

Building a Sustainable Community of Leaders Across the National Science Foundation Engineering Research Centers: An Intentionally Designed Conference

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Abstract

This evidence-based practice paper describes how to intentionally design an interactive, in-person conference that fosters leadership skills, encourages the sharing of best practices, and builds a sense of community that benefits education leaders and graduate student leaders in National Science Foundation (NSF) Engineering Research Centers (ERCs). To strengthen the network of such leaders across ERCs, particularly after the disruption of COVID-19, four ERC directors who had been organizing monthly ERC-wide virtual meetings for educational leaders, proposed and received NSF funding for a 2 ½-day ERC Conference for Leaders held in February of 2024. Each center was invited to send 4-6 participants, including at least two graduate student leaders, ensuring representation of emerging voices. A former ERC graduate student leader joined the four organizing committee members to help plan and facilitate some dedicated student sessions focused on their unique interests and challenges. The conference, designed to be interactive, was built around four goals: 1) to enable leaders to share programs, best practices, outcomes, and lessons learned; 2) to foster mentoring and collaboration for joint programming, research, publications, and/or funding opportunities; 3) to inspire and strengthen the ERC community; and 4) to establish sustainable structures beyond individual ERC lifespans. Seventy-two leaders from 15 ERCs, including 24 graduate student leaders, attended the ERC Conference for Leaders. Sessions were built around a facilitated discussion model in which most of the educators served as facilitators, opening each session with an activity and guiding conversations that drew on the collective expertise of participants and cultivated an environment of connection and trust. An external assessment yielded a 93% survey response rate (N = 67) and 8 completed interviews from 24 volunteers as planned. Results confirmed the four conference goals were met. In addition to 82% or more of respondents rating each of the sessions as very useful or useful, 92% of respondents reported a strong sense of community, 95% of respondents learned a lot from other leaders, and 89% of respondents made several new professional connections. Importantly, 77% of respondents indicated they were likely or very likely to collaborate with another ERC leader post-conference, with more than half already planning joint efforts. From survey comments made, graduate students and newer ERC leaders reported the greatest benefits, noting increased confidence, clearer understanding of their roles, and stronger motivation to implement new ideas. Based on these outcomes, the organizing team plans a 2025 ERC Meeting for Graduate Student Leaders to build on these foundations. Notable, as well, survey and interview findings suggest that both the facilitated discussion model and intentionally designed interactive environment were key to the conference's success. NSF has expressed interest in adopting more of a facilitated discussion model approach for their future ERC Biennial Meeting. In conclusion, the ERC Conference for Leaders suggests that intentional, in-person engagement is essential for sustaining the innovation, collaboration, and leadership development that defines the NSF ERC community. Institutionalizing such ERC-wide leadership conferences is therefore recommended to enhance collaborations, disseminate best practices, and strengthen educational impact across ERCs.

Introduction

Leadership development has long been a strategic priority of the National Science Foundation (NSF) Engineering Research Center (ERC) program [1]. Since the program's inception, successive generations of ERCs have increasingly emphasized the preparation of faculty and students to assume complex leadership roles within academic, industrial, and interdisciplinary research environments. As the ERC program has matured, greater attention and resources have been directed toward building leadership capacity alongside technical excellence.

Within ERCs, responsibility for designing and implementing leadership-oriented educational efforts typically falls to Directors of Engineering Workforce Development (EWD) and Directors of Diversity and Culture of Inclusion (DCI). These roles are inherently complex, requiring expertise that spans educational theory, program design, assessment, administration, and organizational leadership. Individuals entering these positions bring diverse backgrounds and strengths. Faculty members, particularly those trained in engineering education, may contribute strong theoretical grounding, but often lack the administrative experience managing large, multi-institutional programs.

Conversely, professional staff and practitioners often possess extensive programmatic and administrative experience but have less familiarity with educational research frameworks. As a result, many education leaders must develop critical competencies while simultaneously executing high-stakes responsibilities.

Leadership development within ERCs also extends to graduate students, who are increasingly expected to become future leaders in their fields and to acquire professional skills beyond technical research expertise [2]. While engineering and science graduate programs have traditionally emphasized disciplinary knowledge, ERCs intentionally create leadership opportunities for students through structures such as Student Leadership Councils (SLCs). Established in 1996, SLCs provide graduate students with formal roles in center governance and decision-making [1]. NSF further institutionalized these leadership responsibilities by requiring SLCs to conduct annual SWOT analyses of the center and the graduate student experience, and to report their findings during site reviews. Through roles such as chair, vice-chair, industry liaison, or outreach lead, student leaders assume responsibilities that demand rapid development of communication, management, and leadership skills, often within short one- to two-year terms.

For both education and student leaders, access to peers and mentors with shared contextual knowledge is critical. Although ERC leaders regularly interact within their own centers, opportunities for cross-center engagement are more limited. Virtual meetings and large-scale conferences provide valuable opportunities for information exchange but often limit deeper relationship-building and mentoring, particularly for individuals new to their leadership position. Research and practice suggest that trust, collaboration, and meaningful professional learning are more readily fostered through in-person interactions that allow time for informal exchange, reflection, and shared problem-solving.

In response to these needs, the ERC Conference for Leaders was intentionally designed to support community building, mentoring, and knowledge building among ERC education leaders and student leaders across centers. Rather than relying primarily on traditional presentation-based conference formats, this conference emphasized facilitated discussions structured to leverage participants' collective expertise. The goal was to create an environment that promoted trust, encouraged candid dialogue, and enabled participants to develop actionable insights relevant to their leadership roles. This design approach aligns with the ERC program's founding vision, which emphasizes a strong sense of community and a shared purpose across centers [1]. The present paper describes the intentional design of this conference and examines its outcomes in supporting leadership development and cross-ERC collaboration.

Background and Prior Work

The ERC program expanded the role of education initiatives significantly during the 1990s. At that time, ERC Education Directors participated in annual cross-center meetings focused on sharing best practices, and an ERC education consultancy provided structured mentoring with experienced education directors who were compensated to visit and advise new leaders [1]. In addition, ERC Best Practices Manuals were developed to document effective strategies for education and workforce development (<https://erc-assoc.org/best-practices/best-practices-manual>). While these resources provided important guidance, written documentation alone proved insufficient for addressing nuanced, context-dependent challenges faced by education leaders navigating complex, multi-institutional centers.

As annual education-focused meetings and formal education consultancies were phased out, NSF continued to support cross-ERC community through various mechanisms. ERC Biennial Conferences inviting each center's leadership team (2017, 2019, 2022 - delayed due to COVID, and 2024) were valuable opportunities for center leadership teams to learn about NSF priorities and to showcase student work through competitive poster and Perfect Pitch sessions (<https://erc-assoc.org/biennial-meetings>). However, their biennial frequency and broad scope limited opportunities for sustained, role-specific interaction and mentoring among education leaders and student leaders across centers.

In parallel, ERC leaders have engaged in periodic virtual meetings organized by role (i.e., EWD Leaders, DCI Leaders). While these meetings have served as important venues for information sharing and peer support, they are still virtual, posing challenges to forging close, trusting relationships that lead to meaningful mentoring. As research has shown, and as we have learned from COVID, virtual meetings alone are often insufficient for building the depth of relationships required for candid discussion, mentoring, and collaborative problem-solving [3 – 7]. A true community dedicated to sharing knowledge and supporting one another needs time in person to build trust and develop friendships before online mediums can be as effective.

It is also difficult for many directors to be completely honest about uncertainties, problems, or challenges they are having when NSF representatives are present at the virtual meetings. In addition, NSF relies on comparative data that they compile across centers, and such data is required to be part of a center's annual report and used to evaluate centers. This practice may unintentionally reinforce center-to-center competition rather than collaboration. Without established trust or informal peer networks, leaders -- especially those new to their roles -- may

find it difficult to seek guidance or share concerns candidly. Conversely, leaders with more expertise and time in their ERC role may be reluctant to freely share their knowledge in the absence of a relationship.

Previous education conferences for leaders outside formal NSF-sponsored efforts provide additional context for the present work. In 2019, an in-person conference brought together leaders responsible for EWD, DCI, SLC, and Evaluation at North Carolina State University. It spurred communication between the many leaders who attended, and they later reported high levels of satisfaction with opportunities to share best practices and build new professional connections at the conference.

A follow-up conference in 2020 had to transition to a virtual format due to COVID-19 restrictions. *Hopin* was the online event platform used, and while the online conference was generally viewed as a worthwhile use of participants' time overall, feedback indicated reduced engagement and limited opportunities for meaningful discussions, consistent with broader findings on virtual professional convenings.

Collectively, these prior efforts highlight both the value of cross-ERC engagement and the limitations of existing formats for supporting leadership development, mentoring, and collaboration. The absence of regular, intentionally designed, in-person convenings focused specifically on education and student leadership created a gap in professional support structures within the ERC ecosystem. The ERC Conference for Leaders was conceived as a response to this gap, drawing on lessons learned from earlier initiatives while explicitly addressing the need for trust-building, peer mentoring, and sustained community formation across centers.

Participant Selection and Rationale

Within the ERC ecosystem, education leaders collaborate regularly within their own centers, often forming localized communities of practice shaped by disciplinary background, institutional context, and center maturity. However, opportunities for sustained interaction across ERCs, particularly among individuals serving in similar leadership roles, are comparatively limited. An in-person event would allow leaders to continue networking, learning, mentoring, and forging collaborations across all ERCs, thereby effectively disseminating best practices. Importantly, shared engagement among EWD, DCI, and SLC leaders also supports program coherence, as leadership initiatives are often most effective when aligned across workforce development, inclusion, and student leadership domains.

To address these shortcomings and overcome the siloing of ERCs, the Organizing Committee intentionally designed an ERC Conference for Leaders as a working conference that would emphasize community building, collaboration, reflection, and leadership development. Sessions were structured to promote interaction both within leadership roles and across roles, with the goal of strengthening individual capacity while also fostering a broader ERC-wide leadership community using predominantly a facilitated discussion format.

Pedagogical and Facilitation Framework

The conference was grounded in a facilitated discussion format rather than a traditional presenter-led format. The decision to adopt this model was informed both by prior scholarship and by the authors' own experiences participating in conventional academic and professional conferences. In many presenter-centered formats, time constraints, hierarchical dynamics, and slide-driven delivery often limit meaningful dialogue, reduce opportunities for peer exchange, and position knowledge as flowing primarily from speaker to audience. Drawing on these observations, and on experiences in more interactive professional development setting where dialogue-based models yielded deeper engagement, the conference design intentionally shifted from dissemination to co-construction of knowledge.

The difference between facilitated leaders (facilitators) and presenters (lecturers/speakers) in conferences or workshops has been studied across several distinct fields, such as organizational psychology, education, sociology, and engineering education. Prior research and extensive practice suggests that facilitated sessions promote greater participant engagement, stronger transfer of learning to practice, and increased collaboration compared to lecture-based approaches [8]. These outcomes are particularly relevant for experienced professionals, whose expertise can be leveraged through structured peer interaction.

Facilitators were chosen based on their own declared interest in facilitating a particular topic. They were reassured that they were to guide discussion and encourage broad participation, rather than to deliver a formal presentation. It was made clear that there was no need to 'play the expert.' This framing helped reduce performance pressure and reinforced the conference's emphasis on shared learning.

Sessions followed a common structure with facilitators clarifying the session focus and inviting a volunteer to scribe. Brief contextual framing and selective resource sharing were followed by guided discussions designed to elicit participants' experiences and perspectives. Facilitators were also encouraged to incorporate active learning strategies to support engagement. Sessions addressed both challenges and opportunities related to the topic area and concluded with a discussion of potential actions, collaborations, and next steps.

In addition to emphasizing facilitated dialogue, the organizing committee intentionally defined the scope and developmental aims of the conference to balance peer exchange with structured professional growth. Conference themes were identified through 1. consultation with current ERC EWD, DCI, and SLC leaders, 2. reflection on recurring topics from prior cross-ERC meetings, 3. a survey of interest in proposed topics by conference attendees, and 4. consideration of shared challenges across ERC lifecycle stages, including leadership transitions, program sustainability, cross-pillar alignments, and student governance effectiveness. The conference was designed with explicit objectives: to strengthen role clarity and leadership confidence, enhance strategic thinking within complex multi-institutional contexts, and cultivate sustained peer mentoring networks. Drawing on literature related to adult learning and communities of practice, sessions were structured to move participants beyond experience-sharing toward reflection,

integration of effective strategies across centers, and identification of actionable next steps, positioning the conference as an intentionally designed developmental intervention rather than solely a networking venue.

Conference Implementation and Additional Intentional Design Elements

There were 15 active ERCs at the time of the conference. Given venue capacity and funding constraints, participation was limited to six representatives per center. Each center was encouraged to send an EWD leader, a DCI leader, and two graduate student leaders (typically students serving in Student Leadership Council roles). Sending two SLC leaders helps with continuity, as SLC terms are often short and transitions are frequent. Centers were also given discretion to allocate up to two additional participant slots, allowing inclusion of co-directors or leaders responsible for related education or societal impact initiatives. This flexibility enabled centers to tailor participation to their organizational structures while maintaining balance across leadership roles.

The conference was held on February 21-23, 2024, at the Embassy Suites by Hilton Chicago O'Hare Rosemont, an easily accessible hotel a few minutes from the Chicago International Airport. It was well attended, with 72 attendees, and with representation from all 15 currently funded ERCs. Most centers sent between four to six participants. This composition created opportunities to strengthen internal alignment while also fostering broader community formation across ERCs.

The conference was held over three days at a single venue selected to support informal interaction and sustained engagement. Sessions, meals, and social activities were co-located to reduce logistical barriers and encourage continued interaction outside the formal meeting times.

These environmental features encouraging interaction were intentionally aligned with the stated goals of the conference, which were:

1. Encourage leaders of ERCs at all stages of their life cycles to strategically consider their EWD, DCI, and SLC programs from a self-sufficiency perspective; encourage mentoring by ERCs in later stages.
2. Provide an opportunity for ERC leaders to share their most unique activities and programs, best practices, outcomes, and lessons learned with other interested leaders.
3. Enable and encourage collaboration among the ERC EWD, DCI, and SLC leaders with the purpose of identifying joint programming, research, publications, and/or grant opportunities.
4. Provide an opportunity to inspire, energize, and foster community-building and networking among the EWD, DCI, and SLC leaders of the ERCs.

Several design elements were incorporated to reinforce conference objectives. A combined opening reception and poster session provided an accessible entry point for networking while allowing participants to learn about other ERCs in an informal setting. Short plenary sessions were used sparingly to articulate shared goals and expectations rather than to convey extensive content. Breakout sessions were organized by center, leadership role, ERC generation, and topic

area to support targeted peer interaction. The SLC leaders had several graduate student-only sessions to discuss the challenges unique to SLCs. The final conference session focused on role-specific action planning, encouraging participants to identify concrete steps to pursue following the conference.

To support focused engagement during sessions, each facilitated discussion included a designated scribe. Shared online documents allowed participants to contribute notes collaboratively, while scribes synthesized key discussion points after the session. These records were made available to participants following the conference, extending the value of discussions beyond the event itself.

Assessment Methods and Results

Conference outcomes were assessed using a multi-method approach that included a survey and follow-up interview questions that were developed by the Conference Organizers in collaboration with an external evaluator from Everett Evaluation Research & Consulting. The external evaluator administered the survey via a link provided at the end of the final session, hence the high response rate reported below. They also conducted follow-up interviews in the 2-3 weeks following the conference and then wrote a report for NSF. Survey items assessed participants' perceptions of conference quality, usefulness of sessions by topic, community building, networking, learning, and anticipated future collaboration. Interviews provided additional insights regarding participant experiences and perceived impacts.

As mentioned, the survey response rate was high (93%, 67 of 72 attendees), with an equal number of participants from Gen 3 ERCs (those established 2008-2017; N=35) and Gen 4 ERCs (those established 2018 or later; N=31) responding, and one person belonging to both a Gen 3 and a Gen 4 ERC. Twenty-four SLC/graduate student leaders (almost all PhD students) and 43 directors/assistant directors of other pillars (EWD, N=16; DCI, N=15; EWD/DCI, N=6; Other leaders, N=7, most Societal Impact) responded to the survey.

The only background/demographic type of data collected about participants was their ERC and their role in their ERC (EWD, DCI, EWD/DCI, Other, or SLC/Student Leader). Due to the limited sample size, analyses were restricted to descriptive comparisons rather than inferential statistical testing. Responses were reviewed by role to explore potential patterns; however, no systematic differences were evident across the different roles.

Overall ratings were extremely positive for conference logistics (facility, food), communication (during and before the event), as well as session structure (i.e., having facilitated sessions instead of presentations). Further, all the facilitated sessions were rated by the majority of participants as "useful" or "very useful" (Figures 1, 2.1, and 2.2, the blue and green bars). The SLC/Student Leaders joined in on many of these sessions, but there were also some SLC/Student Leaders Only sessions which they rated as useful (Figure 3, the blue and green bars). No one rated any of the sessions in these Figures as "not at all useful."

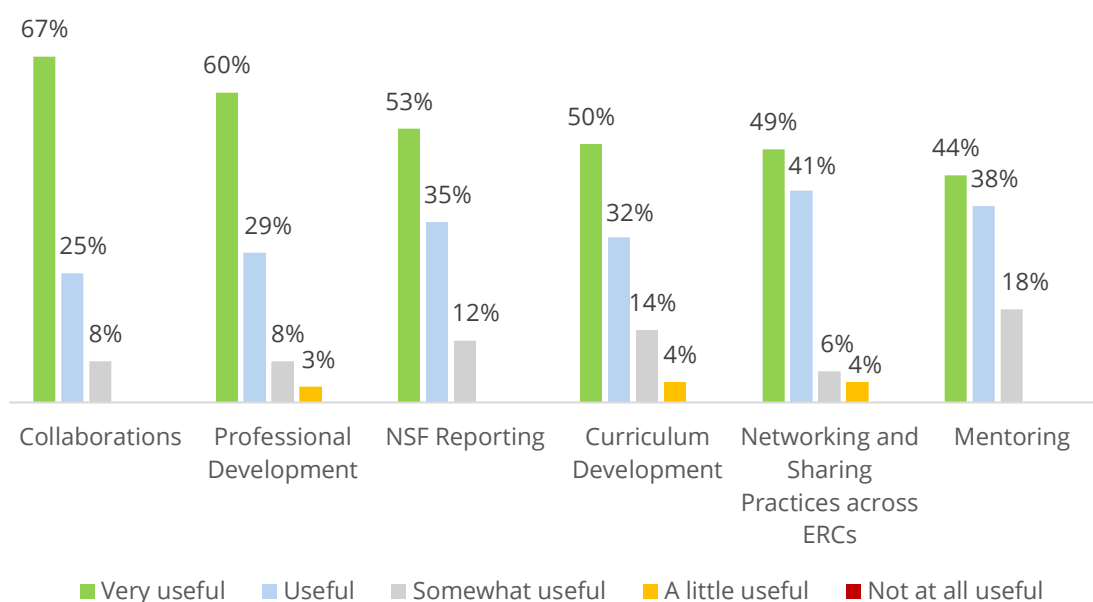


Figure 1: Usefulness of Thursday Sessions

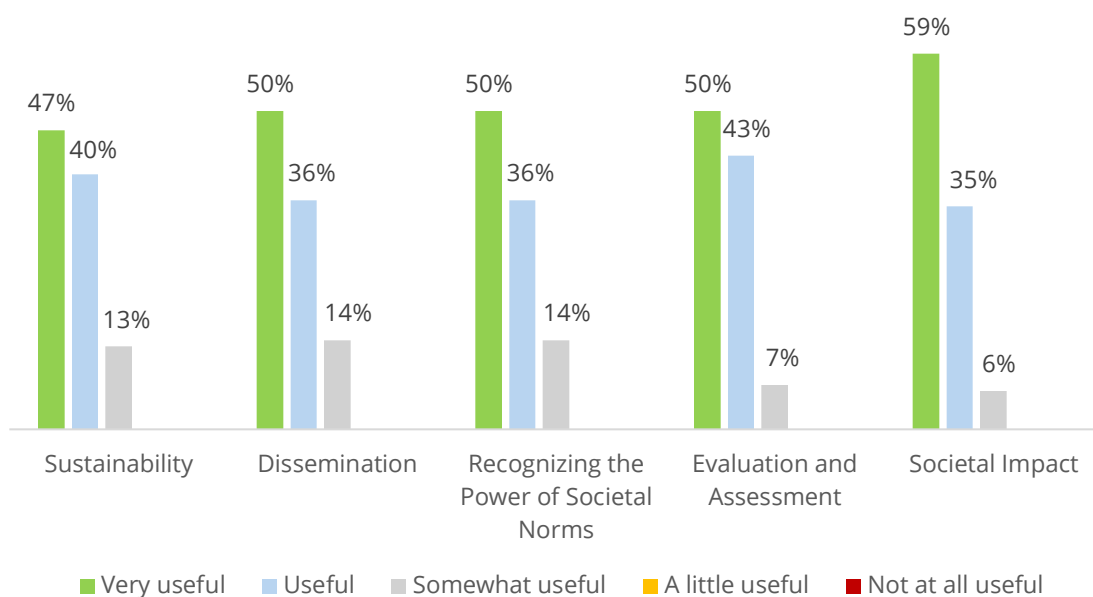


Figure 2.1: Usefulness of Friday Sessions

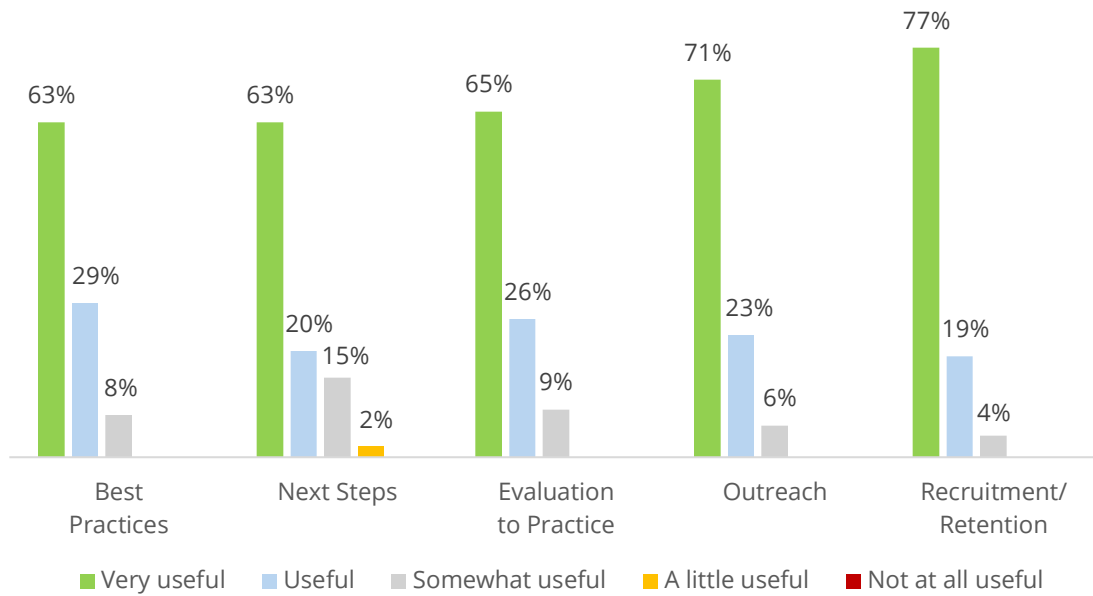


Figure 2.2: Usefulness of Friday Sessions (*continued*)

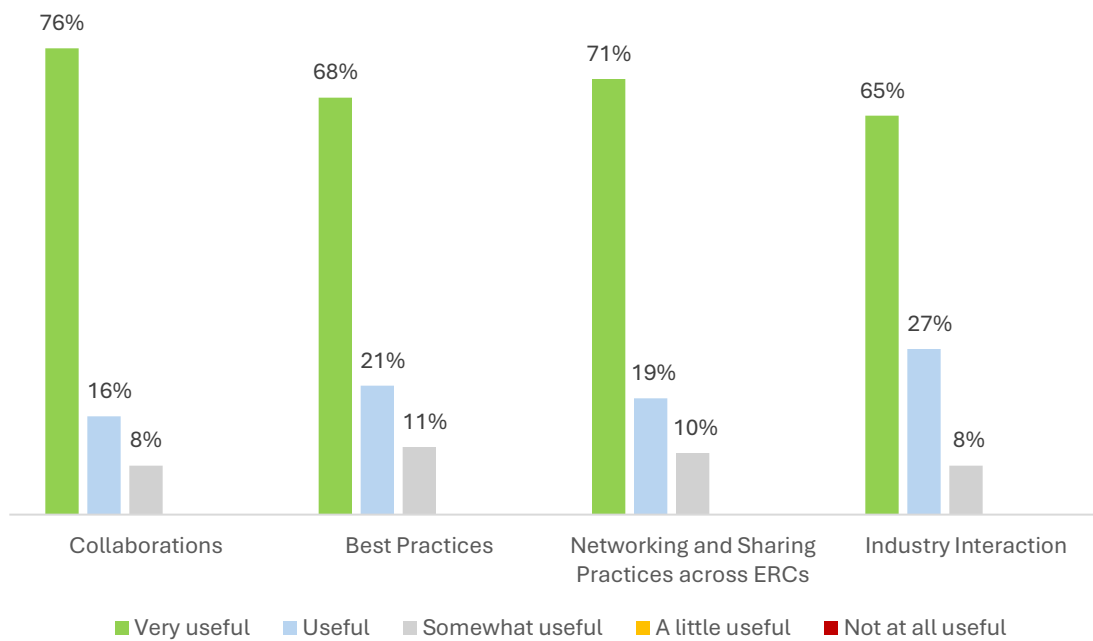


Figure 3: Usefulness of SLC/Student Leaders Only Session

Participants also reported substantial gains in community building and networking/information sharing, with many indicating increased confidence and clarity regarding their leadership roles. High percentages of participants responded “very much so” or “a great deal” to the questions about the conference promoting community building (92% - 94% range) (see Figure 4, the blue and green bars).

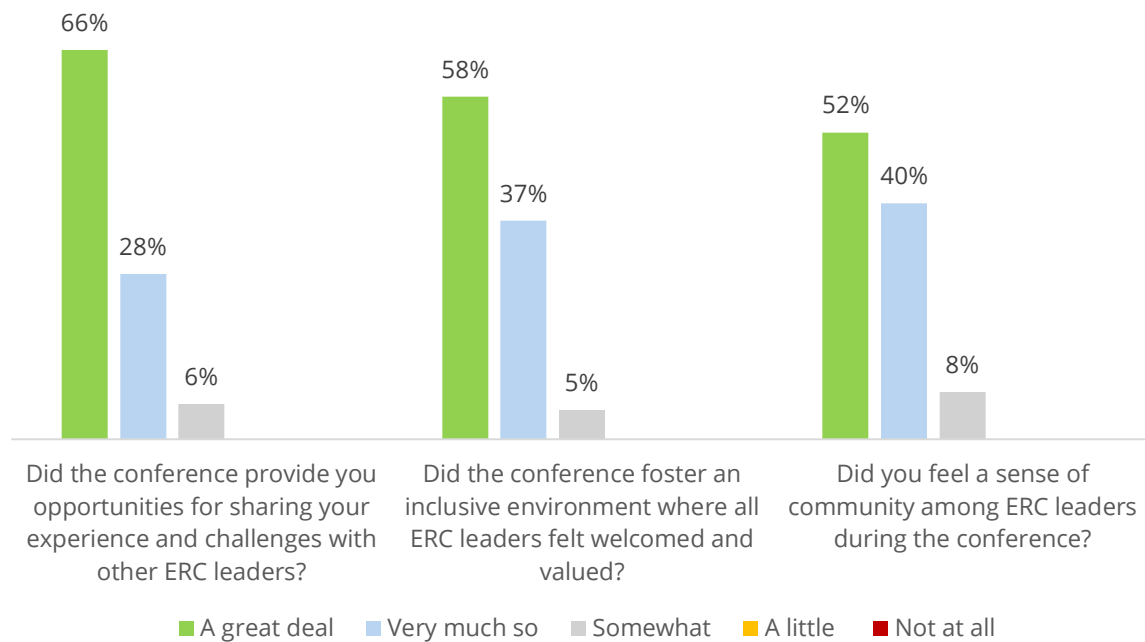


Figure 4: Conference Promoting Community Building

Six participants made comments (responses were optional on the survey). All comments were positive about building a sense of community. One participant said, “*It was so helpful to hear about the challenges that other ERCs faced and to spend time thinking about the struggles that unite us as centers. I think one phrase that was often repeated is that we don't need to spend time "reinventing the wheel" since others have already invented the wheel, it's just a challenge of making sure everyone has wheels.*”

Similar high percentages of participants responded “very much so” or “a great deal” to all the questions about the conference promoting networking and information sharing (89% - 99% range) (see Figure 5, the blue and green bars).

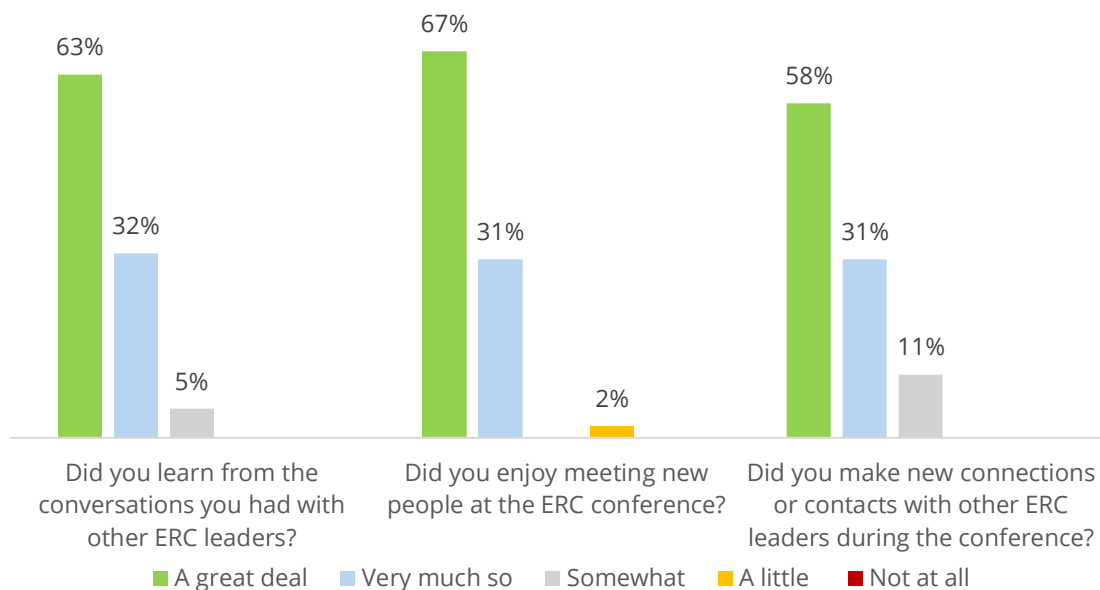


Figure 5: Conference Promoting Networking and Information Sharing

Eight participants made comments (optional, all positive) about being able to network and learn from one another. One participant reported, *“I have never been to a conference where it was that easy to really connect with so many people and have meaningful discussions.”* Another participant reported, *“I made a lot of connections and had some productive conversations. I now have a lot of next steps!”*

Another goal of the conference was to promote collaborations. A large percentage of participants (77%) reported that it was “likely” or “very likely” that they would collaborate with another ERC leader from the conference in the future, and many described specific intentions to pursue joint initiatives following the conference. Qualitative comments emphasized the value of candid discussion, peer mentoring, and learning about other centers’ activities and best practices.

Lastly, conference participants were asked “Would you recommend having such a working conference again?” As seen in Figure 6, 94% of participants said “yes” and 6% of them said “maybe.” None of the participant said “no” (two participants did not reply).

When asked to explain their response (optional), 16 comments were provided. Several participants were inspired, with one participant explaining, *“This whole conference was super-inspiring. I’m going to start up new outreach initiatives because I want to emulate what the other centers are doing.”* Other participants were excited about networking and community building, with one participant sharing, *“It’s important to have an opportunity to collaborate with those in similar roles and across ERCs.”* There were also participants who

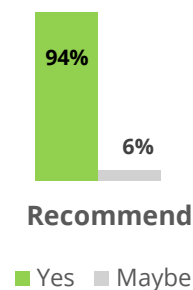


Figure 6: Recommend?

thought about how to sustain the conference after recommending it. As one participant offered, *“This type of conference is needed - maybe it could be regularly what happens in the off years with NSF’s biennial.”*

Interview Findings

Interview findings reinforced these results. Eight of 24 participants who had agreed to being possibly contacted and interviewed were chosen to represent equally the ERC attendees by roles represented at the conference. In the weeks following the conference, all eight participants contacted agreed to a half-hour interview with the external evaluator. In the executive summary by the external evaluator, the following points were made based on these interviews:

- The conference format as a whole was described by participants as “energizing,” with a much richer exchange of ideas compared to more traditional conferences, fostering a sense of camaraderie and community among participants. Interviewees stated they left with not just with knowledge, but with actionable plans and a sense of reinvigoration for their roles within the ERCs.
- Feedback from respondents also suggested that this interactive, facilitator-led format could serve as a model for future conferences, promoting a more collaborative, interactive conference environment.
- There was a consensus among interviewees that NSF funding of such conferences is not only beneficial but essential, as it supports the growth and the ability to adapt to new challenges within the ERCs. The conferences were seen as an investment in the collaborative efforts of the ERCs, ensuring they continue to innovate and lead in their respective fields.

Discussion

Evaluation findings suggest that the ERC Conference for Leaders effectively addressed gaps in existing professional support structures for ERC leaders. The intentionally designed format of the conference, combined with the venue itself, facilitated trust-building, peer mentoring, and collaborative learning in ways that participants perceived as meaningful and actionable. Consistent with research on broadening one’s professional identity development [9], these outcomes were particularly important for individuals new to their ERC leadership roles as they were leaving with a better sense of what was expected of them and more confidence that they could meet these expectations.

Moreover, the facilitated discussion format emerged as a central design feature. By shifting the focus from information transmission to collective discussion, the conference leveraged participant expertise while supporting inclusive participation. This approach aligns with research on adult learning and communities of practice, suggesting its applicability beyond the ERC context.

At the same time, challenges were identified. Some participants noted uneven participation within a few sessions, with a small number of individuals dominating the discussion. Future conferences would benefit from additional facilitator training focused on managing group dynamics and ensuring equitable participation [10]. Another challenge was the complexity of the

conference agenda. Although the agenda and detailed session information for the conference sessions were both available to the participants online, some attendees were unsure where to look or found it difficult to integrate – often on their phone – both documents. Future efforts could utilize conference planning software to assist in communicating more effectively.

Limitations and Future Directions

Findings are subject to several limitations. First, participation was limited to a subset of ERC leaders, which may constrain generalizability. Second, assessment relied primarily on self-reported perceptions and captured short-term outcomes. Longitudinal follow-up would be needed to assess sustained collaboration or longer-term impacts on leadership practice. Although the last session of the conference separated participants by role and was devoted to creating an action plan to keep the momentum of the conference going, in hindsight, the Conference Organizers could have done more to foster the creation of online communities. For example, while the various educators already had NSF-supported monthly meetings where they could discuss the conference and their next steps, SLC/student leaders had no such regularly planned meetings. We could have requested NSF to support such meetings post-conference had we thought of it. At least the organizers reconvened and held a successful SLC/graduate student leaders meeting a year later that emphasized putting in place ways to sustain collaboration across the SLCs [11].

Despite the above limitations, results suggest that role-focused, in-person conferences, intentionally designed with facilitated versus presenter-led sessions, can play a valuable role in supporting leadership development within large, distributed research programs. The ERC Conference for Leaders provides a transferable model for fostering community, mentoring, and collaborative learning among ERC EWD, DCI, and SLC leaders. Future efforts could incorporate regularly planned meetings or hybrid convenings to sustain momentum. Selected design elements may also be adapted for inclusion in existing NSF-sponsored meetings. Continued investment in leadership-focused professional communities, such as forming communities of practice to solve problems a group of ERCs may have, has the potential to strengthen ERC capacity for achieving both technical and educational excellence.

Conclusion

The ERC Conference for Leaders provides evidence that intentionally designed, role-focused, in-person convenings can meaningfully strengthen leadership capacity across centers. Outcomes consistently demonstrated high perceived value across 15 ERCs and 72 participants: 92-94% of respondents reported that the conference strongly promoted community-building, 89-99% reported substantial networking gains, 77% indicated they were likely or very likely to pursue future collaborations, and 94% recommended holding the conference again. Importantly, no facilitated session was rated as “not at all useful,” and qualitative feedback emphasized not only inspiration but concrete next steps and actionable plans.

These findings suggest that the conference moved beyond information exchange to catalyze confidence, clarity of role, and collaborative intent among both directors and graduate student leaders. By creating space for trust, reflection, and shared problem-solving, the conference amplified the educational impact of ERCs through collective learning and sustained collaboration.

A central outcome of this work is the demonstrated effectiveness of a facilitated discussion model for experienced professionals operating in complex, multi-institutional environments. By replacing a predominantly presentation-based format with structured peer dialogue, the conference leveraged participants' existing expertise, fostered candid conversations, and created a safe setting for discussing shared challenges. Participants described the format as energizing and noted that they left not only with knowledge, but with renewed motivation and concrete plans. These outcomes reinforce research on adult learning and communities of practice: leadership development among professionals is strengthened when learning environments emphasize reciprocity, reflection, and collective problem-solving rather than unidirectional content delivery.

Beyond immediate participant satisfaction, the conference model has broader implications for engineering education. Many engineering education initiatives face similar challenges: siloed efforts, limited cross-site mentoring, uneven leadership preparation, and insufficient time for trust-building. The design principles demonstrated here are transferable to these contexts. Specifically, the following elements can be adapted across engineering education settings:

- **Role-specific convenings** that allow individuals with shared responsibilities (e.g., workforce development, student leadership) to engage in focused dialogue.
- **Facilitated, discussion-centered formats** that position participants as co-constructors of knowledge.
- **Intentional trust-building structures**, including co-located sessions, meals, and informal interaction.
- **Action-oriented closure**, prompting participants to identify next steps, collaborations, or implementation strategies.
- **Documentation through shared artifacts** (e.g., collaborative notes) to extend learning beyond the event.

These principles are not limited to NSF ERCs but could be effectively applied in other large-scale engineering education ecosystems, including multi-campus research initiatives, industry-academic partnerships, and graduate leadership development programs. In contexts where professionals must balance administrative, educational, and technical responsibilities, intentionally designed convenings can reduce duplicated efforts and strengthen collective capacity.

Although long-term impacts require further study, these findings indicate that leadership-focused conferences function as strategic infrastructure for sustaining innovation in engineering education. Investing in community-building and peer mentoring strengthens coherence, accelerates the sharing of best practices, and equips leaders to adapt and collaborate effectively in increasingly complex environments.

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