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Work in Progress: Measuring Authentic Diversity, Equity, and Inclusion Efforts in a Multiscale Sustainable-Food System Research Network

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Measuring Authentic Diversity, Equity, and Inclusion Efforts in a Multiscale Sustainable Food System Research Network (Work in Progress)

Introduction

The COVID-19 pandemic resulted in unprecedented social, environmental, and public health impacts that disproportionately affected communities experiencing historic and ongoing oppression. The severe impact of the pandemic on these communities exposed the need for evidence-informed solutions that promote equity. Conducting equity-centered research requires interdisciplinary efforts that intentionally focus on the complex, dynamic, and interacting factors that comprise systems.

Given the urgent need for equity-centered research, research networks can play a crucial role in advancing evidence-informed solutions. As defined by Wasserman and Faust (1994), research networks bring together individuals or organizations with a common interest in a particular field of study, providing a platform for interdisciplinary collaboration and collective expertise that can help to address complex challenges. Research networks are often interdisciplinary in nature, bringing together scholars from a variety of fields to tackle complex research questions, share ideas, and disseminate findings to a wide range of audiences (Newman, 2001; NCER, n.d.). Research networks are unique in that they cultivate their own culture, norms, structures, and procedures, which shape the research agenda of all network members. Thus, these networks can center and promote equity, as well as a culture of diversion and inclusion, in all research projects and hold each other accountable throughout the duration of the collaboration. However, little is known about the formation of the culture of these networks, and how they are shaped by the procedures chosen, promoted, and reinforced by network leaders, supporting institutions, and personnel.

Diversity, equity, and inclusion (DEI) is a framework for establishing and maintaining settings where everyone can experience inclusion, respect, and worth (Cox, 1993; Lee et al., 2022). The framework insists that organizations must actively look for and remove structural barriers to equity while fostering diversity and inclusion at all organizational levels, hence ensuring DEI efforts are authentic and not performative. Incorporating DEI principles within a research network may lead to a more equitable and inclusive research environment that values the contributions of all members and promotes scientific progress. Research collaborations that are more diverse and inclusive have been shown to produce more innovative research outcomes, and to better represent the interests and perspectives of a wider range of stakeholders. Findings from Freeman and Huang (2015) suggest that diversity in inputs, as indicated by author location, ethnicity, and references, results in higher contributions to research, as indicated by citations and impact factors. Research has also shown that networks that prioritize DEI are more likely to attract and retain talented individuals from underrepresented groups, which can enhance the network's overall expertise and impact, as well creativity in work output (Lee et al., 2022;

Hundschell et al., 2022). That said, there is little research that documents the planning, implementation, and evaluation of DEI principles in research networks.

In 2021, the National Science Foundation funded the Multiscale RECIPES (Resilient, Equitable, and Circular Innovations with Partnership and Education Synergies) for Sustainable Food Systems to create a research network of over 40 researchers and 15 institutions to address food waste in the United States. One of the goals of this multiscale sustainable food system research network (RECIPES) is to evaluate the extent to which the research network effectively promotes diversity, equity, and inclusion, and to derive insights that can guide best practices for similar research networks and collaboratives. In this article, we outline the recent efforts of the network to develop and implement DEI goals and objectives. Additionally, we describe challenges the network has faced in pursuing these goals as well as ongoing efforts to monitor and evaluate progress towards DEI objectives.

Organizational Structure of the RECIPES Research Network and Clusters

RECIPES consists of eleven (11) interdisciplinary "clusters": Data, Modeling, Community, Typologies, Circular, Circular-prevention, Co-design, Education, and Diversity and Culture of Inclusion (DCI). These clusters meet monthly to facilitate the convergence of knowledge to address the broad research questions of the network. Members of network leadership, faculty, postdoctoral fellows, and graduate students across the RECIPES research network can participate in clusters. The DCI cluster was established to ensure the network had a central body to manage DEI efforts. Members of the DCI cluster are charged with coordinating all diversity, inclusion, and equity efforts, including implementation, engagement, and assessment.

Definitions of Diversity, Equity, and Inclusion

While there are numerous interpretations of diversity, equity, and inclusion, it is crucial to contextualize them and define them clearly for effective communication and a shared understanding within the research network. This process is essential for developing strategies and policies that tackle challenges related to diversity, equity, and inclusion. In the subsequent section, we outline the definitions of diversity, equity, and inclusion as they are understood within RECIPES. These definitions will continue to evolve as we engage in data analysis, and they serve as a foundation for our work. Given the varied interpretations of these terms within our expansive network, we aimed to create simple definitions that leave room for inclusivity rather than overly specific ones that could limit it. We intentionally kept our definitions open-ended and intend to revise them as we progress in our work as a cluster responsible for DEI.

Diversity refers to characteristics that make individuals unique, including both visible and invisible differences that shape individuals' experiences and perspectives (Cox, 1994, Gurin et

al., 2004). Under diversity, the demographics at play within the research network included: race, national origin, gender identity, sexuality, disability, position in academia (faculty, postdoctoral scholar, graduate researcher, undergraduate researcher), disciplinary background, and historically under-represented groups.

Equity involves ensuring that all individuals have fair access to the distribution of resources, opportunities, and support they need to succeed and achieve their full potential, regardless of their backgrounds or identities: It involves recognizing, acknowledging, and addressing historic and systemic inequalities (Adams & Bell, 2007; Penner et al., 2019). The RECIPES research network focuses on equity both within its operations and its research. It acknowledges that inequities in food access, affordability, working conditions, and environmental exposures undermine the functioning of the food system's resilience and sustainability. In this paper, we focus our attention on how equity is operationalized within and between in-network members and community partners.

Inclusion is the practice of creating an environment that actively seeks out and values diverse perspectives and backgrounds, promotes diversity and equity, and works to remove barriers that prevent full participation (Homan, 2019; Thomas & Ely, 1996). In an inclusive research network, members can fully participate in activities and decision-making processes.

In a research network, diversity, equity, and inclusion refer to a set of values, behaviors, structures, processes, and practices that recognize and respect individual differences, thereby creating and sustaining a research community culture where all individuals feel included and empowered to contribute network (Lee et al., 2022). To achieve this, the network must actively seek out and address systemic barriers to equity, and promote diversity and inclusion at all levels of the network to ensure all individuals have access to the resources and opportunities they need to thrive.

DEI Efforts Within the Network

Leadership Buy-in

Leadership buy-in is considered important in organizational diversity, equity, and inclusion (DEI) efforts because it provides the necessary resources, support, and accountability needed to create meaningful change. When leaders prioritize DEI, they signal to the rest of the organization that it is a priority, creating a culture where DEI efforts are more likely to succeed. Deitch et al., (2018) claim that leadership buy-in could lead to more diverse leadership teams and more inclusive policies and practices.

Rooted in values that allowed for diverse representation, equity, and a culture of inclusion, the network leadership, from the onset of the project recognized and acknowledged the potential power dynamics at play within and outside a multiscale network structure. Thus, to set the tone

of the larger network, the core team of PIs and Co-PIs were scholars from racially diverse backgrounds (South Asian, White, and Black); the extended team of senior personnel also covers a range of backgrounds – race, gender, and academic disciplines. In addition, the research network comprises members from several universities that serve historically underrepresented groups and that are in metropolitan regions that have significant racially- and economically-marginalized populations (Table 1). Many of the non-profit and community partners participating in RECIPES's projects work in marginalized Black neighborhoods. This diversity was deemed imperative for a robust research program, outreach, and educational activities.

In the early phases of the project, the network leadership held a workshop aimed at discussing how they might enable or ensure a culture of inclusion within their collective work. The workshop was a platform for discourse and brainstorming to identify and characterize themes that could impact the DEI culture of the network. Some topics covered in detail at the network meeting included: rethinking traditional hierarchies, building cultures where people feel comfortable questioning authority; ensuring no one feels 'tokenized' in the network or the work done with communities; and efforts to make products, content, and meetings more accessible. Outcomes of the workshop included a plan to develop a DEI statement for RECIPES to promote a shared understanding of expectations; plans to create a process and communication channels within the network to raise concerns about DEI issues with the option to remain anonymous; and plans to create educational opportunities for network members aimed at learning to how to communicate accessibly internally, externally and across disciplines. The efforts of the network leadership aligned with the RECIPES's missions which include creating and sustaining a culture of diversity, equity, and a culture of inclusion through tools of self-assessment of network activities, the development of values and ethics, and the opportunity to share findings to serve as guidance for other research networks.

The network leadership also introduced a self-reported demographic information survey for the research network. The anonymous survey on self-reported demographic information provides valuable data to assess the current representation and participation of individuals from diverse backgrounds. The collected data will help identify potential disparities in access and opportunities and guide the development of targeted strategies to increase diversity and equity in the network.

Table 1: Groups Represented in the RECIPES Research Network

Stakeholders		Groups Represented
Organization	University 1	Historically Black College & University
	University 2	On the pathway to becoming a Hispanic Serving Institution
	University 3	Home to the Institute for Individuals with Disabilities
Regions	Midwest City 1 East Coast City 1 Southern City 1 Midwest City 2 East Coast City 2 East Coast City 3	Metropolitan regions with significant racially- and economically-marginalized populations

DEI Goals & Objectives

This section presents an overview of the DEI goals and objectives and the process of creation, plans for corresponding assessment or measurement or evaluation of the goals and objectives, as well as future work to determine acceptable evidence of the implementation. To achieve this, the DCI made use of the Backward Design process as a guiding framework. In their book, *Understanding Design*, the authors propose three stages of Backward Design: the first stage of design is to identify desired outcomes; the second stage is to determine acceptable evidence of learners' (in our case, "stakeholders") understanding and proficiency; and the final stage is to plan appropriate learning experiences and instruction that align with the items designed in the initial stages (Wiggins, et al., 2005). The DCI cluster's work in developing DEI goals and objectives involved identifying key areas for improvement, setting clear targets, and establishing strategies for achieving those targets.

Development of Goals & Objectives

Building on the work of the network leadership, the DCI cluster created DEI goals and objectives that expounded upon the RECIPES's Diversity and Culture of Inclusion Statement by providing specific and measurable actions to achieve the center's broader mission of promoting diversity, equity, and inclusion. While a Diversity and Culture of Inclusion statement outlines the values and principles that guide the center's work, goals and objectives provide a concrete roadmap for achieving those values in practice. Table 2 shows the DEI Action Plan Matrix, created by the DCI cluster, which provides a practical framework for measuring and operationalizing the

center's commitment to DEI. In the creation of the goals and objectives portion of the matrix, the questions asked included:

1. What are the desired outcomes (DEI goals and objectives) of the network?
2. Who are the network partners (in-network or community) this desired outcome relates to?
3. Who is the main stakeholder impacted by the desired outcome?
4. What are the DEI indicators or metrics associated with this desired outcome?
5. What action verbs make this goal specific, measurable, and attainable?
6. What are the accepted definitions of the DEI indicators identified?
7. What aspect of the DEI framework does this outcome relate to?

Table 2: DEI Action Plan Matrix

Goal	Partner Type	Goal / Objective	Stakeholder	Indicator / Metric	Action Verb (s)	RECIPES Shared Definition (s)	DEI Category
A	In Network	Increase the **power, representation, and participation of students** who reflect the diversity of global society but who have been historically underrepresented in sustainability research	Students	Power	Increase	the ability to control resources, access opportunities, and make decisions that affect individuals and communities	inclusion, equity
				Representation		the presence and visibility of different social groups in various contexts, including workplaces, schools, and the media; the extent to which individuals from diverse backgrounds are included and valued in decision-making processes and organizational structures	diversity, inclusion
				Participation		the involvement and engagement of individuals and communities from diverse backgrounds in decision-making processes, activities, and initiatives	diversity, inclusion
B	Community	Develop **accessible communication and engagement mechanisms** that are beneficial for all	Community / External Partners	Accessible communication	Develop, Create, Engage	the provision of information and communication in a way that respects and responds to individual differences and ensures that all individuals can participate fully in society	diversity, equity
				Engagement mechanisms		processes and strategies that facilitate the involvement and participation of diverse individuals and communities in decision-making processes, activities, and initiatives	diversity, equity, inclusion

Assessment

Assessing the effectiveness of Diversity, Equity, and Inclusion (DEI) efforts is essential to ensuring that the network is making a meaningful impact. This assessment will take various forms, such as gathering feedback from participants, monitoring quantitative metrics, and conducting a qualitative analysis of the desired outcomes. The assessment process will be ongoing, with regular check-ins and evaluations to ensure that the DEI goals and objectives are being met and areas for improvement are identified and addressed. The DCI cluster asserts that an effective DEI assessment must be comprehensive, incorporating a range of data sources to provide a holistic view of the impact. It is also important to ensure that the assessment process is inclusive and participatory, involving stakeholders both from within the network and from participating communities. By engaging in rigorous and ongoing DEI assessment, the network will continuously refine and strengthen their efforts toward creating equitable and inclusive environments.

The DCI cluster will work to create a systematic process to determine the merit, worth, value, or significance of each of the desired outcomes. We will make use of formative and summative forms of assessment of DCI efforts. The purpose of formative assessments is to provide information to stakeholders to help them modify or improve the structures and processes guiding their work to achieve the DCI goals for the network. The purpose of summative assessments is to evaluate DCI implementation efforts at the end of a prescribed period. The terms measurement, evaluation, and assessment are used interchangeably in our work.

Determination of Acceptable Evidence

As part of our ongoing efforts, we will determine acceptable evidence for the assessment of DEI efforts, a critical aspect of the assessment process. Acceptable evidence should be relevant, reliable, and valid, meaning that it should accurately measure the intended outcomes and be based on rigorous and sound research methodology. It is important to establish clear and consistent criteria for acceptable evidence to ensure that the assessment process is transparent and rigorous. By identifying acceptable evidence, the network can ensure that they are measuring the right outcomes and that the assessment process is contributing to the continuous improvement of their DEI efforts. The determination of acceptable evidence will be guided by the goals and objectives of the DEI efforts, and it should consider the context of the program and the specific needs of the community it serves. For instance, some acceptable evidence may include data on participation rates, satisfaction surveys, or other quantitative measures of the program's impact. Additionally, qualitative data such as feedback from participants and stakeholders can also provide valuable insights into the program's effectiveness and aid in monitoring progress.

Relevance to Engineering Education

We propose that measuring authentic Diversity, Equity, and Inclusion (DEI) efforts in this multiscale sustainable food network is crucial for engineering education spaces and higher education in several ways. Our findings can ensure that engineering fields involved in sustainable food networks are inclusive and equitable, providing equal opportunities for the representation of groups such as women and people of color, who have been historically underrepresented in these spaces. Sustainable food networks are essential for addressing global challenges such as climate change and food insecurity, and measuring DEI efforts can ensure that diverse perspectives and experiences inform engineering solutions to these challenges. Promoting and measuring DEI efforts can help attract and retain diverse students, faculty, and other related stakeholders in engineering programs focused on sustainable food systems, leading to a more diverse and inclusive engineering workforce. Our work in evaluating our commitment to diversity and a culture of inclusion aims to serve as a guide for future research network initiatives.

Conclusion

This measurement of diversity, equity, and inclusion efforts in this multiscale sustainable food system research network, RECIPES, is essential to ensuring that the center's efforts towards DEI are more than just symbolic gestures but are backed by substantive actions that result in measurable progress toward equity and inclusion. Our findings as we progress in our measurement efforts will serve as a model for promoting authentic DEI efforts in other research networks. The network has demonstrated the importance of intentional interdisciplinary efforts, actively identifying, and addressing structural barriers, engagement mechanisms, and accessible communication to create a culture of inclusion that values and respects individual differences. The DEI goals and objectives, combined with regular assessment and evaluation, will allow the network to identify areas for improvement and develop targeted strategies for increasing diversity, equity, and inclusion. While there is still much work to be done to achieve a truly equitable and just society, the efforts of the RECIPES multiscale sustainable food system research network provide a promising path forward. By continuing to prioritize DEI efforts and leveraging the power of interdisciplinary collaboration, we can work towards a more inclusive and equitable future in multiscale sustainable food system research networks, in engineering education spaces, and in higher education.

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