

## **BOARD #165: Social Connections Formed from Engaging in a Faculty Development Workshop**

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# Social Connections Formed from Engaging in a Faculty Development Workshop

## Abstract

This research paper explores the social connections formed during a variety of faculty development workshops. Since 2019 the Kern Entrepreneurial Engineering Network (KEEN) has been offering Engineering Unleashed Faculty Development (EUFD) workshops to engineering faculty to support the development of entrepreneurial mindset in the faculty participants and their students. EUFD workshops consist of 3 days of in-person engagement followed by a year of coaching and are focused on developing connections between participants and facilitators/coaches and among participants themselves. In this project, we use a survey of EUFD participants to understand the role of connection in their workshop experience. Our research questions are: 1) How many others did participants have meaningful interactions with during the workshops? And 2) What differences in number of meaningful interactions were there between different workshops?

In our survey, participants selected who among their workshop's participants they had a meaningful interaction with. We then characterized the social connections formed during EUFD workshops using Out Degree and by calculating the number of meaningful connections that were with people who participants met at the workshop (as opposed to having known them prior to the workshop). 83 of the 169 (49%) 2023 EUFD participants that were sent the survey responded. On average, each participant identified 8.83 others with whom they had meaningful interactions and 88% of those connections were people the participants met at the workshop. In a future study, we will examine whether social network characteristics influence the participants' likelihood of implementing the learning outcomes of the workshop. The preferred presentation mode for this work is a poster.

## Introduction

Facilitating change in instructors' pedagogical practice is challenging, but can be facilitated with the implementation of several best practices [1]. One change strategy that is often effective is peer support [2]. For example, a study at University of Illinois sought to understand the effect of participation in communities of practice (CoPs) on an instructor's likelihood of adopting evidence-based instructional practices (EBIPs). Using social network analysis, the researchers found that members of CoPs with higher density and connectedness were more likely to adopt EBIPs [3]. Additionally, the mentors in a community of practice were found to be influential in improving the density and connectedness of their CoPs and therefore the likelihood that EBIPs were widely adopted in their community [4].

In this study, we are interested in a unique type of CoP: communities formed through participation in Engineering Unleashed Faculty Development (EUFD) workshops. Since 2019 the Kern Entrepreneurial Engineering Network (KEEN) has been offering EUFD workshops to engineering faculty to give them tools for supporting the development of entrepreneurial mindset (EM) in engineering students. EUFD workshops consist of three days of in-person engagement followed by a year of coaching. The post-workshop coaching is focused on reinforcing the workshop content and developing connections between participants and facilitators/coaches and among participants themselves.

Understanding the nature of the instructor communities formed through EUFD workshops and how engagement within those communities affects instructors' subsequent adoption of pedagogical innovations could provide further insights into the social nature of instructional change. In this paper, we characterize the social engagement of EUFD workshop participants immediately after the workshop was completed.

### *Research Questions*

Our research questions are:

- RQ1: How many people did participants have meaningful interactions with during the workshops?
- RQ2: What differences in the number of meaningful interactions were there between different workshops?

### **Background**

Below we share the details of the faculty development workshops and the social network characteristics that are relevant to this study.

#### *Engineering Unleashed Faculty Development Workshops*

KEEN offers a variety of multi-day workshops for faculty to participate in each year. Among those are: Integrating Curriculum with Entrepreneurial Mindset (ICE), Problem Solving Studio (PSS), MakerSpark: A Framework for Developing EM Making Activities, Making with EM Across the Curriculum (MEM), and Enhancing Inclusive Teaching Practices through EM Learning (EIT). The workshops of interest took place in the summer of 2023 in several locations across the United States [5]. Each workshop had between two and four facilitators who worked with participants during the workshop and two to four coaches who met participants during the workshop and then engaged with participants in the year following the workshop. Details of the workshops of interest are provided in Table 1.

**Table 1.** Engineering Unleashed Faculty Development Workshops of Interest

<b>Workshop Short Title</b>	<b>Major Topic</b>	<b>No. Participants</b>	<b>No. Facilitators/ Coaches</b>
ICE June	Basics and application of entrepreneurially-minded learning	29	7
ICE July	Basics and application of entrepreneurially-minded learning	26	4
PSS	Creation of an interactive constructivist learning environment in engineering	30	5
MakerSpark	Creation of entrepreneurially-minded maker activities	28	5
MEM	Creation and support of entrepreneurially-minded maker activities	30	4
EIT	Integration of inclusive STEM spaces through entrepreneurially minded learning	26	4
Total		169	29

## *Social Network Analysis*

Social Network Analysis can be used to understand a variety of phenomena, including how information flows within groups of people (actors) and how social connections (ties) influence behavior. Each participant in an EUFD workshop is an actor and each actor has several alters (i.e., someone they know or someone who knows them). For this work, we are interested in a simple social network measure: Out Degree. Out Degree is a measure of network size [6]. For this study, Out Degree is the number of alters a given ego has listed as having had a meaningful interaction with at the EUFD workshop [7]; the more alters in an ego's network, the more likely they are to have access to workshop-related ideas and support..

While it is difficult to say precisely how a given participant's Out Degree might affect their long-term engagement with the EUFD workshop content, higher Out Degree provides an actor with more opportunities to support their engagement with and adoption of the workshop content.

## **Methodology**

On the last day of each workshop noted in Table 1, participants were asked to take a survey that focused on the connections they made during the workshop experience. Reminder emails were sent one week and three months after the conclusion of the workshop. In the survey, participants identified which workshop they participated in and selected individuals from a pre-populated list of participants and facilitators/coaches with whom they "had a meaningful interaction with as a result of the EUFD workshop". Respondents also had the ability to add the names of others who were not in the pre-populated list. For each selected person, respondents indicated how they knew them, choosing from "I met them through the <Name of Workshop> Workshop", "Colleague at my institution", "Colleague at a different institution", "I met them through another KEEN event", and "Other". Participants were also asked demographic questions including their institution, faculty position type, gender, race, and how many other EUFD workshops they had been participants in. Note that while facilitators and coaches were included in the pre-populated list of workshop attendees, they were not asked to complete the survey. The survey was implemented in Qualtrics [8] and proper human subjects protocols were followed (Rowan University University IRB PRO2023-86).

Using the survey data, we then characterized the social connections formed during EUFD workshops via the creation of ego-networks. For Out Degree we counted the number of alters each survey participant indicated they had a meaningful interaction with. We were also interested in the percentage of these connections that were established at the workshop (rather than from prior interactions such as being colleagues at the same institution). To determine this percentage, we took the ratio of the number of connections for which the respondent selected "I met them through the <Name of Workshop> Workshop" to the total number of connections for each respondent. The descriptive statistics for each network characteristic for each workshop (RQ1) and differences in participants' social network measures between workshops (RQ2) were determined using SPSS [9]. To compare differences we used a one-way ANOVA.

## **Results and Discussion**

83 of the 169 (49%) 2023 EUFD participants that were sent the survey responded and completed the entire survey. Recall that coaches and facilitators were not sent the survey, but are part of the networks of participants, so the 83 responses represent 42% of the 198 total actors. While 42% is

not an adequate response rate to analyze the full network for each workshop, the analyses described here were focused on the ego-networks of individuals who did complete the survey, not the network as a whole. Using this data, Table 2 shows the descriptive statistics for all of the EUFD workshops combined. Only the ego networks of those actors who completed the survey were used to generate this data, but the ego networks could (and usually did) include alters who had not completed the survey.

**Table 2.** Overall descriptive statistics of the EUFD workshops of interest.

Measure	Out Degree	% of Connections Established at EUFD
Average	8.83	87.8%
Standard Deviation	4.23	16.3%
Min	0.00	25%
Max	19.00	100%

The mean Out Degree indicates that each participant in a workshop had a meaningful interactions with between 8 and 9 other people in the workshop (participants and/or facilitators/coaches), which represented approximately 30% of the total number of people engaged in each workshop. On average, 87.8% of these connections were with people the respondents met during the workshop.

#### *Research Question 1*

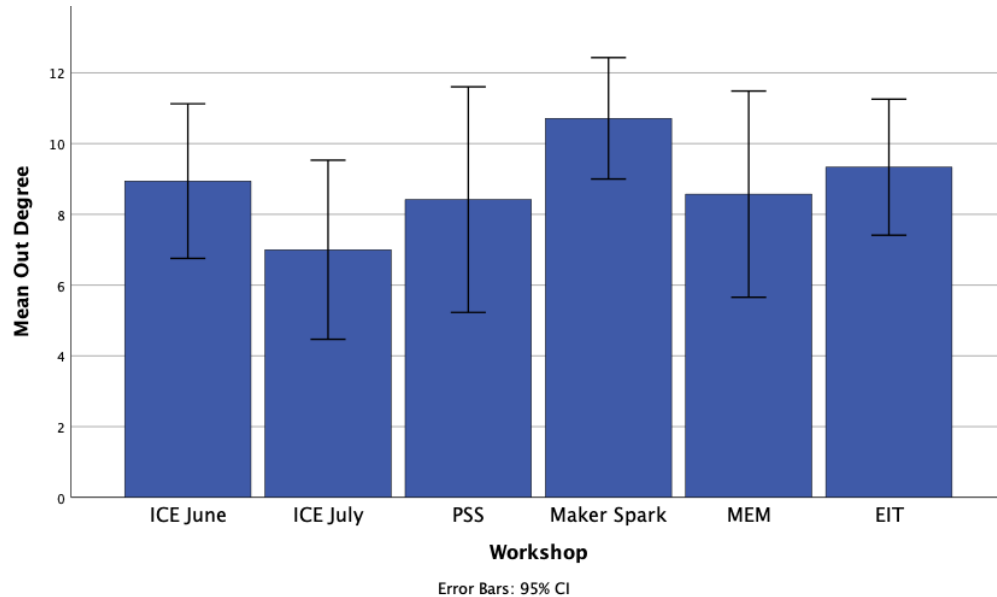
We then analyzed each workshop independently to answer RQ1. Table 3 shows the characteristics of interest for each workshop. When considering Out Degree, it is clear that MakerSpark participants reported the largest number of meaningful interactions. On average, those who engaged in that workshop had meaningful interactions with 10 to 11 others representing 32% of the total available actors. ICE July had the lowest Out Degree, with participants having meaningful interactions with 7 others (23% of the total available actors).

**Table 3.** Network characteristics of EUFD Workshops of interest.

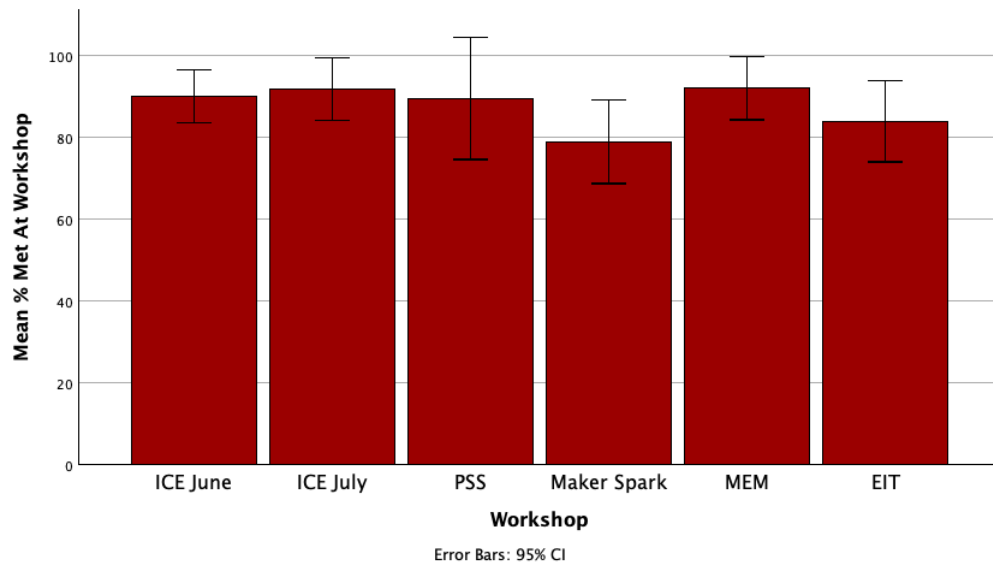
Workshop Short Title	No. Survey Respondents	Total Actors (Participants and Facilitators/Coaches)	No. Respondents as a % of Total Actors	Out Degree		% of Connections Established at EUFD	
				Mean	Std. Deviation	Mean	Std. Deviation
ICE June	17	36	47%	8.94	4.25	90%	13%
ICE July	14	30	47%	7.00	4.38	92%	13%
PSS	12	35	34%	8.42	5.02	90%	23%
MakerSpark	14	33	42%	10.71	2.97	79%	18%
MEM	14	34	41%	8.57	5.05	92%	13%
EIT	12	30	40%	9.33	3.03	84%	16%

### Research Question 2

A one-way ANOVA was conducted to compare the variables of interest between workshops. Normality of the continuous outcome variables was checked and found to be within normal range for both Out Degree and Percent Connections Established at EUFD. Neither Out Degree nor Percent Connections had statistically significant differences based on workshop (Figures 1 and 2)



**Figure 1.** Out Degree as a function of workshop. Error bars represent the 95% confidence interval.



**Figure 2.** Percent of connections who respondents met at the workshop as a function of workshop. Error bars represent the 95% confidence interval.

These findings for Out Degree suggest that, while there may be a difference in the number of connections developed by participants based on which workshop they attended, this difference cannot be confirmed due to the number of missing responses for each workshop. However, there are some attributes of the workshops that may have influenced the Out Degrees of participants including the number of people the participants already knew at the workshop, the focus and structure of the workshop and the characteristics of the facilitators, coaches, and participants themselves. Note, for example, that MakerSpark has both the highest Out Degree and the lowest percentage of connections respondents met at the workshop. MarkerSpark respondents may have had more meaningful connections because they knew more people before the workshop, strengthening both existing and new relationships.

Elaborating on the brief descriptions of each workshop in Table 1, the ICE workshops cover the basics of EM and then support participants in developing EM-focused interventions for their own classrooms and context. ICE is targeted at new and experienced faculty looking to get started with EM learning and embed EM into their classes. ICE participants can come from any engineering discipline and have wide-ranging experiences in engineering classrooms. In contrast, MakerSpark is focused on addressing concepts that students struggle with through the creation of maker-related activities. MakerSpark is specifically for instructors with previous making experience. MakerSpark's narrower audience may have made it easier for participants to connect while also increasing the chances that they knew each other beforehand.

Workshop focus may not be the only factor affecting participants' Out Degree. The facilitators' approaches to each workshop could also be influencing Out Degree. For example, a workshop that required frequent engagement among participants and intentional rotation of working groups may result in higher Out Degrees for participants compared to a workshop that had little engagement among participants or allowed working groups to remain the same throughout the workshop. Additionally, some workshop facilitators may have valued relationship-building among their participants in a way that promoted connection formation among the workshop participants. The impact of these differences will be explored in future work.

### *Limitations*

Because we received responses from only 49% of workshop participants, we were unable to generate full networks for each workshop, limiting our ability to understand the complete network structure of the workshops. Additionally, because we were dividing responses among six workshops, the statistical power for the analyses was low despite having 83 complete responses.

### **Conclusions and Future Work**

We characterized the number of people participants in six Engineering Unleashed Faculty Development workshops had meaningful connections with during the workshop. We found that the average survey respondent had an Out Degree (or number of people with whom they had meaningful interactions) of 8.83 connections, 87.8% of which they met as part of the workshop. There were no statistically significant differences between workshops in the variables of interest.

As an immediate future work, we will be re-surveying the participants after the year-long coaching experience to observe differences in their identified connections and explore the

relationship between likelihood of implementing the changes encouraged by the EUFD workshop and a participant's network. By understanding how social connections formed during faculty development affect the likelihood of enacting faculty development learning outcomes, we can guide faculty developers' approaches to increase impact. In the longer term, we hope to interview participants to better understand the mechanisms by which the social connections they made at the EUFD workshops influenced their implementation of workshop objectives.

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