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Initiating and sustaining international ethnic engineering education scholarly communities in the United States

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Abstract

This paper shares and compares the experiences of initiating and sustaining two graduate student-led international ethnic engineering education scholarly communities for Chinese and African groups. Our goal is to reflect on our lived experiences and inspire future students and academics to cultivate such communities to broaden participation and enhance research capability. We adopt the Community of Practice (CoP) as the theoretical framework and opt for comparative ethnographic narrative analysis as the method in this paper. Specifically, we focused on the following dimensions of two communities led by the two authors: (1) the origin and purpose; (2) the characteristics; and (3) practices. Our findings suggest that the reasons behind and the processes of forming these two communities were alike. Interestingly, both communities differed in terms of their leadership structures and the ongoing activities. In this paper, we highlight how both communities value providing and sustaining a safe space for their members to explore and develop their professional interests and intersectional identities. Thus, we call for the emergence of similar communities that could help ethnic engineering education communities not just survive the rigors of their domains of inquiry, but thrive throughout their entire doctoral or professional careers.

Introduction

Cultivating research capability is a central focus in higher education and particularly critical for engineering education research, an emerging but rapidly developing field of inquiry. The early institutionalization of engineering education as an academic field coupled with building a community of affiliated scholars to enhance its research capability [1]–[3]. Through funding from the National Science Foundation, pioneers created a series of workshops to disseminate state-of-the-art education research methods and promote a Community of Practice (CoP) [1]. The participants consisted of three groups of "intellectual neighbors" – engineering educators, learning scientists, and faculty developers in higher education at the national level. Similarly, lessons learned from the Institute for Scholarship on Engineering Education (ISEE) CoP model include 1) the importance of the local context and interest of cultivating a CoP for success; and 2) community building and interactive feedback as the most critical design principles for a successful CoP [2]. In Europe, the advancement of engineering education research appeared in the form of CoP as a loose support network of like-minded scholars to further exchange ideas [3], e.g. the formation of Nordic Network in Engineering Education Research [4].

More recent literature in engineering education has shared the experiences of capability building related to a CoP. For example, Matemba and colleagues [5] depicted how a professional community, the Engineering Education Research Network in Africa, catalyzes scholarship and mentorship in engineering education research. They highlighted the benefits of such a research community, including capacity development, networking, emotional support, impact on professional identity, social and environmental impact, and breaking borders. Goldsmith et al. [6] used autoethnography to share their journey into engineering education research by engaging as a research community, the Centre for Research in Engineering & Information Technology Education in Australia. They identified the crucial role of this community in establishing a safe space for the growth of novice engineering educators for both knowledge-building and socialization. Furthermore, Jensen et al. [7] described an NSF grant-based mentoring program in the United States, Research Initiation in Engineering Formation, which paired engineering faculty in traditional disciplines with experienced engineering education researchers to conduct educational research in engineering. Such mentoring relationships facilitated professional development and authentic engagement for novice faculty and helped reduce the uncomfortable feeling of "imposter syndrome" in the new field of inquiry.

A key observation of the literature summarily described shows that extant studies primarily focus on faculty development. Worldwide, numerous graduate programs focusing on engineering education have been established, which ushers in the argument that graduate students could also benefit from such formal or informal communities outside their programs [3]. Emerging research on the experiences of international graduate students in engineering education programs buttress our point [8]–[10]. These studies suggest that international engineering education graduate students complain about not being heard or understood, and lack a sense of belonging as they navigate the limited opportunities available to them by virtue of their international student statuses. Responding to a call to genuinely support international engineering students' well-being

and career development and counteract their othered experiences [10], this work aims to compare and contrast the experiences of initiating and sustaining two student-led international ethnic engineering education scholarly communities for Chinese and African groups. In this paper, we operationalize international ethnic groups as groups that identify as non-domestic American and belong to a common origin, national (e.g., Chinese international students) or continental (African international students). Our goal is to reflect on two key community personnel's lived experiences and inspire future students and academics to cultivate similar communities to broaden participation in engineering education and enhance research capability.

Theoretical Framework

We adopted Community of Practice (CoP) as the theoretical framework for this work. Wenger and colleagues define a CoP as "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis [11] (p.4)." This definition unearths three fundamental elements: a *domain* of knowledge about particular topics; a *community* of people concerned about and pursuing advancement in this domain; and the *shared* practice undergoing development to be effective in its domain [11]. Streveler et al. [1] argued for the legitimacy of engineering education as a community of practice featured in its rapid expansion in terms of the domain of knowledge on how people learn engineering and the best practices in educational research; groups of members who might be the core community, active participants, and those not yet part of the community; and joining professional organizations to initiate collaboration with partners to facilitate shared practice, such as Rigorous Research in Engineering Education (RREE) workshops. The benefit of cultivating such a CoP for engineering education has been documented: 1) advancing the scholarship of teaching and learning; 2) establishing scholastic rigor; 3) bridging research and practice; 4) improving faculty professional development; and 5) facilitate knowledge sharing within a community of practice [2]. Thus, emphasizing the social relationship among members of a CoP could lend opportunities for establishing and developing an identity towards the community and building distributed, communal expertise [2].

Specifically, positioning our international ethnic scholarly communities as the structures locates the *domain* as engineering education; the *shared practice* as sharing, discussing, and informal mentoring surrounding mutual support on learning the engineering education research enterprises; and the *community* consisting of (former and current) graduate students enrolled in or about to enroll into engineering education programs. Echoing the root of CoP, knowledge sharing and building serves as the basic and central function of such scholarly communities.

Methodology

We opt for a comparative ethnographic narrative analysis in this paper [12]. Narrative data analysis facilitates the understanding of stories of lived experiences in terms of its content, structure, or function [12]. The comparative ethnographic narrative analysis method (CENAM) is particularly effective in exploring how culture is revealed from a narrator's perspectives [12]

(p.3). The procedure of this method consists of independently identifying themes for each sample respect to the research questions and then comparing the discovered themes across samples following the principles of cross-cultural analysis and ethnographic procedures. Specifically, the research group teams up to compare the definitions, the grounded exemplars, and the meaning embedded in identified themes respective to its culture [12]. Following that, the emerged concepts that are potentially culturally distinct are closely scrutinized to eliminate culturally blind bias, to optimize the codebook, and improve the overall trustworthiness of the research. Next, a metanarrative, the overarching interpretation of the cultural circumstances, is executed to revisit the stack of findings, and conforming the shared and distinct phenomena and their interpretation.

CENAM lent us an opportunity to narrate and compare our respective lived experiences in starting and sustaining communities of practice peculiar to our individual international ethnic communities from a cross-cultural perspective. Essentially, we chose this method to dive into how meanings, identities, and behaviors were shaped by different cultural contexts. Our operationalized method involved periodic meetings to discuss the mainstays of both the African Engineering Education Fellows (AEEF) in Diaspora group and the Chinese Engineering Education Club (CEEC). These conversations were tracked with notes taken during our meetings as we discussed the differences and similarities of the groups. Specifically, we focused on the following dimensions of two communities led by the two authors, including (1) the origin and purpose of the community; (2) the characteristics of the community; (3) the practices of the community.

Findings

The comparison of the two international ethnic communities of practice is summarized in Table 1 below. The findings suggest that both communities were formed around the same time, with similar purposes of serving as safe spaces and resources to boost the professional development and identity of their members. Likewise, the diversity and the membership structure for both communities are similar in terms of the geographical locations of members, work and study experiences, and volunteerism. Members of both groups co-locate in the globe while most of them study or work in the United States, which coincides with the fact that the United States dominate the scholarship of engineering education research [3]. Further, most members of both groups are current graduate students in engineering education related programs or departments, with a small portion of members holding postdoc or faculty positions at various institutions. Similarly, members of both groups commit to diversified research agenda and interests. It is notable that both communities till date record 100% completion rates for members involved in postgraduate education by developing scholarship and peer mentorship in EER.

Table 1
Comparison for two international ethnic engineering education scholarly communities

		Chinese Engineering Education Club	African Diaspora Group
Initiation of CoP	Origin	Shortly after the 2019 ASEE conference, the first conference for the community facilitator	Started in 2020 during the mandatory stay-at-home orders prevalent in the US due to the Covid-19 pandemic
	Purpose	The need to build a community to connect Chinese students and scholars for information sharing and inquiry with mutual support	To serve as a virtual community to help members navigate their engineering education programs in lieu of absent culturally relevant physical communities
Characteristics of the community	Size	12 graduate students + 3 postdocs + 3 early career faculty and staff	32 graduate students + 2 postdocs + 5 early career faculty + 2 senior faculty
	Age of community	4 years	3 years
	Geographic distribution	Majority of members live in the United States in various states; two live in Europe, one in Australia, and one in China	Most of the members live in various states across the US; others live in Europe, Australia, Canada
	Diversity	Members are holding different levels of seniority related to EER and coming from various institutions with diversified research interests.	
	Boundary	All members identify as Chinese and have overseas study or work experience.	All members identify as African and also have varied study and work experiences abroad
	Membership	Volunteering	

	Leadership	Shared leadership where everyone is welcome to facilitate discussions and events	Two-fold 1. Informal shared leadership - all members can initiate conversations, ask questions, share resources, collaborate on scholarship. 2. Formalized structure that evolved into a non-profit organization in 2023 with representatives nominated from the group for international activities
	Culture/Value	Informal mentoring; Emotional support; Building professional, social, and cultural capitals	Pan-African philosophy, informal peer mentoring and support for professional growth
	Organization	Loose and aperiodical	Default structure is informal; formal activities are channeled through assigned representatives
Shared Practices	-	Spontaneous Q&A and information sharing in the chat channel; Informal gathering at major EER conferences; Dyadic consultant and cooperation	Frequent discussions on WhatsApp group, peer collaborations on research projects; scholastic collaborations for EER papers; informal gathering at major EER conferences, periodic in-person meetups
	Persistence	100% retention and/or attrition rate for all members involved in postgraduate studies so far	

Conversely, the differences of both communities emerge from their different leadership and organizational structures. The major difference rests in the leadership structure. The African Diaspora group formed a formal executive council to facilitate scholastic collaboration opportunities and international activities. While individual scholastic collaborations exist in both communities, the AEEF in Diaspora group embarks on formal collaborations to present at engineering events in Africa, publish at conferences, and apply to grants. The informal group meets periodically to discuss emerging events, celebrate members' achievements, or seek advice regarding research. In parallel, based on CEEC's members' individual research interests and expertise, dyadic or triadic collaboration sometimes gets established as the Chinese community

embraces a loose organization structure with shared leadership, where everyone is welcome to raise questions, seek for advice, and call for gatherings from the entire group. Another notable difference pertains to membership. While all CEEC members are required to have extensive study abroad experiences to be able to hold membership, the AEEF in Diaspora group attracts any individuals who identify as Africans in the Diaspora within the field of engineering education.

Due to the different sizes of members, sustaining the communities took place in different forms of shared practices. For the Chinese community, the spontaneous Q&A and information sharing and the informal gathering at the major conferences help the community members to continuously maintain their intersectional identities as Chinese identities and the engineering education research scholar identity. For the African Diaspora community, the growth model relies on informal but regular gatherings, recentering and decolonizing members' experiences, expanding the representation of member African countries within the group, and tackling projects in Africa and goals such as Agenda 2063 [13] by interfacing with other existing external bodies. However, both communities value the virtue of providing and sustaining a safe space for its members to explore and develop their professional interests and intersectional identities.

Conclusion

This paper shares and contrasts the experiences of two key personnel belonging to two different international ethnic engineering education scholarly communities, who observed and contributed to the initiation and development of their support communities. The purpose of the two groups coincides with the ethos of Community of Practice theory, which unites group members to develop a shared practice and boost their professional identity formation and development. The comparison of the two groups focuses on three major themes: (1) the origin and purpose; (2) the community characteristics; and (3) shared practices. We argue the major difference occurs in the leadership structure and the ongoing activities that the two communities engage in as shared practice. The difference in both communities only shows that there is no universal approach to building international ethnic engineering education scholarly communities. However, the attendant benefits demonstrated by the measures of persistence, scholarship, and mentorship validates the need for these communities. Thus, we call for more similar communities that could emerge for meaningful groups of individuals to survive and thrive in their domain of inquiry and stay encouraged and supported to experience their entire doctoral or professional careers.

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