From Co-op to Career Development: Engaging Freshman in Lifelong Career Planning

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Abstract - **The McCormick Office of Career Development is a radical expansion of the renowned engineering Co-op Program at Northwestern University and now serves nearly all engineering undergraduates. Its overarching objective is to enable students to set themselves on a path to an individualized professional pursuit. The McCormick Career Development programs provide opportunities for students to have industry experience (co-op or internships), service learning projects, or employment in research laboratories. This expansion follows the reasoning laid out in research on the connection between cooperative education and career development.**

McCormick freshmen are encouraged to take the co-op and internship prerequisite course, Introduction to Career Development course (CRDV 301). The course is taught by adjunct faculty who are working professionals in engineering organizations and the topics addressed in this course equip our students with the tools necessary to acquire their first position and to manage a lifelong career in the professions. The course itself has created a climate of early engagement in career development through work-integrated learning. It was predicted that by expanding our programs, we would serve 30% of students in career development programs. The student response was nearly double what we expected, with 55% of undergraduates in an internship or a co-op. Following on our success with internships and co-op, we developed Engineering Research Experience, applying the same "work-integrated learning" principles that are present in the co-op and internship experiences. The third new program is called Engineering Projects in Service Learning for students whose work would be as volunteers in the non-profit sector. We now serve over 1000 students (67% of undergraduates) in the combined programs of co-op, internships, service learning, and research experience.

BACKGROUND: 1939 to 2007

Northwestern University has a rich history of cooperation with industry to educate future engineering leaders in business, industry, and government. During the 1930's, Walter P. Murphy, a leading Chicago industrialist, gave Northwestern $36,000,000 to fund a school of engineering and to require cooperative engineering education as a pedagogical experiment.

Having collaborated with Dr. Charles Kettering, the premier technologist and inventor of the time as well as Chief Research Engineer for General Motors, and Dr. Herman Schneider, the "Father of Cooperative Education" and one of the most innovative engineering educators of the time as well as the Dean of Engineering at the University of Cincinnati, Mr. Murphy became convinced that cooperative education was a "superior form of engineering education."

Dr. Walter Dill Scott, president of Northwestern University at the time of Mr. Murphy's gift, stated in his biography of Mr. Murphy that "any one of these three [Murphy, Kettering, Schneider] might have been the first to recognize that industry furnishes a training laboratory for engineers which no college can equal. Actually, Herman Schneider was the first to make this idea the basis of engineering education. Charles Kettering was the first to make it respected by the industrial leaders in America. Walter Murphy was the first, and only, individual to be willing and able to subsidize a conclusive experiment in cooperative education.

As a result, the Murphy gift was the largest contribution ever made by any one person in America to a single institution in support of training and research in one field of learning" (Scott, 1952, p. 92). Since 1940, Northwestern University has continuously maintained the Co-op Program to serve students and employers.

Mr. Murphy's gift to Northwestern University's engineering program was so significant that, following his death, the Co-op Program was renamed in his honor as the Walter P. Murphy Cooperative Engineering Education Program. From 1940 until 1960, the Co-op Program was mandatory for all engineering students. In 1960, the faculty voted to make co-op optional in order to meeting the rising demand for engineers to advance the

space race and the expanding U.S. economy. Since 1960, approximately one third of the engineering students at Northwestern have participated in co-op.

At Northwestern, co-op is a profoundly important educational program that allows engineering students to alternate periods of academic study with full-time periods of paid work experience related to their academic and professional goals. In addition to the benefits to the student, the engineering school itself derives many benefits from the program, including a rich trove of data from evaluations completed by all students and their supervisors during each work term.

These data provide the faculty at McCormick with a vital assessment of student learning outcomes as mandated by the Accreditation Council for Engineering Education (ABET). Faculty also use the evaluation reports in the advising process for students who need guidance in moving through their academic programs.

EXPANSION: 2007 TO PRESENT

Once the leadership of the McCormick School of Engineering recognized the value of the co-op process for its contribution to our ABET accreditation success, the Dean fully committed to expanding the pedagogical methodology of co-op to a formalized Internship Program. In order to provide for both co-op and internships, a new center was created for their administration. The McCormick Office of Career Development is a radical expansion of what our renowned co-op program and now serves nearly all engineering undergraduates and graduate students at Northwestern. Its overarching objective is to enable students to set themselves on a path to a professional pursuit of their own making. The McCormick Career Development programs provide opportunities for students to have industry experience (co-op or internships), service learning projects, or employment in research laboratories.

For undergraduates, these opportunities are built upon the Engineering First® curriculum, including the course sequences, Engineering Analysis and Design Thinking and Communications. These two course sequences involve an interdisciplinary, team-based approach to working with external clients, under the supervision of faculty, to develop products or services to meet real-world problems. Students leverage these team project experiences into positions in industry, government and the non-profit sectors. Resumes and interviews include direct references to these classroom projects, often forming the first real basis for engineering experience that can translate into meaningful skills for practice in industry.

In order to prepare for the process of applying to co-op positions and internships, engineering students are offered the opportunity to take "Introduction to Career Development" (CRDV 301) beginning in their first year. The course is taught by adjunct faculty who are working professionals in engineering organizations and the topics addressed in this course equip our students with the tools necessary to acquire their first position as an intern or in co-op and to manage a lifelong career in the professions. The three major themes for the course are self-assessment, job search preparation and the transition to professional roles.

Introduction to Career Development allowed us to accomplish three goals:

1. Serve a much larger population of students because of the strong interest in internships;
2. Establish a level playing field for all students to be equally well prepared for the acquisition of a co-op or internship;
3. More fully develop the relationship between work experience and overall career development theory for all of our students.

OUTCOMES

We anticipated that the addition of internships and CRDV 301 would result in a 30% increase in participation in career development programs. The first increase that we experienced was in the enrollments for CRDV 301, which was initiated as a beta test version in the fall quarter of 2007. One section was offered and 15 students enrolled. By the end of the spring quarter of 2008, an additional 85 students had completed the course. Beginning in the fall of 2008, CRDV 301 was established as a prerequisite for students entering the Co-op Program or the Engineering Internship Program and enrollments have averaged 300 students per year since the fall of 2009.

The second major development was to add the opportunity for students to work as research assistants in university or government labs, applying the same "work-integrated learning" principles that are present in the co-op and internship experiences. This program is called, Engineering Research Experience. In Fall, 2009, we added a program called Engineering Projects in Service Learning for students whose work would be as volunteers in the non-profit sector, again applying the same principles as the co-op and internship programs.

The student response was more than double what we expected. We now serve over 1000 undergraduates in the combined programs of co-op, internships, service learning, and research experience. With approximately 1500 students in the baccalaureate engineering programs, 67% of these students are now engaged in the process of gaining experience through career development. Although none of these programs are required of students at McCormick, it is clearly becoming a choice that many students make because they see the value of integrating

theoretical and practical knowledge to become whole-brain engineers. These students all began this journey with their first year experience in Introduction to Career Development – a profoundly formative experience.

As of spring quarter, 2012, engineering students at Northwestern University now have the opportunity to earn co-op or internship recognition through a combination of part-time work and part-time classes. It is too early to tell how many students will take advantage of the opportunity to work while taking a reduced course load, but we anticipate that many students who previously opted for an internship will find that it is much easier to build credits toward a co-op certificate using part time work continuously throughout their time at McCormick.

ASSESSMENT: THE LINK BETWEEN CO-OP AND CAREER DEVELOPMENT

All student work is subject to a comprehensive, and penetrating, evaluation process, using input from both the students and their supervisors in industry, labs, or non-profit organizations. This assessment directly measures student learning outcomes in the competencies that are required for ABET accreditation. These evaluations are discussed first with the student's career advisor and then with the academic advisor. Finally, aggregated data are sent to each department for all of the majors offered by that department for the purpose of curriculum review. The McCormick School applies performance metrics that must be met, and the University continuously operates its Program Reviews process.

Student learning outcomes are assessed at the end of each work term by the student's workplace supervisor; simultaneously the students evaluate the quality of their experiences at the end of each work term. Students participate in quarterly check-in meetings with their career advisors after each work term, an exit interview at the end of their graduation year, and a survey evaluating the programs and services of McCormick at graduation time.

The linkage between the these four programs and career development theory follows the reasoning laid out in research on the connection between cooperative education and career development, conducted by Fletcher (1989), Nunnally and Bernstein (1994) and Parks, Cash and Onwuegbuzie (2001). In each citation, a direct connection is drawn between each phase of the career development process and cooperative education. (The same case can be made for other forms of work-integrated learning such as internships, service learning and research lab work.) These phases include:

1. Self-assessment – taking inventory of one's skills, interests, abilities, values and needs;
2. Job and career research – understanding what opportunities might provide the best fit for one's profile;
3. Job search preparation – written and verbal interactions with potential employers, as well as networking;
4. Career exploration – the work experience itself;
5. Transitioning to work – understanding the work of one's organization and one's role in that work;
6. Reflection – leading to an enhanced understanding of the efficacy of one's career choices in light of the self-assessment and the actual experience.

Not only do co-op, internships, service learning and lab assistantships provide the context for career exploration *in situ*; the process of acquiring these positions demands proficiency in all steps necessary for being hired in the first place. In other words, work-integrated learning programs are wholly contained microcosms of the entire career development process itself.

The most significant component of this process, however, is not the preparation for the job search, nor is it necessarily the work experience itself. The true value of these programs is the assessment of learning outcomes and the opportunity for guided reflection on the affects that these experiences have on our students' lives. In a recent exit interview with a graduating senior, I asked what he considered to be the most valuable outcome of his co-op experience. His reply: "Clarity." One cannot really hope for more from an experience.

The process of reflection also involves the career advisors and the students' faculty advisors. All of us who work with these students before, during and after their time spent in industry, in the community and in a lab develop a much better understanding of what moves and shapes our students and the world around them. It opens our eyes to how our students engage – or not – with organizations and their environment. Whether our students work for Fortune 50 corporations, tiny start-ups, government research labs or venture into volunteer work with Engineers for a Sustainable World, they are constantly being shaped by their experiences and bringing those experiences back to the classroom when they return to school. Our campus is richer for the experiences and the reflections that our students contribute to the classroom and beyond. All of us in the McCormick community are enhanced by our students' career development, acquired through what began as the Walter P. Murphy Cooperative Engineering Education Program in 1939.

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