



## **Developing Effective Entry and Socialization Programs to Improve Retention of STEM Students**

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As the demand for science, technology, engineering and mathematics (STEM) talent continues to increase and outpace the supply of graduates, it becomes increasingly more important for an organization to effectively recruit and retain STEM talent.<sup>1</sup>

Strategies for recruiting, orienting and socializing STEM graduates to the workplace are varied, but one that has been shown to be particularly effective is internship or cooperative (co-op) education programs through a college or university.<sup>2</sup> Retaining students in STEM academic programs is just as difficult.<sup>3</sup>

Critical factors that determine the effectiveness of the internship or co-op from student and employer perspectives are the entry and socialization processes experienced by the student, whether planned or unplanned. If the student does not effectively transition from the academic environment to the work environment, learning outcomes will not likely be accomplished, satisfaction with the experience is unlikely, potential for dissatisfaction with the chosen academic program and career increases, and self-esteem and confidence in the ability to succeed may be negatively affected.<sup>4-7</sup>

From the employer and university perspectives, an ineffective pre-entry and socialization process can result in lower productivity from the student and negative morale, which could influence current employees and other intern or co-op students, or new employees who may want to work for the employer organization.<sup>8</sup> This can greatly limit the potential for retention of the student or new engineering employee, thereby minimizing the return on investment.<sup>9-11</sup> This same phenomenon holds true for retaining students in a STEM academic program.

### **Student entry and socialization factors**

A qualitative study of the structure, processes and relationships among people associated with the mandatory engineering co-op program was conducted at Grand Valley State University in Allendale, MI. Through review and reduction of the data, a five-stage socialization

model was developed to explicate the movement of students from outside the engineering program to inside an engineering organization and occupational roles.<sup>12</sup>

Entry into an organization “is the process of breaking in and joining up, or learning the ropes, or figuring out how to get along and how to make it.”<sup>13</sup> This process is marked by induction activities, basic training and socialization of the individual to the norms and values of the organization.<sup>14</sup> Starting in the co-op program, the student began outside of the organization and occupational role, and by the end of the program, the student had gained some level of inclusion in each group. Effective entry via the co-op program resulted in 95% retention in the engineering field five years after graduation for the 22 study participants.

Entry consists of the student “breaking in” and being socialized through two distinct processes:

1. Entry to the organization.
2. Entry to an engineering-related occupational role.

The corollary is a student entering the university and entering the role of a university student. Students are expected to learn rules and regulations, norms and expectations, cognitive categories and scripts, and effective processes via tactics that are employer and student driven.

Regulative processes and activities rely on rules, laws and power systems to ensure people conform. Normative processes and activities teach organization and group norms, and help define roles and jobs. Cognitive categories and scripts rely on mimetic mechanisms and a person learning by copying and adopting the behaviors, actions and beliefs of others.

Effective processes refer to emotion, sentiment and motive. Tactics can range from being formally to informally communicated or presented, and consciously enacted to taken for granted. The tactics define how organization members display, project, communicate and teach students about, as well as evaluate worthiness of the student for acceptance into, the organization and occupational roles.

Entry to an organization focuses on teaching the student what all employees need to know, regardless of what group the employee belongs to in the organization. Therefore, more



(but not only) formal tactics are used to ensure consistency organizationwide with certain elements important to the organization, most often in the forms of rules and regulations, and cognitive categories and scripts.

Entry to an occupational role is concerned with the student learning about what to do and how to behave and act (norms) within expectations of defined jobs and positions. It is a much more narrowly focused process and, therefore, relies on more individual and informal tactics enacted by a person (a mentor) or smaller group of the organization, most often in the forms of norms, expectations and affective processes.

### **Entry to an organization**

Many of the first tactics used by the organization after hiring the student include communication of rules and regulations. The process is often formal and planned, and it occurs within the first two weeks of starting work. People in central management functions within the organization (HR personnel and department managers) communicate many of the rules and regulations. The purpose is for everyone in the organization to have the same set of rules and regulations by which to abide.

Making it inside the organization includes two general components: orientation tactics, and cultural and environmental tactics. Many organizations have some form of companywide orientation program for new hires that is typically coordinated by the HR office. This program often includes an overview of company policies or procedures (such as filling out timecards), an overview of company systems (such as computer login and intranet use) and training (such as safety in the facility). More elaborate orientation programs exist at some organizations and include facility tours, presentations by group and company leaders, and lunch gatherings. Orientation does take place within the workgroup or departments; however, these are more often unplanned and less formal, and involve getting to know people, facilities and tools.

Tactics used to communicate norms and expectations, and cognitive categories and scripts also are prevalent during entry to an organization. Effective processes are used but are more generalized and symbolic than the impact that the effective processes have in the entry to an occupational role. The student is expected to learn how to act and what is acceptable or unacceptable behavior within the organization. Effective processes tend to be fairly generalized



and symbolic. The result is that the student experiences an effect associated with the organization, but not as strong of an emotional connection when compared with the effective processes used in entry to an occupational role.

More often than not, students gather information about company culture through observation and talking with their coworkers and mentors. Getting to know and understand the organization culture involves environmental factors, peoples' attitudes, and student mentor and student-workgroup activities. The environment consists of the type of atmosphere (easy going or professional) and the physical setting (for example, the office layout).

Mentors are important people within the entry to the organization process because the mentor communicates various norms and expectations, types of information and effective processes to the student. The organization assigns the mentor as a person trusted to help the student learn and understand many of the various key aspects of the organization.

### **Entry to an occupational role**

There is a different composition of tactics used for entry to an occupational role compared with entry to an organization. Fewer rules and regulations are used, and the predominant tactics teach norms and expectations, and rely on effective processes. Entry to an occupational role is much more concerned with learning how things are done, how to act within the workgroup and gaining acceptance from the workgroup members.

Students learn about and gain access to various occupational roles through interactions with workgroup members and through work assignments. Students will likely experience forms of testing and challenging by coworkers before being allowed inside the workgroup or team. These activities can include questioning the student's understanding and ability to perform tasks and assignments.

Students are expected to prove knowledge and ability to perform engineering-related work by first demonstrating the ability to learn and accomplish small tasks. The student is either encouraged or expected to ask questions to learn what to do. Eventually, the student is given assignments to demonstrate an ability to handle more responsibility. More increasingly complex and meaningful assignments are given to the student until the student is accepted as part of the



work team and has regular responsibilities similar to other members of the workgroup, thereby gaining inclusion into progressively more responsible engineering roles.

### **Significance of entry and socialization on retention**

Often, the importance of effective socialization on student retention is ignored or incompletely addressed. For example, some organizations do a wonderful job of providing orientation activities up-front but neglect the critical component of designing purposeful mentoring programs with carefully selected mentors. The entry and socialization process is multilayered and cannot stop after the first few weeks of the new experience.

Universities that understand the application of entry and socialization concepts can better help students transition not only during the first year, but also intentionally provide the tools and information to successfully self manage the transition process throughout the academic experience and apply it to other aspects of the students' lives, including workplace transitions.

Finally, universities need to provide training prior to work experiences (internships and co-ops or post-graduation careers) on how to effectively navigate the transition to the workplace. Universities also must work with employers to help prepare more effective, complete entry programs to improve long-term retention.

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