Research Brief
Center for the Advancement of Engineering Education
NSF Grant ESI-0227558

A Qualitative Study of the Early Work Experiences of Recent Graduates in Engineering

Authors: Russell Korte, Sheri Sheppard, and William Jordan
Source: Proceedings of 2008 American Society for Engineering Education Conference

After several years of demanding study, new engineers graduate from higher education as professionals eager to apply their expertise to solving "real world" problems. Yet, the transition from school to the workplace involves a socialization process through which new graduates attempt to learn the specific tasks and expectations of their job and begin to integrate into the social context of the organization. This paper reports the findings of a study investigating the socialization experiences of newly hired engineers in a large US-based, global manufacturing company.

Implications of Findings

Based on the findings of this study, there are important implications for engineering education and the workplace. First, the social context of engineering in the workplace is a major driver of engineering work. This suggests that engineering programs might better prepare students for the social context of their work and organizations might manage the social context of the work group to help new engineers better integrate into the organization. Second, the problems faced by engineers in practice are extremely complex, ill-structured, ambiguous, and dependent on the social and organizational contexts. Educational programs that address this might provide better preparation for students. For example, in a recent study of the effectiveness of the EC2000 criteria, 25 percent of employers rated the preparation of new graduates as inadequate at communication and teamwork skills, and 48 percent rated the preparation of new graduates in engineering as inadequate at understanding organizational contexts and constraints. Education might do a better job preparing students for this aspect of the work; on the other hand, organizations should have a better understanding of the work for which they hire engineers.

While it seems critical for engineering education to offer industry-relevant learning experiences to students, it is just as critical for organizations to facilitate successful transitions into the workplace after graduation. The final experiences of socialization take place in industry and, therefore, only industry can facilitate this stage of a successful transition from school to work.

"I think school was more like a technical thing, like where you learned equations. Where now it's more like a logical sort of brainstorming, think through stuff, you know, sort of thing. It's more of a hands-on thing where you kind of see it and you're taking measurements or taking a part on and off. Or you know it's not fitting right but you don't know why and there's no mathematical formula you could use like you would in school to solve this problem kind of thing."

Methods and Background

To better understand the context of the inadequacies described by employers, we conducted in-depth qualitative interviews with newly hired recent graduates of engineering programs. Specifically, the team examined the work experiences of newly hired engineers (both male and female) having less than two years employment at a large, US-based manufacturing company. This is the period during which new employees typically encounter and learn

the specific expectations and requirements of the job and are arguably the most aware of any differences between their engineering education and engineering practice. This is also the time when new engineers become socialized into the practice of engineering in organizational settings.

A qualitative case-study research approach seemed most appropriate to answer the research questions in this study:

- How do newly hired engineers learn the specific job requirements of the workplace?
- How do newly hired engineers practice engineering in the workplace?
- What are the factors affecting how newly hired engineers begin practicing engineering in the organization setting?

The organization in this study was a global manufacturer based in the US. The mission of engineering in the organization was to produce advanced, high-quality products quickly and efficiently. The organization assigned many of the newly hired engineers to work groups that were developing, validating, and bringing to production, new technologies to meet the highly competitive demand of the market. Most of the newly hired engineers were mechanical and electrical engineers.

Following the logic of theoretical or purposeful sampling, managers in the organization identified individuals for the research interviews in order to collect, rich, in-depth information that would address the research questions. Participants were from different work groups that ranged in size from 8 to 20 individuals who reported to a manager. Interviews included 17 new graduates who were interviewed in January and February of 2007. Interviews lasted from 50 to 90 minutes. The interviews were semi-structured, following the Critical Incidents Technique. The questions used in the interviews asked participants to recall a project or problem assigned to them for which they had to use their technical expertise to resolve. Each participant was asked to choose two projects or problems and to describe for each some specifics, such as how they became aware of the assignment and how they defined the problem.

What We Found

Analysis of the texts from the interviews identified a number of tasks and experiences related to problem solving. Participants described their work as a process comprised of tasks from each of these four major categories:

- The problem solving process
- Working within the work group (social system)
- Working with the organizational system
- Managing individual effort

While new engineers primarily defined their work as a problem-solving process, they also described the extent to which this process was embedded in social and organizational structures and processes. Thus, their work as problem solvers was mediated by the social processes, procedures, systems, and culture of the work group and the organization.

A common theme emerging from these data indicated that problem solving was a more complex process than what these engineers reported they experienced in school. Also, the enormous influence of the social context was the primary difference between school and the workplace. Overall, these data indicated that the social context was a primary mediator of the experiences of new engineers in this organization.

To make a successful transition from school to the workplace required new engineers to integrate effectively into a work group by developing relationships with coworkers and managers. Without

effective, high-quality relationships with coworkers and managers, new engineers struggled to learn what they were to do and how they were to do it. Hence, the quality of their relationships with coworkers had an enormous effect on the quality and success of their learning and performance on the job.

www.engr.washington.edu/caee June 2008