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WIP: An early glimpse into the 'who', 'what', and 'why' of faculty interactions about engineering teaching and learning

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Introduction

Faculty interactions are common in academic workplaces, where faculty members interact, communicate, and form relationships and connections. Relationships are important and vital in every sphere of social life, including academia. Relationships play an important role in developing individual and systemic capacity for change [1-3], which refers to the ability and empowerment of system actors to adapt to changing needs and achieve shared objectives [4-7]. In STEM higher education, we posit that relationships among faculty affect their **STEM education capacity**—their ability to adapt to students' needs and achieve education-related objectives. This paper examines engineering faculty interactions, the formation of relationships, and how teaching and learning discussions occur within academic settings. We aim to uncover how faculty members develop and leverage their relationships and communities. We also explore how faculty members approach and reach out to their colleagues for diverse, multifaceted, and specific needs related to teaching and learning. Our study is part of a broader research project that assesses STEM education capacity through social network analysis, develops tools to assess capacity building, and evaluates capacity development initiatives in higher education.

This work-in-progress paper addresses the following research question: **What kinds of relationships and communities do engineering faculty members foster, and to whom do they reach out for assistance and support?**

Theoretical Framing and Literature Review

We designed our study around the Five Capabilities Model of Capacity, which splits the construct of capacity into five capabilities: capability to (a) commit and engage, (b) carry out tasks, (c) relate and attract support, (d) adapt and self-renew, and (e) balance diversity with coherence [8]. We selected this model because it is one of the few existing models of capacity that breaks the construct down into observable components. We used the 5C Model to align our interview questions with each capability of the model, as we posited that different kinds of relationships and interactions between faculty would support different capabilities. Table 1 lists examples of activities for each capability.

Table 1: Five Capabilities (5C) Model of Capacity [8]

Dimension of capacity	**Examples of activities aligned with capability**
Capability to commit and engage	Mobilize resources; create autonomy for independent action
Capability to carry out tasks and produce results	Perform at acceptable levels; generate substantive results; sustain productivity over time
Capability to relate and attract support	Establish partnerships and alliances, and leverage resulting resources; build legitimacy in the eyes of stakeholders
Capability to adapt and self- renew	Proactively anticipate and respond to new challenges; learn by doing; cope with change; develop resiliency

Capability to balance diversity with coherence	Balance control and consistency with flexibility; integrate and harmonize plans across a diverse set of actors

The environment and culture within an organization play a crucial role in shaping how people interact, as supportive environments foster healthy interactions. Research indicates that both contextual and individual factors—such as environment, culture, personality traits, and motivation—significantly influence professional interactions among faculty members [9]. Many studies have focused on the interactions and relationship between students and faculty members, but there is relatively little research and literature focusing on the interactions and relationships among the faculty members, and how they approach each other for diverse needs and support. One such study has shown that faculty interactions result in myriad positive outcomes, including educational achievement, academic welfare, and psychological well-being [10].

Methods

In this first phase of the study, we conducted semi-structured interviews with five faculty members from the college of engineering in the Spring semester of 2024. The study is based at a large, public university in the Southeast United States. We chose a qualitative, semi-structured interview format to solicit deep, detailed descriptions of faculty interactions through open-ended questions. The interview questions used the critical incident technique [11] and were based on the Five Capabilities Model of Capacity. The interviews ranged from 45 to 60 minutes each. We included our full interview protocol as an appendix.

We selected the participants based on their participation in community-based faculty development activities. We conducted a pilot interview among ourselves, as a trial to check the quality and relatability of the interview questionnaire. After making minor changes to the interview protocol, we finalized the interview questions. We recruited participants via email and asked them to sign a consent form before the interview, following an approved IRB protocol. The participants consented to audio recording of the interviews and to the use of data for further analysis.

We transcribed the interviews verbatim using Otter.ai software and verified them manually to ensure the correctness of the transcripts. We performed qualitative coding and thematic analysis using MAXQDA software, employing in-vivo and axial coding methods. A study shows that people consider both the intent and outcome of actions when judging social interactions [12]. We categorized the codes into two groups and color-coded them for visual clarity: blue and red. The blue codes represented the “who” and “what” of the interaction, indicating who participants talked to and what they discussed. The red codes represented the “why” of the interaction, indicating the purpose and the intent of the conversation. This color coding helped us explain the codes more effectively and improved our understanding of the interactions. In most cases, we inferred the red and blue codes based on the context, as the interview questions did not explicitly address them. From the identified codes, we developed broad themes and categories, segregating the codes into these categories, as described in the results section.

Additionally, we used MAXQDA's code relations browser to analyze possible correlations between the blue and the red codes. We checked, verified, and discussed the codes using a peer examination approach among the authors to ensure rigor in the study [13].

Results

The analysis yielded many interesting insights into the interactions and relationships among faculty members, shedding light on the situations and instances which lead to interactions and on the purposes of these interactions.

The major themes for the blue codes ("who" and "what" of the interaction) consisted of the following:

1) Collaboration and discussion with colleagues: All participants described reaching out to fellow faculty members for varied reasons, such as, for help and support from experienced faculty and peers; for resources, techniques and new technologies; and lastly, for ideation and collaboration purposes. One participant described learning about a new classroom assessment technique: *"So this is that active learning piece [I got from another colleague]. There was this technique called the muddiest point. And I've now employed that in [course], primarily, and I'd like to do that in [different course], as well."*
2) "Interactions of opportunity" with colleagues and mentors: All participants described important interactions that were unplanned and resulted from running into someone in the hallway, in a common room, or at an event. For example, one participant mentioned about running into a colleague at a copy room: *"I would go to anyone in our college—lecturers are going have a conversation. […] Like, if you are in a copy room and you're copying [and you see a colleague], you have a conversation, and you are being asked or asking something."*
3) Engagement in structured teams and communities: Most participants discussed engagement with certain communities, and all participants sought professional development from at least one other source, such as seminars, workshops etc. For instance, one participant commented on participating in an educational research incubator program: *"I think that goes along on the fact that we're having these weekly meetings […] have been creating this community that now we work all together, creating these tools that help us keep improving the program that ultimately serves the student success."*
4) Students and TAs: Most participants talked about feedback from students and TAs as critical input for their teaching and learning. For reference, one of the participants talked about receiving valuable feedback from the students: *"I also have midterm surveys […] It's anonymous, so I get their feedback that way. And I really try to create an environment where students are comfortable in approaching me, to bring up any questions or concerns."*

The major themes for the red codes ("why" of the interaction) were as follows:

1) Support from faculty members and communities: All participants discussed working with other faculty to learn or better themselves in the domain of teaching and learning. Most discussed reaching out to other faculty for 3 kinds of support: (1) advice, (2) collaboration, and (3) resources. For example, one faculty member mentioned reaching out to an experienced colleague for a specific need: *"I actually made an appointment with […], [I] had a discussion with him because we both have a large section, class of like, over 100 students, and I was curious about how he handled attendance and his late work policy."*

2) Persuasion: All participants mentioned persuasion for different things, such as for resources/approval, for adoption of a new idea/tool in the class, or persuasion for someone else to try a new teaching style or technique. For reference, when discussing why they encouraged their colleagues to use a specific 3rd party gradebook tool, one participant said, *"If there are more faculty using it, it might warrant the money [to implement a new grading tool]. I think it would be a really good tool, especially if you're doing online masters, because [our learning management system] is not good tool for grading."*
3) Support others: Most participants described offering themselves as resource to others, for varied reasons and situations, such as being an advisor for student clubs, being a teaching and learning resource for colleagues, or offering themselves for hiring processes. For example, one participant described offering themselves for writing support: *"I routinely interact with [other faculty] and talk about teaching stuff. And some of them, I do writing seminars in their classes […] in addition to my classes that I teach, I also, kind of offer myself as a resource for [them]."*

The code relations browser analysis found that participants primarily engage in communities and teams for self-betterment, while participants approached individual conversations for a wider array of reasons, especially discussions and collaboration. Faculty who reached out to more experienced peers did so for advice more often than any other reason.

Discussion and Conclusion

Our initial findings suggest that interactions and relationships can emerge from various settings and occasions within the context of teaching and learning. These results indicate that capacity building manifests in diverse situations and satisfies divergent needs. The study has implications for informing future faculty development initiatives and programs to enhance the interactions and relationships among faculty members. First, because meaningful conversations about teaching and learning often emerge from "interactions of opportunity," creating spaces for informal gatherings (e.g., social breakfasts or lunches) is important to allow these conversations to emerge regularly. Second, because faculty reach out to colleagues for a variety of support, it is important that faculty are aware of their colleagues' expertise and strengths. Faculty developers can facilitate this process by creating designated spaces or events where faculty can showcase their approaches, innovations, and experiences around teaching and learning.

While the study yielded many interesting insights, our study was limited in that participants struggled to respond to our critical-incident-style interview questions. We expected that faculty members would have specific kinds of relations and connections for each of the capacities mentioned in the 5C model, but it was found to be untrue in our study. There were no specific and fixed 'go-to' relationships; instead, casual occurrences and connections evolve depending on several factors, such as proximity, friendship, or random conversations. We found that many meaningful interactions around teaching and learning were unplanned, emerging from casual interactions, community engagements and events, and sometimes random interactions in the hallway. For future interviews, we will focus on understanding how interactions come to pass at a more basic level and attempt to map these interactions to the 5C Model as part of analysis.

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References

[1] M. Gibbon and D. Pokhrel, "Social network analysis, social capital and their policy implications," *Participatory Learning and Action*, vol. 36, pp. 29-33, 1999. [Online]. Available: https://pubs.iied.org/6334iied?s=PLA&b=d.

[2] M. E. Hambrick, P. G. Svensson, and S. Kang, "Using social network analysis to investigate interorganizational relationships and capacity building within a sport for development coalition," *Sport Management Review*, vol. 22, no. 5, pp. 708-723, 2019, doi: 10.1016/j.smr.2018.12.002.

[3] J. Luque et al., "Using social network analysis to evaluate community capacity building of a regional Community Cancer Network," *Journal of Community Psychology*, vol. 38, no. 5, pp. 656-668, 2010, doi: 10.1002/jcop.20386.

[4] A. Bain, A. Walker, and A. Chan, "Self-organisation and capacity building: sustaining the change," *Journal of Educational Administration*, vol. 49, no. 6, pp. 701-719, 2011, doi: 10.1108/09578231111174839.

[5] H. Baser and P. J. Morgan, *Capacity, Change and Performance: Study Report*, European Centre for Development Policy Management, 2008. [Online]. Available: https://ecdpm.org/wp-content/uploads/2013/11/DP-59B-Capacity-Change-Performance-Study-Report-2008.pdf

[6] D. W. Brinkerhoff and P. J. Morgan, "Capacity and capacity development: Coping with complexity," *Public Administration and Development*, vol. 30, no. 1, pp. 2-10, 2010, doi: 10.1002/pad.559.

[7] L. Stoll, "Connecting Learning Communities: Capacity Building for Systemic Change," in *Second International Handbook of Educational Change*, A. Hargreaves, A. Lieberman, M. Fullan, and D. Hopkins, Eds. Springer Netherlands, 2009, pp. 469-484, doi: 10.1007/978-90-481-2660-6_28.

[8] H. Baser, P. Morgan, J. Bolger, D. Brinkerhoff, A. Land, S. Taschereau, and J. Zinke, *Capacity, change and performance: study report*, 2008.

[9] M. Mohammadimehr, "Explaining the factors in the formation and improvement of professional interactions of faculty members," *Future of Medical Education Journal*, vol. 12, no. 4, 2022.

[10] M. Mohammadimehr and J. Haji, "Identifying the factors affecting on interaction of faculty member: A meta-synthesis," *Journal of Education and Health Promotion*, vol. 11, no. 1, p. 343, 2022.

[11] J. C. Flanagan, "The critical incident technique," *Psychological Bulletin*, vol. 51, no. 4, pp. 327-358, 1954, doi: 10.1037/h0061470.

[12] X. Wu, R. Hua, Z. Yang, and J. Yin, "The influence of intention and outcome on evaluations of social interaction," *Acta Psychologica*, vol. 182, pp. 75-81, 2018.

[13] J. A. Leydens, B. M. Moskal, and M. J. Pavelich, "Qualitative Methods Used in the Assessment of Engineering Education," *Journal of Engineering Education*, vol. 93, no. 1, pp. 65-72, 2004, doi: 10.1002/j.2168-9830.2004.tb00789.x

Appendix: Interview Protocol

- To start with, I would love to know more about the kinds of things you've been doing lately with the goal of supporting student success. It could be things you're doing in the classroom, or outside of the classroom.

- Who do you tend to go to when you want to talk about teaching and learning?

- I'm now going to transition to asking you about the various people that comprise your support network as an educator. First, with respect to teaching or another means of supporting success, can you please tell me about a time when someone at [...] helped you pursue a project you wanted to try?

- Can you please tell me about a time when an idea you tried (in the classroom or outside of classroom) worked out really well. What kinds of support or feedback did you receive that contributed to that success? Who did you celebrate with?

- Tell me about a time when you had to bounce back when something you tried did not work well. Who and what were important to helping you stay resilient during that time?

- Please tell me about a time when you successfully persuaded someone else that an idea of yours had merit. What kinds of strategies and connections were important to your success in persuading them?

- Tell me about a time when a sudden change to your situation necessitated changing your teaching approach. How did you change, and who did you reach out to for support during that change?

- What other kinds of interactions have you had around teaching and learning that you consider important but we have not covered yet?