Meet the Engineering Education Pioneers – Panel & Roundtable

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***Abstract*— This panel session combines principles from graduate student socialization and intergenerational mentorship to provide a unique opportunity for early career scholars and pioneers in engineering education to interact face-to-face. Pioneers will serve as panelists and give their personal tips and reflections on networking and mentorship. Session attendees will then meet with the pioneers in a roundtable format, to ask questions, seek advice, and get feedback. This work builds on the National Science Foundation-funded Engineering Education Pioneers Project, which documented the stories of more than 40 engineering education pioneers through online profiles. The intended audience for this panel includes graduate students, junior faculty, and other individuals interested in the engineering education community. Expected benefits include better understanding, increased belonging, and new or enhanced interest in engineering education. Future efforts associated with this session include understanding the impact of such exposure to the pioneers on attendees and exploring the possibility of offering this event at future engineering education conferences.**

Keywords—educational development, career paths, mentoring, graduate students, postdoctoral students, faculty

I. Introduction

The Engineering Education Pioneers Project focuses on understanding previous change efforts within engineering education to facilitate future transformation in the field [1]. A hallmark of the project, funded by the National Science Foundation under Grant No. 1263512, has been educating the future leaders and change agents of engineering education about the earlier generations of "pioneers" who preceded them. During the first phase of the project, graduate students and junior faculty (including this session's organizers) interviewed and authored profiles on more than 40 pioneers identified by relevant communities as significant contributors to the field of engineering education. Now these pioneers' stories, as told by their profiles, are being disseminated through various means – workshops, classrooms, and online [2-3] – to introduce new members to the engineering education community and to educate those unaware of its evolution and history. Positive outcomes among those who have engaged with the profiles, as either interviewers or readers, include an increased sense of belonging in the engineering education community, increased reflection on their own career trajectories, plans, and expectations, and increased curiosity about issues in engineering education [4].

The overall purpose of the special session is to facilitate community building, networking, and early-career professional development in engineering education at scale. For the first time, new members to the engineering education community will have a dedicated forum to meet and talk with some of the

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namesake scholars whose publications they may have read and whose work may have influenced their own. This opportunity is expected to help new members see the bigger picture of engineering education and their place within it. This event can also facilitate access for graduate students and junior faculty to identify potential thesis committee members, letter writers, and other mentors who can help advance their work and careers. The pioneers who serve as panelists also have the potential to benefit from having the opportunity to meet and mentor the next wave of engineering education scholars, seeing how their work is being used in new ways, and staying informed about new research methods and pedagogy.

II. Importance of Understanding Our History

The motivation and design of this panel session is informed by research on graduate student socialization, which underscores the importance of indoctrinating students to the history and context of their academic disciplines to success [5, 6]. Scholars should understand their field and its forebears for acculturation into and success within their field. Understanding the history of their field helps students make sense of its norms, standards, and values, identify research strengths and career interests, and develop a sense of professional identity [5]. It can also help students make connections between their work and prior work [7]. Similar outcomes have been shown for researchers transitioning into new fields generally [8, 9], and particularly when this learning is situated within communities of practice [10].

The development of engineering education as a discipline and the factors shaping this development have been documented and shared through various media, including books (e.g., [11, 12]), journal articles (e.g., [13, 14]), and workshops (e.g., [15]). Most engineering education doctoral programs feature courses on the history and contexts surrounding the engineering education field as well. A specific emphasis within this body of work has been on career trajectories in engineering education, particularly the ways in which engineering education scholars have become involved in the field and their impact (e.g., [16], [17], [18], and the Pioneers Project). This session builds on the Pioneers Project by providing early career scholars the opportunity to interact with and learn from the pioneers directly, hopefully extending to this new population the same benefits reported in Trellinger et al. [4].

III. Importance of Intergenerational Mentorship

Research on intergenerational mentoring also informed this session. Mentorship is often described as a support relationship that promotes an individual's personal and professional development [19]. It is associated with various positive outcomes across a range of contexts and disciplines [20, 21] and may come in different forms (e.g., one-to-one, among peers, and via the internet) [22]. One-to-one mentoring is the most traditional form of mentoring and oftentimes occurs between a mentor and mentee who belong to different generations, also known as intergenerational mentoring [23].

Existing scholarship on intergenerational mentoring highlights its benefits to both the mentor and mentee. For example, research on youth mentoring states that this kind of relationship is not only beneficial for supporting vulnerable youth but also benefits older adults through the social engagement involved in the relationship [24]. A smaller body of scholarship has examined intergenerational mentoring in the workplace, including among educators and faculty members [21, 23, 24], which is relevant to this special session. One of the most salient advantages of mentoring is that it helps promote retention and career success (e.g., increased publication rates, fruitful research collaborations, and improved prospects for getting promotion and tenure). Finally, a study focused on engineering faculty found that the mentoring process helps with the following outcomes: (1) developing independence, (2) establishing independence, (3) negotiating the terrain, and (4) opportunities for non-professional interactions [21]. Existing scholarship provides compelling evidence in favor of how valuable intergenerational mentoring can be among professionals associated within academic settings. This session promotes intergenerational mentorship between generations of engineering education scholars through the design and implementation of a panel and roundtable session focused on networking.

IV. Session Goals

This special session aims to build on the Pioneers Project by providing graduate students and junior faculty interested in engineering education with a unique opportunity to network with pioneers face-to-face.

Inspiration for this session comes from professional organizations in related fields that offer similar opportunities for intergenerational mentorship and networking at their gatherings. The National Society of Black Engineers (NSBE), the Society of Hispanic Professional Engineers (SHPE), and the Society of Women Engineers (SWE) all host networking sessions connecting students with professionals during their annual conferences. Several divisions of the American Educational Research Association (AERA) hold mentoring seminars or programs designed to connect graduate students and junior faculty with established experts in their fields at the annual AERA meeting. Likewise, the Association for the Study of Higher Education (ASHE) annual conference offers a "scholars roundtable" exclusively for graduate students. Each of these events have become mainstays on their respective agendas due to positive reception from the students and faculty for whom they are designed and the willingness of experts who give their time to support these events.

To the organizers' knowledge, similar events are not currently offered at any of the main engineering education conferences, such as the American Society of Engineering Education (ASEE) Annual Conference, the Frontiers in Education (FIE) Annual Conference, or the Research in Engineering Education Symposium (REES). Programs and events such as the ASEE Educational Research and Methods (ERM) Division Breakfast/Lunch of Champions or the Apprentice Faculty Grant have a similar mission to pass on history and mentorship; however, none of these expressly focuses on connecting new and earlier generations of scholars within engineering education.

V. Session Plan

The proposed 80-minute session will begin with a brief 10-minute introduction to the Pioneers Project as well as to the half dozen pioneers who have signed on to participate. A 30-minute panel with the pioneers will highlight the importance of networking and building mentoring relationships. Each pioneer will provide their own personal reflections, including examples of significant mentoring relationships they have had in their careers and advice for how to network and find mentors effectively. Session attendees will have the remaining 40 minutes to visit with pioneers in a roundtable format (two sessions of 20 minutes each), to discuss and get feedback on their research interests, career pathways, and other questions. The roundtable session will also serve as an opportunity for attendees to practice the tips and advice gained from the first part of the session.

VI. Session Participants

The panel organizers include members of the Pioneers Project research team (Yasuhara and Allendoerfer) as well as three of the early-career scholars who helped to interview pioneers and author corresponding profiles (Brunhaver, Carberry, and London). All five organizers share a keen interest in helping members of the engineering education community engage with and benefit from outcomes of the project. They conceived of the panel session based on their experiences attending similar sessions at other professional meetings, as well as other mentorship and networking experiences.

The pioneer panelists include seven successful leaders and change agents in engineering education. Panelists were selected based on publication record, impact on the field of engineering education, international impact, and leadership roles within engineering education programs and professional organizations. They include both those who participated in the Pioneers Project and others who have had significant presence in the engineering education community and literature. The panelists are listed here:

- Cynthia Atman, Professor in the Department of Human Centered Design and Engineering at the University of Washington
- Jennifer Case, Head and Professor in the Department of Engineering Education at Virginia Tech
- Cynthia Finelli, Associate Professor in the Department of Electrical Engineering and Computer Science, and in the Department of Education, at the University of Michigan
- Ann McKenna, Director and Professor in The Polytechnic School at Arizona State University
- Wendy Newstetter, Director of Learning Sciences Research in the College of Engineering at Georgia Institute of Technology
- Sheri Sheppard, Professor in the Department of Mechanical Engineering at Stanford University
- Karl Smith, Professor in the School of Engineering Education at Purdue University
- Jennifer Turns, Professor in the Department of Human Centered Design and Engineering at the University of Washington
- Karan Watson, Professor of Electrical and Computer Engineering at Texas A&M University

The intended audience for this panel includes graduate students, junior faculty, and other individuals who are new to the engineering education community and want to learn more about its history and people. Those interested in expanding their professional network or improving their networking skills are especially encouraged to attend.

VII. Future Long-Term Impacts

This session has potential as a pilot for a regularly held event at FIE or another engineering education conference (e.g., ASEE). It is important that generations of the engineering education community have a way to interact and share information to keep this still-emerging field growing. This session helps fill this need, and if successful, the organizers plan to seek sponsorship from partners such as the ASEE ERM, Student, and New Engineering Educators divisions, to continue the event year-to-year.

Future work will investigate the impact of this type of session on session participants. The organizers plan to follow up with both the pioneer panelists and the attendees from this year's session approximately three months later to determine whether and how they may have benefited from participating. The results could be reported at a future conference. There is corresponding interest in tracing dissemination of the pioneer profiles themselves, meaning, how session participants share and use these profiles. The data collected will be used to help inform long-term strategies for their dissemination and use going forward.

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