

Professional Development for Early Career DBER Scholars through In-Person and Virtual Career Panel Workshops

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In discipline-based education research (DBER), early career scholars, such as graduate students and postdoctoral researchers, observe a slew of possible career pathways. Yet, there is a lack of opportunities to learn about such pathways, particularly when transitioning from traditional science, technology, engineering, or math (STEM) disciplinary training into a DBER position. Thus, the DBER Scholars-in-Training Professional Development subcommittee was created within the Society for the Advancement of Biology Education Research (SABER) community to develop a collection of workshops that would serve the greatest professional development needs of early career scholars entering DBER. Through a series of surveys disseminated over multiple years, early career scholars expressed interest in better navigating their career options, which led to the development of the career panel workshop, held during the 2019 and 2020 SABER Annual National Conferences. In this report, we explore the development, implementation, and results of two career panel workshops and compare and contrast the 2019 in-person workshop with the 2020 virtual workshop. We also offer our insights on the value of the career workshop, discuss the next steps, and explore valuable resources for those planning on organizing similar events.

KEYWORDS conference workshop, professional development, careers, graduate students, postdoctoral researchers

INTRODUCTION

Graduate students and postdoctoral scholars, here referred to as scholars-in-training (SiT), are in a transitional phase of their careers as they move along the continuum from novice to expert. Within the discipline-based education research (DBER) community, SiT are often entering into education research after science, technology, engineering, or math (STEM) disciplinary training.

Traditionally, early career DBER scholars are trained to enter the professoriate; however, Connolly et al. (1), tracking 501 STEM doctoral students' career pathways 5 years after earning their PhD, found that 37.5% ($n = 188$) of individuals did not pursue academic careers. With increasingly fierce competition for faculty positions (2), SiT may consider alternative career paths that allow them to operationalize skill sets built during their graduate program or postdoctoral tenure (3). In response to the unique needs of SiT, particularly in exploring various career paths, the DBER Scholars-in-Training (DBER-SiT) committee was born.

Nested within the Society for the Advancement of Biology Education Research (SABER) community, the DBER-SiT leadership committee advocates for the needs of biology education research SiT. With leadership composed of elected graduate students and postdocs across the United States, DBER-SiT connects SiT to increase a sense of community within DBER and

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provide opportunities for travel funding and professional development. DBER-SiT is split into four main subcommittees: Outreach, Funding, By-Laws and Elections, and Professional Development (PD). The PD subcommittee is dedicated to providing DBER-SiT with PD opportunities to hone their professional skills to better prepare for the next steps in their career.

This report focuses on the efforts of the PD subcommittee to provide career development programming to SiT, particularly through a career panel model. Career panels are a popular professional development model for career exploration. Career panels are often implemented as part of larger professional development workshops, symposia, or courses (3–7), with general objectives to encourage and guide students' career exploration while validating and positively influencing student perceptions of different career paths. Despite their wide use, career panel development, implementation, and data outcomes have rarely been published in detail, leading to the inefficient reinvention of the wheel. Our work outlines the development, execution, and assessment of two career panel workshops organized for DBER graduate students and postdocs in 2019 and 2020. Due to the coronavirus disease 2019 (COVID-19) pandemic, the 2020 workshop was held virtually, which allows us to discuss the strengths and weaknesses of the in-person 2019 and online 2020 workshops. To our knowledge, this is the first article to share and compare the development and outcomes of an in-person and virtual career panel. We hope that by sharing how the DBER-SiT PD subcommittee carried out these events, interested future institutions, programs, or student groups can implement similar workshops for their participant population.

OUR MISSION AS A PROFESSIONAL DEVELOPMENT SUBCOMMITTEE

At the inception of the PD subcommittee (2016), we envisioned a collection of workshops that would serve the greatest PD needs of SiT. Oftentimes, workshops are held without evidence of the need from their target population. Thus, we dedicated our efforts to providing PD skills and opportunities to SiT through workshops that were member driven; what is the greatest need from SiT and how can we best provide that service at a reasonable cost? Toward this end, we had three primary goals: (i) collect evidence of PD needs, (ii) organize and facilitate a diverse and inclusive low-cost/no-cost workshop, and (iii) assess and evaluate the workshop for future improvement.

IN 2019

Meeting goal 1: survey the needs of the DBER-SiT community

To identify the needs of the DBER-SiT community, we developed and disseminated a survey via email to postdoc and graduate student members of SABER before the SABER

2018 National Conference. Alongside demographic questions, we asked survey participants to rank their top three choices from an extensive list of potential workshop topics (see Appendix 1 in the supplemental material for survey questions). Of the 119 graduate students and postdoc members, 61 individuals participated in the postconference survey (51% response rate; 48% graduate students/52% postdocs). Of the 13 proposed workshop topics, “Navigating the Job Market: How to Get Hired after You Graduate/Move on from Graduate Student/Postdoc Position” had the largest percentage of interest from our participants (51%) (see Appendix 2 for survey results). Based on these results, we developed a career panel workshop to be held at the 2019 SABER National Conference.

Meeting goal 2: organize and facilitate an accessible, diverse, and inclusive career panel workshop

Over the 2018 to 2019 academic year, the two cochairs of the PD subcommittee (authors M.M.C.M. and B.T.) collaborated with 4 DBER-SiT volunteers (including authors E.G. and K.G.) to invite panelists, ranging in areas of expertise, who could speak to the benefits, challenges, and opportunities of career paths inside and outside academia. We chose to include panelists from both within and outside academia since the literature suggests that STEM doctoral students pursue varied career paths, with 37.5% outside tenure-track academic positions (1). In this paper, we identify careers as “academic” if they meet the following criteria: (i) pertain directly to research and/or teaching (which we identify as within the professoriate) or (ii) connect to an academic institution, such as teaching and learning centers (outside the professoriate). All jobs outside these two parameters are defined as “nonacademic careers”, such as careers that are academic adjacent but not associated with an academic institution (e.g., museums, the private sector; funding agency, etc.). Our goals were for participants to (i) gain a better understanding of careers available to those with training in DBER, (ii) obtain insight on the “do’s and don’ts” of the DBER job market, (iii) collect ideas about how to obtain a job in their desired field, and (iv) learn approaches to maintaining a healthy work/life balance. We measured if we accomplished these outcomes by obtaining feedback from participants after the workshop (see Meeting goal 3).

Selecting career workshop panelists

To choose the 2018 to 2019 panelists, we brainstormed types of academic and nonacademic careers in DBER (Table 1, career type). We leveraged our established connections to develop suggestions for panelists in each of these areas. To stay within budget, we prioritized panelists who were regular attendees of the SABER National Conference or if they lived/ worked in the Twin Cities area, where the conference is typically held. After deliberation with our subcommittee members, we invited five panelists to speak at the panel in person as part of the conference. The participating panelists (2019 and 2020) are outlined in Table 1.

TABLE I
Career panelist names, career types, and institutions who participated in 2019 and 2020 SABER National Conference career panel workshops

| SABER National Conference | Name of panelist | Career type | Institution |
|---------------------------|--------------------|---|---|
| 2019 | Marjee Chmiel | Director of Evaluation Educational Media | Howard Hughes Medical Institute, Chevy Chase, MD |
| | Holly Menninger | Informal Science Education/Director of Public Engagement and Science Learning | Bell Museum, University of Minnesota, Saint Paul, MN |
| | Christina Petersen | Teaching and Learning Center | University of Minnesota Center of Educational Innovation, Minneapolis, MN |
| | Brian Sato | Academic Teaching in a University (R1): Tenure Track | University of California Irvine, Irvine, CA |
| | Jeff Schinske | Academic Teaching in a Community College | Foothill College, Los Altos Hills, CA |
| 2020 | Tracie Addy | Associate Dean of a Teaching and Learning Center | Lafayette College, Easton, PA |
| | Kris Callis-Duehl | Informal Science Education/Director of Education Research and Outreach | Danforth Plant Science Center, St. Louis, MO |
| | Jenny McFarland | Academic Teaching in a Community College | Edmonds College, Lynnwood, WA |
| | Lisa McDonnell | Academic Teaching in a University (R1): Tenure Track | University of California San Diego, San Diego, CA |
| | Abdi Warfa | Academic Research in a University (R1): Tenure track | University of Minnesota, Minneapolis, MN |
| | Kimberly Williams | Academic Teaching and Research at a Historically Black College or University (HBCU) | Spelman College, Atlanta, GA |

Workshop participants, structure, and inquiries

Attendance of the 2019 SABER workshop was capped at 50 participants due to room size limitations. All 50 spaces were filled, with last-minute cancellations filled by a waiting list. The workshop consisted of a brief introduction of the event by the moderators, introductions of the panelists, and a whole-group panel discussion, followed by small-group breakout sessions. In preparation for the career panel, and in further alignment with our first goal (assess the needs of the DBER-SiT community), we requested questions for panelists from potential attendees via a preworkshop survey and Twitter (e.g., what questions do you have for panelist I?). These questions were sent to panelists in advance, allowing them to prepare their answers prior to the workshop. During the panel discussion, preworkshop survey questions were interspersed with participant questions.

The breakout sessions split the participants into five small groups, with one panelist per group. After 15 min, the panelists would rotate to another small group. By the end of the workshop, all attendees had met with each panelist, thus maximizing direct participant interaction with panelists. Additionally, this

format minimized movement for participants with mobility challenges. At the end of the workshop, attendees were given a postworkshop survey (see Appendix 3 for survey questions) to collect feedback on the session and inform the organization of future career panel workshops.

Common themes that emerged from panelists' answers

As mentioned previously, attendees had an opportunity to ask questions to panelists in person as well as through the online presurvey (which were then asked in person by the moderator). The most common questions asked (40%) focused on the daily duties and responsibilities of the panelist's job and prior experience and preparedness needed to pursue a chosen career. Additional questions (20%) focused on the availability of various sources of support in the panelists' roles. Having a diverse group of panelists led to rich and varied responses. One salient theme among panelist responses was that alternative careers are not actually "alternative careers." Rather, they are the careers that the DBER-SiT community actively pursues. Academic

paths are no longer the only pursuits considered valid and valuable.

Meeting goal 3: assessment and evaluation of in-person career panel workshop

We sought postworkshop feedback from participants through in-person and online surveys (Appendix 3). Of the 50 attendees, 30 individuals provided feedback (60% response rate). The results revealed that 87% rated the workshop “Very Satisfactory (4) (on a 1 to 4 scale),” with the remaining participants (13%) rating the workshop as “Satisfactory (3).” In addition, 100% indicated that they would attend this workshop if offered in subsequent years.

We also analyzed open-ended responses to two survey questions regarding what participants found most and least valuable about the event. The small-group breakout sessions were identified as highly effective by 60% of participants ($n = 18$): “The rotation of panel members to each table was extremely valuable! I thought some very productive and informative conversations came from this portion.” Similarly, another participant exclaimed, “Making contacts with the panelists at the roundtables was so informative; this format was very helpful and more interactive than a pure panel. Well done!” The limited time in breakout sessions was the area participants identified as needing improvement (57%, $n = 17$): “I think we should have more time to ask more questions at round tables if possible.” Several others echoed this sentiment, “Lack of time. . . only wish we had more time to talk to panelists at the round tables!”

IN 2020

Meeting goal 1: resurveying the needs of the DBER-SiT community

Positive feedback from the 2019 career panel workshop and continued discussion with the SiT community prompted us to continue the career panel in 2020 and improve the representation of professionals from a variety of ethnic backgrounds. To assess the needs of the DBER-SiT community (goal 1), two newly elected cochairs of the PD subcommittee (authors M.M.C.M. and R.M.M.) along with five DBER-SiT volunteers (authors E.G., K.G., A.B.H., A.K., and A.J.Z.) administered a new survey to determine the most desired career types (see Appendix 4 in the supplemental material for survey questions). The results indicated that careers of greatest interest were (i) research faculty in a doctoral-granting institution, (ii) teaching faculty at a doctoral-granting institution, (iii) faculty at a community college, (iv) teaching and learning centers, (v) teaching faculty at minority-serving institutions, and (vi) evaluation centers.

Meeting goal 2: organize and facilitate an accessible, diverse, and inclusive career panel workshop during the COVID-19 pandemic

The workshop participant outcomes and general format for the 2020 career panel remained the same as in 2019; however, it occurred in the midst of the COVID-19 pandemic. The 2020 workshop moved all proceedings online via Zoom. Given the participant feedback from 2019, we amended the 2020 workshop by ensuring small breakout sessions were lengthened for more casual one-on-one conversations with career panelists. We maintained our goal to invite speakers representing a wide range of careers within the DBER field. In 2020, due to the increased flexibility associated with a virtual conference format, we were able to expand our career panel to include six panelists from a greater variety of locations with deliberate ethnic/racial representation (Table 1). In addition, the meeting was more accessible (no cost/travel necessary to attend) due to its online format.

Workshop participants, structure, and inquiries

The 2020 DBER-SiT virtual career panel had 104 participants, an increase from 2019 due to the reduced cost of registration and absence of travel. Similar to 2019, participants who attended the 2020 workshop were given the opportunity to submit questions before the event via a preworkshop survey and Twitter. Attendees were also able to submit questions during either the whole-group panel discussion or the individual breakout sessions by using Zoom’s chat feature.

Common themes that emerged from panelists’ answers

Panelists in 2020 answered questions pertaining to their daily duties and responsibilities, often noting the importance of work-life balance, time management, and the importance of saying no. Panelists provided examples of how the institutions they worked for fostered a sense of support for their professional endeavors. Panelists often underscored the importance of developing collaborations and cited conferences as excellent networking opportunities. Finally, several panelists shared the importance of self-reflection and pursuing career opportunities that align with an individual’s values and interests.

The Zoom chat feature offered opportunities for interaction and networking during the panel session. Often panelists and other attendees answered questions and offered advice whenever another attendee asked a question, and links to specific resources were shared. A selection of resources shared by both panelists and participants are available in Table 2.

Meeting goal 3: assessment and evaluation of virtual career panel workshop

Similar to the 2019 career panel, we administered a postworkshop survey asking what participants perceived as

TABLE 2
Resources shared during the 2020 DBER-SiT virtual career panel

| Resource description | Link |
|---|---|
| DBER-SiT website | https://dbersit.weebly.com/ |
| Funding for STEM education research | https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505645 |
| Resources for practicing equity and inclusion | https://citls.lafayette.edu/inclusive-pedagogy/ |
| QUBES HUB (resources and job postings) | https://qubeshub.org/ |

most and least valuable from the workshop and how to improve it for future iterations (Appendix 5). Thirty-seven individuals who participated in the 2020 virtual career panel responded to the postworkshop survey (~35% response rate), which was administered online. Ninety-seven percent ($n=36$) of respondents rated the workshop as exceptional or very satisfactory ($n=19$), and 81% of participants indicated they would likely attend future events by DBER-SiT.

The most commonly valued aspects of the 2020 career panel workshop were the diversity of careers/positions and backgrounds solicited from panelists (54%, $n=20$) and the breakout sessions (38%, $n=14$). Workshop participants valued hearing from panelists with diverse positions, with one participant saying, “I definitely benefited from hearing from such a diverse group of faculty. I feel that this group comprehensively covered a nice cross-section of DBER careers.” On learning more about alternative career paths, two participants explained, “It was nice to learn about people who didn’t end up as professors, it’s pretty hard to find information about those career paths.” and “I learned more about careers I hadn’t thought of before.”

Participants indicated valuing the small-group breakout sessions. One participant explained, “The breakout rooms let us have a conversation about a particular job more in-depth.” Another participant highlighted the unique opportunity breakout rooms provided to ask questions, “I enjoyed the breakout rooms, where we had the opportunity to interact with the

speakers directly. It gave me the opportunity to ask specific questions that I have about these alternative career fields.”

What participants found least valuable or difficult was time, particularly the lengthiness of the event (13%, $n=4$), a 3-h workshop with two small breaks. For example, one participant said, “The only thing was how long it was, 3 h on Zoom can be tiring, but the whole session itself was useful.” Another participant pointed out that a drawback to the virtual format was that it did not allow for easy fostering of personal connections for networking, be it with panelists or other early career scholars.

Lastly, we posed a new question in this postworkshop survey that asked how to make this event more equitable and accessible to participants. Many participants suggested adding closed captioning to the presentations (13%, $n=4$). Participants appreciated the ability to ask questions via the Zoom chat rather than asking aloud and valued the panelists’ responses in the chat as well.

COMPARING 2019 AND 2020 CAREER PANEL WORKSHOPS

By comparing both workshops, we can identify pieces that worked well from both events for future iterations (Table 3). Both formats had different strengths, as summarized in Table 4. Notably, the in-person 2019 event

TABLE 3
Summary of differences between 2019 and 2020 workshops

| Workshop characteristic | 2019 workshop | 2020 workshop |
|-----------------------------|---|--|
| Setting | In person, University of Minnesota | Online via Zoom meeting |
| Format | Panel plus breakout sessions | Panel plus breakout sessions |
| No. of panelists | 5 | 6 |
| Communication channels | -Questions asked in presurvey -Questions asked out loud during panel/breakout sessions | -Questions asked in presurvey -Questions asked out loud during panel/breakout session -Questions asked live in Zoom chat |
| No. of attendees | 50 | 104 |
| Size of breakout groups | 8–10 participants | 15–20 participants |
| Length of breakout sessions | ~15 min | 17 min |
| Length of panel session | ~75 min | ~50 min |

TABLE 4
Relative strengths of in-person and online event formats

| Benefits of in-person 2019 event | Benefits of virtual 2020 event |
|---|---|
| <ul style="list-style-type: none"> • Networking with fellow attendees • Smaller breakout sessions • Networking and meeting with panelists in person • No technical issues • Easier to manage breakout sessions | <ul style="list-style-type: none"> • Low cost (no need to pay hotel or travel fees for panelists) • More diverse group of panelists • Backchannel communication facilitated increased engagement from participants • No space limitation allowed for larger attendance • No additional equipment or personnel required to record panel event |

catalyzed in-person networking. Smaller attendance allowed for more intimate breakout sessions. In 2020, lack of room size restrictions allowed for more than double attendance compared to the year before. Backchannel communication (interactions happening between participants, panelists, and facilitators in the Zoom chat concurrent with the main communication channels) facilitated broader engagement from the audience. This backchannel communication was one of the most prominent differences between the two event formats. During the panel session, many more participants asked questions in the Zoom chat box than out loud, and panelists who were not currently speaking often answered these questions directly. Additionally, other participants often answered chat questions and shared resources (Table 2).

WORKSHOP VALUE AND NEXT STEPS

Professional development opportunities, such as career panel workshops, can provide SiT with space to consider and diversify their potential career pathways. The DBER-SiT community responded positively to both in-person and virtual workshops, reporting greater knowledge and confidence in these alternative careers. Notably, the overwhelming response from participants to repeat the 2019 workshop attests to the success of our workshop format. If other groups are considering similar professional development activities, we suggest aligning themselves with the 3 goals we developed for both workshops: seek to understand the needs of the community, build an equitable workshop to

meet the highest-ranked need, and assess if the workshop successfully met those needs through postworkshop surveys. Additionally, the breakout sessions with panelists were a favorite aspect across both workshops.

The above insights were attainable due to evaluations we developed and revised. Assessment through pre- and post-workshop surveys are essential in designing future iterations of the workshop to better serve the needs of any given community. As the needs and interests of graduate students and post-docs vary, the preassessment surveys ensure that the workshops are designed to be relevant to those attending. We propose that future preassessment surveys may be updated to capture other topic areas (e.g., nonacademic career options for educators) or needs (e.g., request for further information on a particular career path) of interest to the community. Furthermore, using validated instruments to measure outcomes of the workshop beyond participants' enjoyment (e.g., the most useful professional development concepts learned) would also be helpful for future career panels. Continued areas for improvement could include implementing this workshop across multiple discrete sessions (instead of one long session), which would reduce participant fatigue, or allowing participants to choose only a subset of breakout sessions. The strengths of both the in-person and online formats have led us to consider a hybrid format for future workshop iterations, where we would give our participants a choice of which format works best for their needs.

To further serve our participants, particularly those who were not able to attend the workshop live, we compiled and made openly available past workshop materials (Table 5), including recordings of the whole-

TABLE 5
Resources compiled from the 2019 and 2020 iterations of the career panel workshop

| Resource description | Link |
|--|---|
| Video recording of the 2019 workshop (in person) | https://dbersit.weebly.com/2019-workshop.html |
| Notes from the 2019 career panel | |
| Video recording of the 2020 workshop (via Zoom) | https://dbersit.weebly.com/2020-workshop.html |
| Compiled list of participants' questions and answers from panelists from the 2020 workshop | |

group panel session, notes, and panelist question/answer lists. We hope that in organizing professional development activities around the above 3 goals, we can better serve the changing needs of our DBER-SiT community.

SUPPLEMENTAL MATERIAL

Supplemental material is available online only.

SUPPLEMENTAL FILE 1, PDF file, 0.5 MB.

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REFERENCES

1. Connolly MR, Savoy JN, Lee Y-G, Hill LB. 2016. Building a better future STEM faculty: how teaching development programs can improve undergraduate education. Madison, WI: Wisconsin Center for Education Research, University of Wisconsin–Madison.
2. Langin K. 2020. Amid pandemic, U.S. faculty job openings plummet. *Science Careers*. <https://doi.org/10.1126/science.caredit.abf1379>.
3. Fuhrmann CN, Halme DG, O'Sullivan PS, Lindstaedt B. 2011. Improving graduate education to support a branching career pipeline: recommendations based on a survey of doctoral students in the basic biomedical sciences. *CBE Life Sci Educ* 10:239–249. <https://doi.org/10.1187/cbe.11-02-0013>.
4. Barr J, Bean C, McDonnell J. 2020. Strategies for running a successful virtual career panel. *Oceanography* 33:8–9. <https://doi.org/10.5670/oceanog.2020.220>.
5. Branan J, Li X, Wheeler R. 2018. Building a career planning course for STEM PhDs. *Nat Biotechnol* 36:1217–1219. <https://doi.org/10.1038/nbt.4312>.
6. Merhout JW, Benamati JH, Rajkumar TM. 2021. The influence of career panels on student perceptions, attitudes, and intentions toward the information systems profession. *Decis Sci J Innov Educ*. <https://doi.org/10.1111/dsji.12257>.
7. Van Wart A, O'Brien TC, Varvayanis S, Alder J, Greenier J, Layton RL, Stayart CA, Wefes I, Brady AE. 2020. Applying experiential learning to career development training for biomedical graduate students and postdocs: perspectives on program development and design. *CBE Life Sci Educ* 19:es7. <https://doi.org/10.1187/cbe.19-12-0270>.