving how the research topics are selected, and how implicit bias is taken into consideration when scoring takes place. In addition to improving the scoring process, advertisement for applications and advertisement for attendance across campus continues to be improved. In the

end, UW created and continues to produce a seminar series that increases the professional development of its students along with top researchers across the United States.

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REFERENCES

1. Vanderford, N.L., "Broadening PhD Curricula," *Nature Biotechnology*, **30**(1), 113 (2012)
2. Kerr, E., "Too Many Scientists, Too Few Academic Jobs," *Nature Medicine*, **1**(1),14 (1995)
3. Schuster, S.M., "BAMBED Commentary: Post-PhD Education," *Biochemistry and Molecular Biology Education*, **37**(6), 381 (2009)
4. Editorial, "Rethinking Aspects of the Training System," *Nature Structural & Molecular Biology*, **8**(7), 587 (2001)
5. *Investing in the Future: Strategic Plan for Biomedical and Behavioral Research Training, 2011*, U.S. Department of Health and Human Services, National Institute of Health, National Institute of General Medical Sciences
6. Mervis, J., "NIH Report Urges Greater Emphasis on Training For All Graduate Students," *Science*, **331**(6017), 525 (2011)
7. Fine, E.a.J.H., *Reviewing Applicants: Research on Bias and Assumptions*, W.i.S.E.L.I.U.o. University of Wisconsin-Madison, Editor 2012
8. Russ, T., C. Simonds, and S. Hunt, "Coming Out in the Classroom... An Occupational Hazard?: The Influence of Sexual Orientation on Teacher Credibility and Perceived Student Learning," *Communication Education*, **51**(3), 311 (2002)
9. Tierney, J., "Do You Suffer From Decision Fatigue?," in *The New York Times* (Aug. 17, 2011)
10. Danziger, S., J. Levav, and L. Avnaim-Pesso, "Extraneous Factors in Judicial Decisions," Proceedings of the National Academy of Sciences, **108**(17), 6889 (2011)
11. Biernat, M., and M. Manis, "Shifting Standards and Stereotype-Based Judgments," *J. Personality and Social Psychology*, **66**(1), 5 (1994)
12. Devine, P.G., E.A. Plant, D.M. Amodio, E. Harmon-Jones, and S.L. Vance, "The Regulation of Explicit and Implicit Race Bias: The Role of Motivations to Respond Without Prejudice," *J. Personality and Social Psychology*, **82**(5), 835 (2002)
13. Wenneras, C., and A. Wold, "Nepotism and Sexism in Peer-Review," *Nature*, **387**(22) 46 (1997)
14. Steinpreis, R.E., K.A. Anders, and D. Ritzke, "The Impact of Gender on the Review of the Curricula Vitae of Job Applicants and Tenure Candidates: A National Empirical Study," *Sex Roles*, **41**(7-8), 509 (1999)
15. Madera, J.M., M.R. Hebl, and R.C. Martin, "Gender and Letters of Recommendation For Academia: Agentic and Communal Differences," *J. Applied Psychology*, **94**(6), 1591 (2009)
16. Carnes, M., S. Geller, E. Fine, J. Sheridan, and J. Handelsman, "NIH Director's Pioneer Awards: Could the Selection Process Be Biased Against Women?" *J. Women's Health*, **14**(8), 684 (2005)
17. Heiman, C., "30 Under 30—The Future of Energy is Nuclear," *Forbes* 2012 ❐