A DECADE WITH DYSS: LESSONS LEARNED AND LOOKING FORWARD

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INTRODUCTION

Ten years ago, graduate students in the Department of Chemical Engineering at the University of Washington (UW) created the Distinguished Young Scholars Seminar (DYSS) series, with eight single-day installments held over as many weeks each summer since 2011, to foster leadership and provide professional development opportunities to chemical engineers across the country. Though networking and communication is essential to long-term success in both academia and industry, these founding students recognized that the overwhelming majority of chemical engineering graduate programs in the United States – including those typically ranked in the top 50 – lacked formal department-level training in such skills.[1,2] Further, while many graduate students and postdoctoral researchers utilize seminars and colloquia to gain proficiency in authoring research abstracts and delivering talks to a relatively broad audience, such conference presentations tend to be significantly shorter than what is expected during an interview or throughout employment. In hopes of better equipping up-and-coming chemical engineers for success on the job market and beyond through a uniquely valuable training experience, DYSS was born.

Since its inaugural offering, the DYSS program provides direct professional development to eight graduate and postdoc participants annually (one per week over an eight-week period) that have been competitively selected through a UW student-led evaluation panel and invited individually to Seattle for a day-long on-campus experience.

The three standing goals of DYSS have been to:

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. [2]

For the invited speakers, identified as emerging leaders in chemical engineering, DYSS provides an opportunity to cultivate skills necessary for future interview and career success, share their research orally with a chemical engineering audience with broad expertise, experience a mock interview firsthand, and receive informal feedback in a low-consequence environment that can help advance their next career stages. To accomplish the first goal and simulate the day-long departmental visit, each seminar speaker has individual meetings with our chemical engineering faculty to discuss their work and the job application process, engages in networking events with current graduate students and postdocs, and gains written and oral feedback on their seminar presentation. Beyond opportunities for professional development, speakers are eligible to receive a $500 cash prize awarded to the Best Speaker, as selected by our chemical engineering graduate students and postdocs. Overall, this process supports promising chemical engineers by serving as a "practice run" with constructive

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feedback, which can strengthen upcoming applications and better prepare participants for success in their future careers.

Within the UW Department of Chemical Engineering, DYSS also provides our students and faculty a chance to learn about cutting-edge research through presentations from early-career professionals in topics beyond what they typically encounter. Furthermore, the program affords our departmental trainees a hands-on experience with an application evaluation process akin to that utilized by hiring and selection panels, as well as concrete examples of what successful student research presentations and applications look like. To achieve the second and third goals aimed within the department, DYSS is managed almost entirely by graduate students, with comparatively minor oversight provided by mentoring faculty. The primary management team consists of 3-4 graduate student teaching assistants (TAs), who work diligently to provide a seamless, guided visit for the seminar speakers, and two faculty mentors, who provide guidance and continuity from year to year, as well as offer direct input based on their experience as proposal reviewers and jobseekers. The TAs help advertise and solicit nominations for the program, collect applications and facilitate their evaluations, create and oversee each speaker's travel and visit schedule, run and attend coffee and happy hours, and escort the speakers between meetings and around campus. Supporting these TAs each year is a team of 15-20 graduate student and postdoc volunteers that help evaluate applications as part of a National Science Foundation (NSF) grant review-style panel. All departmental graduate students and postdocs are invited to attend the seminar and provide written feedback, as well as to score each presentation to help decide which DYSS participant receives the "Best Speaker Award". This translates to an educational experience to current graduate students and postdocs, as well as promotes additional networking with up-and-coming chemical engineers from across the country.

To ensure the success of the program, DYSS has an annual operating budget of approximately $50,000, with the largest costs associated with hotel and travel expenses for the DYSS participants, funding the graduate student TAs, and covering a small portion of the mentoring faculty members' summer salary. To keep DYSS as cost neutral to the department as possible, the seminar series is registered as an official summer course through the university. Since PhD students are required to enroll in at least two academic credits to maintain full-time status and receive benefits during the summer quarter, all chemical engineering graduate students are registered for the DYSS seminar. These student credit hours translate to returned revenue to the department, which almost entirely offsets the costs of the program.

In the subsequent sections of this article, we will take a deeper dive into the history and evolving structure of DYSS, highlighting prior successes and lessons learned over the past decade, as well as opportunities for future improvement.

A STRONG START

Over the past ten years, 79 participants have been selected out of a total of 725 applicants. The selected DYSS speakers hail from 46 institutions spanning 17 of the 50 states, as well as Toronto, Canada. Of these prior participants, roughly 9% have been underrepresented minorities and 32% have been women, as seen in Figure 1. Through on-going efforts to select speakers that represent the entirety of our diverse field, the percentage of woman participants has increased from 0% in 2011 to just under 50% over the past four years with 15 of the 32 most recent participants identifying as female. While the number of underrepresented minority speakers have also increased over the years, efforts to expand the program's overall diversity remain at the forefront of discussion.

In all cases, DYSS alumni have maintained an excellent professional trajectory (Figure 1). Approximately 75% of the 79 past DYSS seminar speakers have remained in academia. Half of the participants from DYSS's inaugural year have

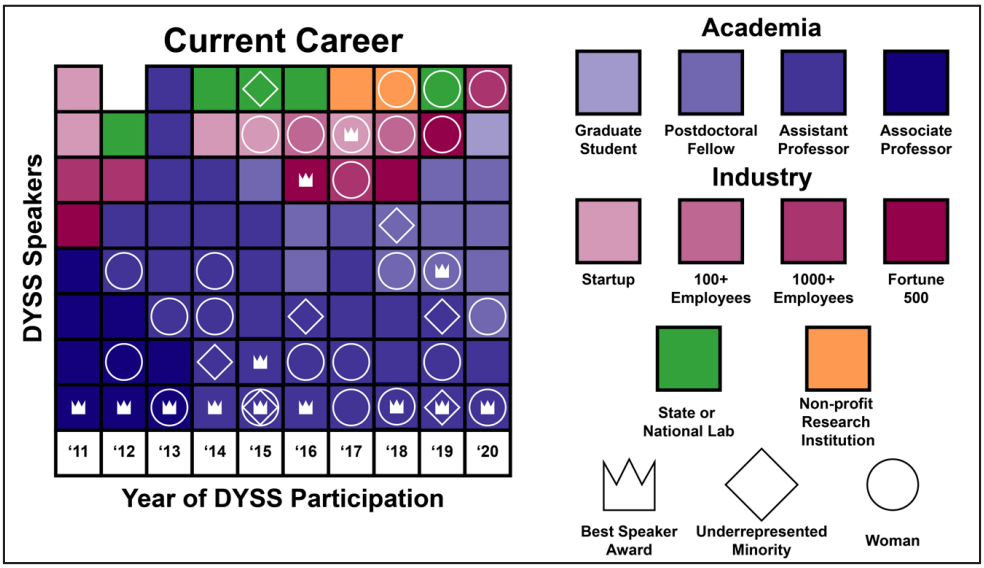


Figure 1. *Current career stage of past DYSS presenters organized by the year they participated (data from June 2021).*

been promoted to the level of Associate Professor, and most other participants who remained in academia have begun their independent research careers as Assistant Professors (primarily in chemical engineering). In addition, 18% have gone to industry, 6% work at state or national labs, and 2 people have taken positions at non-profit research institutions. Interestingly, when comparing the career trajectories of participating women and underrepresented minorities, women have a slightly higher tendency to pursue a career in industry than academia, while no underrepresented minorities have pursued a career in industry. Compared to NSF's "Statistical Profile of Postgraduation Plans of Doctorate Recipients in Engineering Fields, by Sex and Field of Doctorate: 2019," out of the 596 chemical engineers with definite post-graduation plans, ~38% were pursuing postgraduation study, ~5% had academic jobs, ~54% had jobs in industry or business, and the remaining ~3% had jobs in government, a non-profit organization, or another type of employment.[3] Similar to trends seen with DYSS participants, women had a slightly higher tendency to pursue jobs in industry than men. Overall, it can be noted that DYSS participants have a much higher tendency to pursue academia when compared to all chemical engineering graduates (~75% vs. ~43%),[3] indicating that DYSS is inherently attractive for graduate and postdoctoral students interested in academic careers and/or that the DYSS experience helps drive outstanding chemical engineers to follow academic pursuits.

In addition to exhibiting a strong career trajectory, many of the past participants have further gained notoriety as leaders in chemical engineering. Past participants have gone on to receive major science and engineering honors including the NSF Presidential Early Career Award for Scientists and Engineers (PECASE), the NSF Faculty Early Career Development (CAREER) Award, Young Investigator Awards from the American Institute of Chemical Engineers (AIChE) and the American Chemical Society (ACS), and recognition as Forbes "30 under 30" honorees.

Based on surveys of past participants, DYSS seminar speakers have universally found participation in the series to be positive and that the skills honed would aid in their job search process. In addition, many participants had not previously prepared or delivered an hour-long research presentation, so this program afforded new and valuable experience. Major benefits and positive feedback of the program according to the speakers include:

> "*Presenting the seminar and interacting with various graduate students was an important reminder of the breadth of research pursued by chemical engineers. This is something I had forgotten after several years of specialized work. The seminar impressed in me the need to present information for a much broader audience than typically encountered at meetings and conferences*." – 2011 Seminar Speaker

> "*My entire experience was nothing but positive, so I only have positive feedback to give. The opportunity to experience a 'test run' of the day-long visits required for most faculty interviews was extremely insightful, and I learned tremendous amounts through the candid discussions I had with professors about (i) what they look for in candidates while on the UW search committee and (ii) their own experiences while applying as candidates themselves. It was also a real pleasure to interact and learn about all the exciting research going on through the graduate students in your department. It was my first visit to the Seattle, but this experience alone was enough to guarantee that I'll be applying to UW when I do put in my faculty applications in the coming time."* – 2015 Seminar Speaker

> *"It's a great platform for people who are applying for faculty positions. It gives us a chance to have a mock presentation and department visit experience. The best thing was getting honest feedback from the graduate students as well as the faculty members. One on one meetings with the faculty members were extremely helpful. It's amazing to see how the UW chemical engineering department is putting [in] so much [effort] and trying so hard to help people who are looking for jobs in academia."* – 2017 Seminar Speaker

> *"I anticipate that the DYSS experience will be incredibly helpful for my job search process. The faculty search process is a black box, and DYSS shined some much-needed light on the process, clarifying both details of the application itself and the goals of a hiring department. Going through the experience of interviewing and the associated rigors of meeting with professors and students working in very different backgrounds was invaluable. In particular, practicing my research pitch and honing it for individuals with different backgrounds was a useful skill to gain in the setting of an interview. Similarly, comments that I received from faculty and students were constructive, and I've already found myself adding their suggestions into both everyday presentations and into the faculty applications."* – 2019 Seminar Speaker

Though we have been exceedingly happy with the program's outcomes to date, we continue to learn each and every year on how to improve the DYSS experience. Based on post-seminar feedback from our DYSS speakers, the greatest areas that needed focus include:

- More diverse and targeted advertisement of the DYSS program
- Early communication on the speakers' schedule for advanced preparation

- Significant time with professors for advice and feedback on faculty applications
- Sufficient discussion and networking time with department graduate students and postdocs
- Expanded feedback on their research presentations from both faculty and graduate students

Catalyzed by these suggestions, we have worked diligently over the last ten years to modify the DYSS application, the evaluation methods utilized in selecting participants and awarding speaker prizes, and the overall program structure to improve the series and maximize the success of the program's three major goals.

APPLICATION SOLICITATION AND REVIEW

A major component of DYSS is the initial application solicitation and review conducted by the UW Department of Chemical Engineering's graduate student volunteers. Over the years, we have purposely expanded application solicitation to reach a broader community and more diverse groups of scientists, bringing application numbers each year from the several tens to over 100. In DYSS's inaugural offering, advertising was done exclusively at the department level, emailing department chairs at top-tier chemical engineering programs directly. As the years have progressed, we have expanded our advertising efforts to include past DYSS applicants and previously selected participants, presenters at the AIChE "Meet the Faculty Candidate" poster session, as well as over 200 student organizations – including many diversity-focused groups in science, technology, engineering, and mathematics (STEM) – from the top 40 chemical engineering graduate programs. More recently, social media platforms including Twitter have proven useful in furthering awareness and extending engagement (Figure 2). Collectively, the expansion of active advertising, coupled with passive word of mouth, has become a critical tool for increased application numbers and promotion of DYSS.

The application itself consists of several components, including a one-page research abstract, a three-page curriculum vitae, and an applicant-blind letter of support (most typically from a direct research advisor). In 2019, a 300-word "Statement of Interest" was added to the application materials to help reviewers gauge the personal goals and backgrounds of each of the DYSS applicants.

All applications are reviewed by current graduate student and postdoc volunteers at the UW, and all participants are selected following full committee discussion. Prior to providing panelists the application materials for review, all reviewers are required to participate in a two-hour anti-bias training session that includes videos, case-studies about common biases in academia, and group discussions about how to combat

Figure 2. *Twitter advertisement for DYSS in April 2020.*

biases in the DYSS evaluation process. This training has covered many aspects of cognitive bias, including cultural, implicit, explicit, and confirmation bias, factors that often plague professional evaluation panels.[4–6] Furthermore, the required training brings into the limelight focused discussions on diversity, equity, and inclusion (DEI). Almost exclusively, these trainings have been run by Dr. Joyce Yen from the University of Washington ADVANCE Center for Institutional Change, self-described as a "campus and national resource for effective practices in academic leadership development, cultural and policy change, and the advancement of women faculty in STEM".[7, 8] In years in which scheduling conflicts have prevented Dr. Yen from facilitating discussion, the DYSS TAs have managed their own training using publicly available materials from other universities including: the University of California-Los Angeles' "Implicit Bias Video Series,"[9] The University of Arizona's tips for "Avoiding Gender Bias in Reference Writing,"[10] and "Consciously Combating Unconscious Bias" by Dr. Maggie Kuo.[11] Despite an increase in anti-bias trainings across the country, there is still conflicting opinions and limited evidence on the effectiveness of these programs.[12–14] In particular, a 2016 study assessing 40 years of diversity training showed that diversity and implicit bias training only have short term impact,[15] while a report from the Equality and Human Rights Commission indicated that unconscious bias training can reduce implicit bias but is unlikely to eliminate it.[14] Other studies also indicate that consciously trying to avoid implicit biases can make people project their biases by overcompensating or overthinking the very biases they are trying to correct.[16, 17] However,

complementary to anti-bias training, evidence has shown that specific rubrics with well-defined evaluation criteria reduces racial bias in teachers when grading students' assignments.[18] Consistent with these reports, we have observed that anti-bias training shortly before the review process and well-defined evaluation rubrics sets important guidelines for reviewers in order to remain as impartial as possible when reviewing and discussing applications.

Over the years, the actual application review process has evolved based on feedback from the graduate student and postdoc reviewers within our department and morphed to capture different evaluation metrics. Early stages of the rubric were based on similar guidelines used in the NSF Graduate Research Fellowship Program and consisted of very clear guidelines for review. Specific points for what is included in the abstract, CV, and letter of recommendation items were established to assist the students in review.[2] The rubric also included sections based around "Communication", "Scholarship," and "Achievement." At these early stages, the rubric focused primarily on past research and academic achievements. Tied scoring between top-tier candidates were then broken weighting diversity representation (both in speaker identity and research areas), TA and speaking awards, and research productivity taking into consideration their school and supervisor.

As the years continued, prior experience and recognition of excellence in presenting, teaching, writing, entrepreneurship, and outreach were added as evaluation metrics to the rubric. From 2015 to 2018, a new approach was taken, with fewer rubric items and more general questions for each document in the application package. For example, the abstract was scored on how well the applicant communicated their research and if their research was "remotely interesting". Similarly, the CV was evaluated on items that indicated "communication prowess" and the number of first author papers and patents, while the letter of recommendation was evaluated by indication of "communication or presentation prowess" and whether the applicant was "a source of ideas and inspiration for their work." An additional section of the rubric was also added to include hard-to-quantify factors, such as excellence in mentoring, dedication to service, and interesting side projects. While this allowed the application to be viewed through a broader lens, many student reviewers felt as though the rubric needed to have clearer criteria to reduce subjectivity and potential bias. To help provide more clear guidelines in 2019, the rubric reverted back to a similar format as the earlier years of DYSS, but with expanded criteria to include extracurriculars, outreach, and other leadership activities. In 2020, an additional evaluation criterion was added to assess areas considered to be unique and "outside of the box" (Appendix). While these aspects are important, reviewers again felt as though the lack of clear guidelines and criteria for this section allowed for personal bias. Another critique of this rubric was that many review criteria were repetitive between the three overarching categories, over-weighing certain application materials over others. Overall, we have learned through graduate student feedback that the best rubrics provide clear criteria for reviewers to follow, with specific points designated for different qualifications. Implementing this criteria is necessary both to streamline the reviewing process and minimize bias as best as possible. Including a broad spectrum of criterion, such as mentoring, teaching, outreach, and other extracurricular activities, also creates a more unique and diverse set of speakers for the seminar series.

With ~100 applications typically submitted in each recent year, fair evaluation of all proposals presents a substantial lift. For the panel-style review process, a team of 15-20 graduate students and postdoc volunteers within the department to read and evaluate submitted applications is assembled with the help of student/faculty listserv mailings and directed contact (email and in person). During the first few years of DYSS, reviewers could be assigned either a "primary" or "secondary" role on any number of proposals. Each application had a primary reviewer in the research field that led the conversation, as well as two secondary reviewers. Before the review panel, each application was evaluated following the rubric by the three assigned reviewers and average scores were assigned to each DYSS applicant. The overall process of the NSF-style panel included discussing the top 5-10% of applicants based on the given scores and deciding the first 4 seminar speakers based on the feedback. Next, the remaining top 20% of applicants were discussed and voted on by the entire group of reviewers to choose the remaining 4 seminar speakers.

In hopes of capturing the breadth of research spanning the field of chemical engineering, after a few years applications were separated into 5-6 broader categories that reviewers were assigned to evaluate based on their research expertise. Example topical categories include Biomaterial Applications, Computational & Simulations within Energy, Protein Design, Electrochemistry and Batteries, and Nanomaterials Design. Categories are adjusted annually to reflect the trends in focus of submitted applications. The review panel for these years were similar, except that a top researcher from each category was chosen to be a DYSS participant by the reviewers who evaluated that section. With 8 speakers each year and 5-6 identified as the top performer in their category, the remaining 2-3 speakers were identified through full panel review and discussion. Though year-to-year consistency helps ensure a smooth operation overall, we have observed that the reviewing process needs to remain somewhat flexible to accommodate the variation in research breakdown of applicants and the number of graduate students/postdocs on the review panel. The main aspects of the process that has remained consistent and successful has been dividing applicants into separate categories for grading by several reviewers in that general field and group discussion of all top candidates.

EXPERIENCE AND EVALUATION

Upon completing the review process, the eight DYSS seminar speakers are invited to Seattle during UW's summer quarter for a tailored individual visit meant to mimic important aspects of academic and industrial job interviews. On Mondays between June and August, a selected speaker travels to the University of Washington for a day of professional development and networking. The overall day-long experience has remained relatively consistent over the past decade, with the visit consisting of meetings with faculty and research groups with a break for lunch, followed by the hour-long seminar, an hour-long happy hour with snacks and drinks, and finally a dinner with faculty and graduate students. In 2018, a 30-minute coffee chat was introduced in the mid-morning to create more time for graduate students to interact and talk with the seminar speaker. In 2020, we designated a block in each speaker's schedule to meet with a member of our faculty's search committee. Since these faculty members have the perspective of both an applicant and a reviewer, this time allows DYSS participants to hear constructive feedback and guidance about the faculty application and interview process, which should strengthen their application packages as they transition into their future careers. These schedules are arranged at the beginning of summer and sent out to the DYSS speakers as early as possible, no later than one week ahead of their visit.

To further incentivize UW trainee attendance of the seminar, a pre-seminar coffee hour and post-seminar happy hour were included in each weekly schedule. Additionally, a raffle was established, in which a completed speaker evaluation form was counted as an entry. The raffle consists of a small prize (e.g., gift card to local coffee shop) for one attendee of each week, and larger 1st through 3rd place prizes (e.g., Amazon® gift card) at the middle and end of the summer. A bonus raffle entry was given for people who attended all 8 seminars. The raffle approach helped boost attendance, as well as provided a useful conduit for UW students to share feedback with DYSS presenters on strengths and weaknesses of their research seminar.

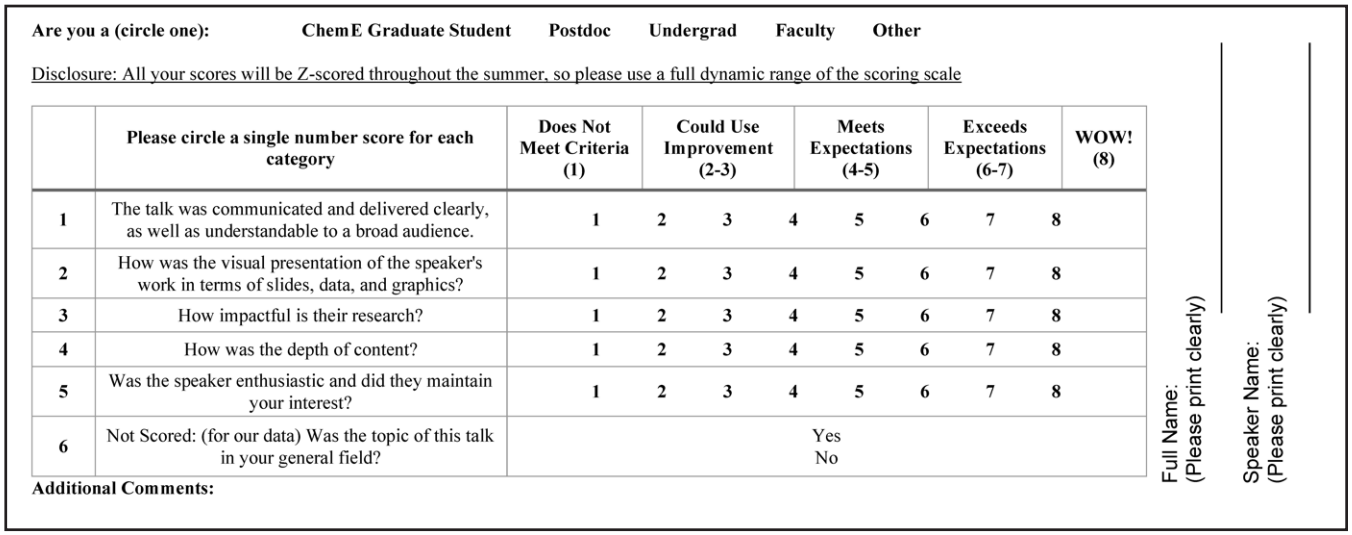
For most of DYSS's history, evaluation of the seminars remained simple, where both the speaker and the content were ranked from 1-5 (low-to-high). In 2019, we introduced a scoring sheet that included 11 questions. Example questions evaluated the speaker's delivery, enthusiasm, organization, visualization, and presentation content. All questions were scored as "Good", "Very Good", or "Excellent," which corresponded to scores of 1, 3, and 5. The challenge with both these scoring methods was that the scoring range was too small, such that speaker scores were often compressed to the point where it was difficult to statistically differentiate from one another. In addition, for the first nine years, all scoring remained anonymous, which makes it difficult to account for different average criticality of our student reviewers. In hopes of improving on this process, the scoring sheet was changed in 2020 in several ways (Figure 3). First, we reduced the evaluation to include just five criteria (i.e., communication/delivery, visual representation, research impact, depth of content, enthusiasm). In addition, the scoring range for each question was expanded to 1-8 with the corresponding associations: Does Not Meet Criteria (1), Could Use Improvement (2-3), Meets Expectations (4-5), Exceeds Expectations (6-7), and WOW! (8). Finally, we removed the anonymity of the scoring so that scores from a single reviewer could be normalized throughout the entirety of the summer following a Z-score. Specifically, the overall averages and standard deviations were determined for each reviewer, and a Z-score was subsequently calculated for each seminar that they attended, as seen in Equation 1:

$$z_i = \frac{x_i - \bar{x}}{\sigma} \tag{1}$$

where z_i and x_i are the reviewer's Z-score and overall average weekly score for a DYSS speaker, respectively, and $\bar{x}$ and σ are the reviewer's score average and standard deviation across multiple seminars, respectively. All values are calculated for each reviewer that attended multiple seminars.

Stemming from the expanded scoring range and examining average Z-scores for each seminar speaker, we were able to more easily differentiate relative scores between participants and to identify the "Best Speaker Award" recipient. This ultimate winner of DYSS, as determined by these normalized graduate student and postdoc Z-scores, receives a $500 cash prize. The DYSS winner is also advertised on the website and on mailings to various departments as recognition of their excellence. In cases in which the winning score is statistically indistinguishable between several participants, this honor and prize is shared by multiple speakers (as occurred in 2016 and 2019). Creating a scoring system that successfully and succinctly evaluates all aspects of a speaker's presentation and can be utilized to statistically differentiate speakers' scores has proven critical for accurate determination of the DYSS winner.

In addition to numerical scores, all DYSS scoring sheets have a section for additional written feedback that are anonymously forwarded to the speaker. Students, postdocs, and faculty have consistently filled out this section, which assists the speaker in improving their oral and visual communication skills. Additionally, DYSS speakers also spend time during the post-seminar happy hours talking with UW researchers who provide in-person suggestions on how to improve their seminars and future application packages. Based on DYSS speaker feedback, these comments and discussions have been incredibly useful for refining the speakers' presentations for future audiences.



Are you a (circle one): ChemE Graduate Student Postdoc Undergrad Faculty Other

Disclosure: All your scores will be Z-scored throughout the summer, so please use a full dynamic range of the scoring scale

	Please circle a single number score for each category	Does Not Meet Criteria (1)	Could Use Improvement (2-3)		Meets Expectations (4-5)		Exceeds Expectations (6-7)		WOW! (8)
1	The talk was communicated and delivered clearly, as well as understandable to a broad audience.	1	2	3	4	5	6	7	8
2	How was the visual presentation of the speaker's work in terms of slides, data, and graphics?	1	2	3	4	5	6	7	8
3	How impactful is their research?	1	2	3	4	5	6	7	8
4	How was the depth of content?	1	2	3	4	5	6	7	8
5	Was the speaker enthusiastic and did they maintain your interest?	1	2	3	4	5	6	7	8
6	Not Scored: (for our data) Was the topic of this talk in your general field?	Yes No							

Additional Comments:

Full Name: (Please print clearly)

Speaker Name: (Please print clearly)

Figure 3. *DYSS speaker scoring sheet from 2020.*

DIGITAL TRANSITION IN THE COVID-19 ERA

Due to COVID-19, and under threat of missing out on our milestone tenth year of DYSS, we made the decision to make the 2020 DYSS series virtual. All aspects of DYSS were conducted online and run through Zoom®, including the anti-bias training, NSF-style panel, faculty meetings with the speakers, the seminar, and the happy hour. All meals were cancelled; we instead allotted a lunch break in the middle of the day.

While the virtual setting did not significantly change the anti-bias training, the introduction of Zoom for the review panel provided a large number of advantages. Based on previous critique, reviewers within the same topic wanted more time to discuss their top choices before engaging with the entire group. Zoom's Breakout Room platform proved very effective for accomplishing this, since we could easily split each topic's reviewers into rooms, while a head TA moved between groups to facilitate discussion and answer any questions. After 30 minutes, we reconvened and immediately had six speakers chosen, with one candidate per review category. To decide the last two speakers, each topic group presented their second candidate, which were then discussed and voted on by the entire group.

The virtual format imposed the largest changes to the DYSS experience during the seminar speaker's visit. To best accommodate speakers spanning all US time zones while allowing for scheduling consistency, as well as to stave off "Zoom fatigue",[19, 20] the DYSS day was shortened from its typical 9 am – 8 pm schedule to 9 am – 3:30 pm (all times given in PDT) through removal of the graduate student coffee hour and dinner. In addition, the seminar and accompanying happy hour were moved up from 4 – 6 pm to 1 – 3 pm to best accommodate speakers presenting from the east coast. After a short orientation for the speaker at 9 am, the schedule consisted of meetings with faculty and research groups from 9:30 am – 12 pm, a lunch break with no meetings from 12 – 1 pm, the seminar from 1 – 2 pm, a networking/happy hour from 2 – 3 pm, and a wrap-up with the TAs from 3 – 3:30 pm. To keep this schedule running smoothly, only two Zoom rooms were utilized (i.e., one for the morning and one for the afternoon) that were both controlled by the DYSS TAs.

Within this schedule, the Zoom platform worked very well for the morning faculty meetings. In typical years, a TA escorts the speaker across campus to meet with faculty in different buildings. In the Zoom environment, the time for in-person travel could be replaced with longer meetings with faculty and/or scheduled down time. In addition, a single Zoom room was utilized for the entire morning to facilitate smooth transitions between meetings. After introducing the seminar speaker and the faculty member, the TA would leave to allow for a private discussion between the two. After 25 minutes (i.e., 5 minutes before the official start of the next meeting), the TA would log back into the Zoom room to note the meeting's end and help transition to the next.

Though the 2020 DYSS took place near the start of the COVID-19 pandemic without much precedent, the seminar itself was run in a manner that is now standard for virtual meetings held over Zoom. To prevent "Zoom bombing", the seminar link was not shared publicly and was only disseminated amongst UW departments and the DYSS speakers.[21] Five minutes before the seminar, a TA would meet the speaker in the second Zoom room to help ensure correctly configured screen sharing capabilities for the presentation. At the beginning of the seminar, one of the TAs would introduce the speaker and read their biography, which typically included their education, research focus, awards, and broader impacts. Throughout the seminar, the TA would moderate the Q&A session at the end by calling on people who used the "raise

hand" feature or by reading questions posted in the chat window. A raffle was also used to incentivize attendance, except all prizes were gift certificates that were purchased and could be used online (e.g., Amazon). Regardless of the raffle, the Zoom platform seemed to enhance overall seminar attendance, likely since Zoom presents a quick and accessible way to participate in seminar and can be viewed from any setting. The virtual platform also helped maintain high attendance throughout the summer, though average attendee engagement (as indicated by questions and those remaining afterwards to discuss) appeared to decrease.

One of the biggest challenges of the 2020 DYSS was how to replicate a meaningful happy hour/networking session in the virtual setting. We found it difficult to motivate graduate students to participate without the usual incentive of food and beverage, which unfortunately often led to comparatively low attendance for these sessions. A future alternative is to schedule 20–30 minute meetings after the seminar between the DYSS speaker and graduate students from research groups in the speaker's field. In addition, we expect it would be valuable to formally schedule a time block after the seminar for the speaker to meet with faculty and get feedback on their presentation. Creating a more set schedule after the seminar will allow the speaker to get more personal time with graduate students, as well as a time for constructive feedback on their research talks.

Another major challenge of running DYSS virtually lies in an inability to replicate the in-person experience of visiting the University of Washington. While there is really no way to perfectly replicate an in-person visit to Seattle purely online, we felt it essential that we still attempt to provide the speakers a way to learn about the culture of the city. Towards this, we created and mailed gift packages to presenter homes after their seminars that included UW-branded supplies and a cultural atlas focused on infographic visuals about Seattle and the state of Washington. Participants uniformly expressed thankfulness over these efforts, though all recognized that these were an imperfect substitute for a conventional visit.

Overall, a virtual seminar has both significant advantages and disadvantages to the DYSS experience. Moving forward, attempts to combine both in-person and virtual aspects to maximize the advantages of both formats could greatly elevate DYSS for both the speakers and the members of our department.

LOOKING FORWARD

Overall, the three standing DYSS goals have been met through 1) simulating a departmental visit for faculty candidates, 2) providing graduate students a look into the rising fields of chemical engineering, and 3) allowing graduate students to run and participate in the NSF-style review process. However, as we plan for future years of DYSS, many aspects of the program will continue to morph to better meet our three goals, improve inclusivity of the program, and reduce bias from the review and evaluation processes. Areas of improvement will be primary focused on the application and rubrics.

For application solicitation, we plan to forward the call for DYSS submissions to more schools and student organizations extending beyond the top 40-ranked chemical engineering programs. In particular, we will send emails to more colleges and universities, included Historically Black Colleges and Universities (HBCUs), more diversity-focused student organizations, and science and engineering departments outside of chemical engineering. Based on NSF ADVANCE programs, this targeted outreach is important since diversifying candidate pools typically results in more diverse hiring outcomes, which can be achieved through reformed recruitment practices and proactive pursuit of talented and diverse applicants.[22]

To better account for excellence stemming from a variety of areas and different backgrounds, the application rubric will also be redefined to include more unique areas of interest. To replace the general points section for unique and "out-of-the-box" experiences, the rubric will be broadened to include new measures of success, including patents, database development, software packages, open-source software, science communication, and tangible efforts to promote DEI. Furthermore, by removing ill-defined metrics (e.g., "other", "out-of-the-box") and instead assessing these unique experiences through specific rubric items, the application review process should be more objective and less biased.[23, 24]

In addition to broadened rubric criteria, we have made plans to add a diversity statement to the application package. Alongside the critical goal of promoting DEI in the application and review process, this addition will provide applicants an opportunity to practice writing such a statement, which is now increasingly required as part of faculty application packages. Review criteria for this statement will be shaped by current evaluation standards and benchmarks of diversity statements at the university level. While diversity statements have become a common component of faculty application packages, there is still debate over the value that these statements have. For example, supporters argue that diversity statements help identify individuals committed to fostering equitable environments,[25–27] while critics argue that diversity statements can be subjective or vague.[28] Regardless, little research has been done on the usefulness of diversity statements during faculty hiring. As more research is conducted, the DYSS application will continue to change and become a more effective tool for identifying individuals committed to DEI efforts and preparing future faculty members for academic applications.

Moving forward, the rubric will also be broken up into the individual application components, rather than by communication, scholarship, and achievement, in order to reduce repetition during application evaluation. The rubric will be

divided by abstract, letter of recommendation, CV, statement of interest, and diversity statement, with aspects of communication, scholarship, achievement, and uniqueness woven into the evaluation criteria. In addition, further analysis will be done to identify and mimic rubrics used during the interview process for faculty applications in chemical engineering programs. Combining all these changes to the application and review process should create a better-defined rubric, remove overemphasis on certain criteria, and expand the definitions of success, which should reduce bias and improve diversity within the program.

Finally, changes will be made to the day-of visit to maximize feedback to the DYSS speakers, improve graduate student networking, and make the meetings and seminars more accessible through digital integration. As DYSS continues, improvements will regularly be applied throughout the entirety of the program. From application solicitation to the seminar visit, modifications will continue to be made to achieve a better professional development experience for all. We expect DYSS to remain a pillar experience of chemical engineering, both for our department and the field as a whole, for many years to come.

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APPENDIX

Category	Application Item	WOW (6)	Exceeds Expectations (4-5)	Meets Expectations (2-3)	Could Use Improvement (1)
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 (4x)**	They blew me away!!!	- Has many presentations at different national conferences - Has invited talks - Has teaching awards	- Has presented at national conferences - Has teaching experience	- Has presented at at least one conferences - Mentions mentoring undergraduate researchers
	Letter of Rec (2x)	They blew me away!!!	- Recommender praises applicant for clarity in presentations, giving specific examples - Recommender praises applicant as a teacher, giving examples of applicants mentorship	- Recommender mentions applicant's presentation ability - Recommender mentions applicant's teaching ability	- Recommender mentions applicant's presentation experiences - Recommender mentions student as a teacher or mentor in lab
	Abstract (5x)	They blew me away!!!	- 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	- 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	- Abstract is well written but contains some errors - Abstract is difficult to understand for someone not in the field.
	Statement of Interest (2x)	They blew me away!!!	- Clearly expressed an interest in sharing their accomplishments - Has a clear demonstration of their future career goals and potential impact	- Articulates goals, but does not have a strong sense of direction - Shows a future path to where they want to go, but doesn't express how DYSS helps them get there	-Does not articulate strong goals or a sense of direction -Does not express any future goals or how DYSS helps them get there
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 while keeping in mind the field they are in and the point in their career they are at (postdoc in computation will have more publications than a graduate student in bio).	**CV (5x)**	They blew me away!!!	- Has a papers published in a variety of high impact journals - Papers have been cited numerous times	- Has at least one paper published in a high impact journal - Has numerous papers in a variety of journals - Papers have been cited a few times	- Has few first author papers - Majority of papers are published in a single journal
	Letter of Rec (3x)	They blew me away!!!	- Recommender praises applicant as a researcher and highlights their ability to come up with novel ideas	- Recommender highlights the applicant's research talents in solving problems	- Recommender praises applicant's technical abilities
	Abstract (3x)	They blew me away!!!	- Abstract communicates the importance of the research which has been done - Abstract show cases its broad impacts on the scientific community - The research is interesting and relevant to the UW ChemE Department	- Abstract cites appropriate literature to show its place in the bigger research picture - Abstract shows the impact it has had and mentions future research directions -Might be relevant to the UW ChemE Department	- Abstract highlights the important conclusions from the work done - Abstract shows its impact within its own specialty -Research not particularly relevant to the UW ChemE Department
	Statement of Interest (2x)	They blew me away!!!	- Has a clear idea of what they hope to gain through the DYSS program - Shows interest in sharing their expertise and gaining the skills to become a strong professor in the field	- Has a clear desire to gain skills, but does not express how DYSS will help them achieve their goals	- Does not express how DYSS will benefit them or provide skills to help achieve a goal
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 (3x)**	They blew me away!!!	- Has won awards for presenting, teaching, writing, entrepreneurship, etc. - Has outreach activities on CV not directly related to their research - Shows leadership	- Has won some awards for presenting, teaching, writing, entrepreneurship, etc. - Has many outreach activities on CV - Is actively involved in scientific societies or other science-related extracurriculars	- Has few outreach activities on CV not directly related to their research - Does not participate in any science-related extracurriculars -Has no awards in their field
	Letter of Rec (3x)	They blew me away!!!	- Recommender praises the applicant's work ethic and leadership abilities - Recommender highlights extracurricular activities of applicant	- Recommender praises the applicant's work ethic and self motivation	- Recommender praises the applicant's work ethic and ability to succeed
	Abstract (3x)	They blew me away!!!	- Abstract demonstrates clear knowledge of their field and/or a novel approach to a broader impact topic - Abstract presents clear and exciting results, with data or figures to back up their research	- Abstract demonstrates a moderate knowledge of their field and/or has a relatively low impact on their field -Abstract does not back up their claims with substantial evidence or data	- Abstract mentions no papers or citations or clear understanding of the literature/impact
Wizardry! Did any part of the application surprise you or make you say, "wow!" Has the applicant done something particularly exciting, novel or cool? Does the applicant go above and beyond on outreach, policy, or education? Did the letter of recommendation include anything particularly amazing?	**Wizardry! (3x)**	They blew me away!!!	This score does not apply for Wizardry	This score does not apply for Wizardry	This score does not apply for Wizardry