

The Design and Impact of Engineering Career Fairs on Professionalization: the Perspective of Career Services

Abstract

Despite the widespread prevalence of engineering career fairs (ECFs) and their importance to the engineering student experience, there is little formal research on them. This research is an initial exploration of career services staff perspectives on ECFs as informal professionalization learning spaces. We analyzed data gathered in group interviews using qualitative coding, and the evolution of career fairs, the role of technology, and developing engineering identities all emerged as key themes. We argue that discipline-specific events such as ECFs offer value in the staff's intentional design for engineering students, in the participation of companies directly interested in developing undergraduate engineers as professionals, and in increased relevance to engineering students as they develop their identities as engineers.

Objectives

Engineering Career Fairs. Each year, engineering students across the United States join hundreds and thousands of their peers at engineering career fairs (ECFs) to network with potential employers. These gatherings are one of the first times that many students prepare to look for specific engineering jobs or internships, but little to no research has been conducted on these widespread informal learning spaces to understand what students learn about being engineering professionals.

ECFs bring together two key stakeholder groups: students and employers looking to hire engineers; a third critical stakeholder group are the career services staff in charge of designing

and running ECFs. The site for our work was a large public university in the southwest United States with one of the largest enrollments of engineering students in the country. By analyzing group interview data gathered from career services professionals in charge of the engineering career fair at this institution, we aimed to study how career fairs are designed as informal learning spaces that contribute to the professionalization of engineering students. This research aspires to enhance the collective understanding of the role of career fairs in shaping students' transformations into engineering professionals and their impact on the broader engineering profession as a whole.

Research Questions. The primary research question guiding this initial stage of work was: What implicit and explicit informal professionalization learning intentions do career services staff have for undergraduate engineering students at career fairs? This paper is primarily focused on exploring this question and providing a preliminary foundation for future work.

Theoretical Framework

We frame ECFs as informal professionalization learning spaces and bring together the theoretical literature around both informal learning and individual professionalization processes.

Informal Learning. We focus on understanding informal learning as it occurs at ECFs. Here, informal learning is understood as a broad term capturing all learning that occurs *outside* of formal classroom environments (Johri et al 2016). Little current literature exists on the

nuances of informal learning in career fair spaces. As such, the goal of this work is to provide an initial launch point for future work to build from.

Kotys Schwartz et al. (2011) provides a six-point framework describing engineering learners in informal educational settings. This framework is itself modified from the Learning Science in Informal Environments framework (National Research Council 2009). In particular, this work considers four strands of the Kotys-Schwartz et al. (2011) conceptual framework mentioned earlier: learners (1) demonstrate being excited, interested, and motivated to think about and discuss their potential careers; (2) explore, predict, question, observe, and make sense of engineering in the world through conversation with employers/recruiters; (3) reflect on engineering as a way of knowing and on the processes, concepts and institutions of engineering after talking with employers/recruiters; and (4) think about themselves as engineers and develop an identity as someone who knows about, uses, and contributes to engineering.

Professionalization. We view professionalization as the singular development of those professional qualities by an individual entering an existing field rather than the broad organizational sense of developing professional qualities for a discipline or trade as a whole (Bikbulatova 2016). This individual understanding of professionalization structures the research approach by refocusing questions of building skills, identity, and interest as an engineer to the level of each singular undergraduate student, and repositions ECFs as one part of an educational journey (Dryburgh 1999).

Professionalization can also be understood as encompassing any activities and behaviors that indicate professional growth or the establishment of a professional identity. This may

include any learning experiences, patterns, or behaviors within an engineering professional or occupational context. This definition represents primarily procedural elements of what may otherwise be termed ‘professional formation’ as per the National Science Foundation’s *Professional Formation of Engineers Framework* (n.d.). Specifically, our understanding of professionalization connects to the final three elements of that framework: (1) development of outlooks, perspectives, ways of thinking, knowing, and doing; (2) development of identity as an engineer and its intersection with other identities; and (3) acculturation to the profession, its standards, and norms (National Science Foundation n.d.).

Methods

Semi-Structured Group Interview. We conducted a two-part group interview with two career services staff members from the university who held primary responsibility for designing and executing the bi-annual ECFs at this institution. We asked them to participate in our research in their professional capacity. We collected data using semi-structured protocols, which was later transcribed for analysis. Data was analyzed as an institution-specific case study rather than a generalizable assessment of widespread attitudes and ideas on ECFs.

Flexible Coding. A flexible codebook was developed and applied to the transcriptions following Deterding and Waters’ (2021) qualitative coding method, with broad primary codes applied first, followed by more specific secondary codes. These codes were primarily descriptive in nature; primary codes were developed in part from current literature as well as from the research questions and interview protocol. Primary coding themes were resolved to the descriptive codes of *professionalization*, *motivation*, *design*, *evaluation*, and *expectations*

(Table 1). Smaller thematic clusters were resolved as secondary codes during the second phase of coding. Coding was conducted using Dedoose software and intercoder reliability tests were performed on each coded interview to ensure the validity and trustworthiness (Walther et al 2015) of the coding process.

Results

The primary codes developed in this research process described several key themes and emergent findings in career services staff's perspectives on ECFs. Key primary and secondary codes are described in detail with examples in Table 1.

'Professionalization' as identity-building. Career services staff emphasized several behaviors and characteristics that can be considered aspects of professionalization. The secondary code of *engineer identity* as a secondary code of *professionalization* emerged from a cluster of statements such as:

And so if they're doing their due diligence, preparing for the career fair is some of that identity. It's "I could see myself as a insert 'whatever that is', working on a 'whatever project' at a 'whatever company' in an industry in this." And so...they've hopefully - not necessarily intentionally, but maybe intentionally - become more self aware about their own identity and again, how they may fit within that. (Group Interview Part 1)

These statements correlate with our understanding of professionalization as an identity-building process (Dryburgh 1999). Additionally, the processes by which that identity is built can occur in informal learning spaces (Kotys Schwartz et al. 2011) which we consider ECFs to be. From the perspective of career services staff learning is designed into ECFs in part with the goal of providing informal professionalization opportunities, including identity formation.

Evolution of Engineering Career Fairs. Career services staff recognized the shifting needs and value proposition of ECFs as informal professionalization spaces with an explicit mention of the internet and online job portals as a key point of change; alignment between staff's design values and both staff and students' goals and expectations for student participation and face-to-face connection was often predicated along technological lines:

"I think career fairs serve multiple layers, but two themes from me [are] - one, make that positive impression on the human being that you're getting to talk to. And that second one is asking the questions that you can't find on their website online, right? Because those questions show that that student has done their research, right, and [is] trying to advance that conversation. So even though we tell the student almost 100% of the time you're going to be told to apply online - "Why am I going to career fair?" for those very two reasons." (Group Interview Part 1)

Additionally, this excerpt emphasizes the shifting alignment between staff and students' expectations for ECFs, specifically with regards to in-person interaction. Career services staff repeatedly emphasized in-person interaction as critical, presenting such interaction as both a learning and identity-building opportunity and as a positive indicator of interest and personability. Understanding how the communication of the perceived value of in-person interaction to students has evolved may affect student participation in ECFs.

‘Design’ for job and self. Career services staff are responsible for bringing together students and employers in the designed environment of ECFs. ECFs are designed as both a means to a specific end - getting students hired into internships and jobs - and as an “educational journey” (Group Interview Part 1, Part 2) that is a key piece of each student’s individual professional formation. From *design* secondary code *objectives*:

Well, clearly, the objectives of the career fair are certainly to help employers and students connect for internship and employment opportunities for the career fair. The other part of it, though, is that there is also an educational component to it where programmatically it follows our goals - that we are trying to help students get internship ready in four semesters. (Group Interview Part 1)

and in *design values*:

And that's different than ‘I'm just looking for a job and I can use all these other tools’, as opposed to ‘this is a moment of performance demonstrating my preparation and my commitment to this field and this profession... Respecting the process and being engaged in the process on that journey. (Group Interview Part 2)

This dual approach to professionalization in the context of ECFs emphasizes the intertwined practical and personal nature of these events - getting a job is both a practical necessity and a significant personal milestone (Walther et al 2011, Bikbulatova 2016). In designing ECFs, career services staff must align practical considerations, their own personal motivations, and student’s expectations within the format of a 1-2 day long voluntary event. As such, we find that approaching ECFs as informal professionalization learning spaces emphasizes the complexity of the process students face in becoming engineering professionals.

Significance. Career fairs occupy a unique space in the educational lifecycle of undergraduate students (Silkes et al 2010). Discipline-specific events showcasing relevant employers and opportunities, such as ECFs, provide highly relevant engagements for students that may increase both student interest and identity formation (Payne and Sumter 2005). However, in spite of the apparent widespread prevalence of career fairs and employer willingness to attend (Gordon et al 2014), limited empirical knowledge exists concerning the nature and impact of engineering career fairs on student informal learning and professional formation; we were not able to identify other papers addressing similar stakeholder groups or perspectives. As such, this research serves an initial exploration of this space.

Many of the criteria cited by career services staff as being key to professionalization in undergraduate engineering students were not unique to engineering as a profession, but rather could be generalized as a benefit any career. Personability, navigating in-person interactions, preparation and confidence, and learning how to interact with potential employers in a positive manner - all factors mentioned by the interviewed career services staff - do not require skills inherent to engineering knowledge or coursework.

As such, we argue that a discipline-specific event such as an engineering career fair offers additional value not in the broader design of the event but rather in the staff's intentional effort of designing the space for engineering students, in the participation of companies who, by their presence, affirm an interest in developing undergraduate engineers in their professional lives, and in the increased engagement of and relevance to engineering students as they develop their individual identities as engineers.

Tables and Figures

Table 1. Codebook table presenting select primary and secondary codes.

Primary Code Secondary Code	Description	Example
Professionalization		
Engineer Identity	Who/what is an engineer? How do individuals identify as engineers? Characteristics describing or defining identity as understood by the speaker, including in-group or out-group characteristics. Statements relating to identity formation/development, self-identification.	“And so if they're doing their due diligence, preparing for the career fair is some of that identity. It's “I could see myself as a insert ‘whatever that is’, working on a ‘whatever project’ at a ‘whatever company’ in an industry in this.” “ (Group Interview Part 1)
Preparedness	How do participants prepare for attending career fairs or attaining associated outcomes/goals? The role of preparation/preparedness in engineering fair participation/outcomes. Preparation as understood/valued by different stakeholder groups.	“Everything that you do from applying early, you know, doing your research, having a focused resume for your top employers, applying online, showing up, being prepared for interview questions, being prepared to ask for the interviews, being prepared, you know, for interviews that day, the next day, the following days, being prepared to ask for the job opportunity.” (Group Interview Part 1)
Design		
Objectives	Designed goals and objectives of engineering career fairs for students and employers, as understood and developed by career services staff.	“Well, clearly, the objectives of the career fair are certainly to help employers and students connect for internship and employment opportunities for the career fair. The other part of it, though, is that there is also an educational component to it where programmatically it follows our goals - that we are

		trying to help students get internship ready in four semesters.” (Group Interview Part 1)
Constraints	Existing structures, timelines, deadlines, events, or aspects that constrain or inform the design. Can be internal/institutional or external/third party (employer, etc).	“And the employers had affirmed that they wanted to recruit undergraduates on their own date and graduates on their own date for a variety of reasons there.” (Group Interview Part 1)
Expectations		
Staff Expectations	What do staff expect of career fair participation (by students or employers)? What do they expect of the event planning, execution, and before/afterwards? May include staff ascribed expectations of other participants.	"So there's an expectation that the students have a level of knowledge about their companies and their roles. And of course, the better thing would be to actually for the student to have gone to the website to apply it online or to and or bring those job descriptions before they apply online to say, before I apply online, could you talk to me more about this?" (Group Interview Part 1)
Employer Expectations	What do employers expect from participating in career fairs? Individually or on behalf of their companies? What do others (staff, students, external) ascribe as employer's expectations? May include employer ascribed expectations of the event or other participants.	"So the employer expectation is that it's not a it's not a cold call. Um, as far as what do they want students to learn? They want students to learn a little more about their company that is not necessarily on their website. " (Group Interview Part 1)

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