

Designing and Integrating a Successful Graduate Cooperative Education Program in a Research Focused Environment

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Abstract – Integrated learning has been part of the culture at Northeastern University in the College of Computer and Information Science (CCIS) for over 23 years. Our graduate co-op program, which began 12 years ago, evolved out of the longstanding success of our undergraduate co-op program. However, due to the conceptual and structural differences of graduate education in CCIS, integrating a formal structured graduate co-op program has presented many challenges. To meet these challenges, we have refined the program over the years.

This presentation will describe the CCIS graduate co-op program in detail. In addition, we will lead a general discussion of the following topics: institutional commitment, co-op vs. internship, and responsiveness to national and international trends in student demographics. Additional themes related to developing a structured program will include: recruiting students, formalizing the application process, preparing students, developing assignments, evaluating assignments, and integrating the program into an intuitional research environment.

INTRODUCTION

Integrated learning has been part of the culture at Northeastern University (NU) in the College of Computer and Information Science (CCIS) for over 23 years. Our graduate cooperative education (co-op) program, which began 12 years ago, evolved out of the longstanding success of our undergraduate co-op program, which is nationally recognized. However, due to the conceptual and structural differences of graduate education in CCIS, integrating a formal structured graduate co-op program has presented many challenges. To meet these challenges, we have continued to refine the program over the years.

Our purpose here is to provide experiential practioners with information that will assist them in developing and maintaining a successful graduate program. We will start off providing the following:

- **Overview of the program and our students**
- **Factors critical to a successful graduate cooperative education program**
- **Overview of the Northeastern cooperative education model**
- **Structure of graduate co-op in CCIS**
- **Assessment**

Who We Are

College of Computer and Information Science (CCIS) co-op program is optional for Master's candidates. There are approximately 120 Master's candidates in the college. There is no co-op available for PhD candidates, but individual faculty members have established internships for some students. (The distinction between co-op and internship will be discussed later.) Our graduate co-op program has grown from 5 students per semester to 30 students per semester. This tremendous growth (most of it in recent years) has occurred largely in response to increased buy-in from CCIS and university administration. As enrollment in graduate programs by both domestic and international students continues to decline across the United States, co-op is increasingly seen as a way to add value to an already-successful educational model.

Institutional profile:

- Northeastern University in the urban heart of Boston, MA
- 18,000 undergraduates (full and part-time)
- 4,000 graduate students (full and part-time)
- CCIS: 120 Masters and 56+ PhDs
- 600 undergraduate students in CCIS
- 2 year Masters program (2.5 years with optional co-op)

- Required for undergraduates

Success Factors

Through trial and error we have determined that the following factors are essential to the success of our program:

- Institutional commitment
- Responsiveness to students
- Responsiveness to international students
- Responsiveness to academic interests (e.g., faculty)
- Recruitment and a rigorous application process
- Commitment to developing relevant assignments
- Preparation of students for the co-op process
- Responsiveness to employers
- Assessment
- Integrating the co-op program into a research environment

Institutional Commitment

Our experience with the graduate co-op program has been positive because of the commitment and financial support of both the Department of Cooperative Education and CCIS administration.

Our graduate co-op program started in 1992 when the Dean of the College of Computer and Information (CCIS) decided that a co-op option should be offered to Masters Degree students. The Dean of CCIS and the Vice President of Co-op agreed to allocate time to the workload to focus on students, develop assignments, and integrate the program into academic learning.

From 1992 – 2001, the program was offered but not publicly advertised. Information about the program was available on the college's website (somewhat buried) for those students who sought it out, and word of the program was passed largely by word of mouth. In the spring of 2005, the college moved the website link to the main page of the Graduate Program and began formally advertising the program in orientations and other marketing efforts aimed at prospective students. Enrollment in the Graduate Co-op preparatory seminar increased to 40 students as of September 2005. This represents approximately quadruple the previous years' enrollments.

Distinguishing a co-op assignment from an internship

Having a co-op program in a research environment has presented us with considerable challenges in successfully merging the needs of industry, faculty, and students. Research faculty and administration acknowledge the importance of the experiential component to students. However, the specific relationship between the classroom and the work environment continues to be heavily debated. We, the cooperative education faculty of CCIS, define co-op as applied learning in which a structured program is developed and supervised by an educational institution in collaboration with one or more employing organizations, whereby relevant and productive work is an integral part of a student's regular academic program [1].

Only Ph.D. students in CCIS complete internships (as opposed to the co-ops done by Masters Students). Our usage of internship refers to a structured period in which students work on or off-campus, under supervision, in a college, factory, hospital, business, laboratory, or government agency. Similar to the apprenticeship model, internships are expected to have greater emphasis on relation to the student's academic program. Apprenticeships/internships at the Ph.D. level are supervised primarily by academic faculty.

Overview of our graduate program

The structure of our program is based on the Northeastern University Cooperative Education Learning Cycle: Preparation, Activity, and Reflection.

The Preparation: All graduate degree candidates interested in participating in the co-op component are required to attend a series of classroom sessions. In addition, students must complete a series of one-on-one practical preparation sessions with their co-op faculty. Altogether the process requires:

- A set of 10 seminars (on topics such as interview preparation) with required attendance.
- Completion of an application process; acceptance based on a minimum Grade Point Average (GPA) and the student's goals
- The "First Formal Interview" – a practice interview designed to assess and develop "professional skills"
- A mandatory "assignment search kickoff" meeting of all students seeking a new assignment that term
- The assignment search itself

The Activity: Six to eight months of participation in an approved co-op assignment, generally developed by a CCIS co-op team member. In certain instances, positions can be developed by the student(s) or faculty.

The Reflection: At the end of the activity period when students return to classes, a group meeting is held in which students returning from co-op assignments may interact with other returning students. This allows them to share co-op experiences, view statistics relevant to their experiences, and discuss overall trends of the field. We facilitate student discussions on knowledge acquired, general self assessment, and how to make connections.

Responsiveness to Students

Along with reflection activities, a key factor in our success has been in tailored and specific assistance given to each student based on his or her unique needs. We use the seminars and First Formal Interview to discuss appropriate dress, interviewing skills, resume critique, and appropriate behavior in and expectations of the workplace.

Responsiveness to International Students

As the majority of graduate program participants are international students, another area on which we have placed a focus is acculturation. We discuss how to interview in the US, how to write a resume for US companies, and cultural differences in work styles and expectations. This sometimes requires collaboration with the Career Services and International Co-op offices on campus. In addition, we work closely with the International Student and Scholar Institute (ISSI) on campus to provide accurate and timely information on work clearance, including Curriculum Practical Training, Occupational Practical Training (OPT) and Pre-OPT.

Responsiveness to the Academic Side

We work very closely with the academic college faculty and the university administration in establishing academic guidelines for participation in co-op. As part of the institutional commitment to the graduate co-op program, we are jointly supervised by the dean of CCIS and the Vice President of Cooperative Education. Regular reports are made to both supervisors regarding the progress of the program. The college in turn provides administrative assistance -- for example, blocking students' ability to register for academic courses during co-op periods, so that they will focus their attention wholly on working.

Recruiting Students

Due to Northeastern's reputation as the premiere co-op institution in the United States, and our continuing success with the undergraduate co-op program, recruitment for the CCIS graduate co-op program has been a relatively simple matter of letting students know that the program exists. Word of mouth has been our most effective long-term method of advertising. In recent years we have added new methods, such as an elevated role for the graduate co-op program on the college website, and regular presentations to discuss co-op during new student orientations. This has caused the program to grow fourfold in the past year. Along with all of the above efforts we are developing a graduate co-op brochure which will be included in all college recruitment materials.

Application Process

Students are required to apply for the graduate co-op program far enough in advance to complete the 10-week seminar series. In general this requires students to apply two semesters before they expect to begin working. To ensure that students have adequate academic preparation to perform well in their assignments, we require a student to be in full-time academic status for two consecutive semesters with at least a 3.2/4.0 GPA. The application process consists of a cover letter, resume, transcript and completion of a formal interview with us. Students are accepted or denied for the program based on completion of all the Graduate Co-op Seminar Sessions, GPA and appropriateness of their goals with the program goals.

Developing Assignments

With the recent expansion of our graduate co-op program, we have begun to explore new avenues of assignment development. Originally graduate co-op assignments were developed as an outgrowth of our undergraduate co-op program; the more difficult or challenging assignments were made available to both our experienced senior undergraduates and graduate students. Since 2005, our co-op team has an Employer Relations Coordinator. A portion of her responsibilities have been to develop specific assignments geared to the level and curriculum needs of the graduate program. She does this in a variety of ways; for example, following up with companies where students previously developed their own assignments. Recommendations and/or leads from college faculty have also been helpful.

In addition, we closely monitor trends in the computer/information science field in order to track and pursue emerging areas of technology within it. Our assignment development process is continuous; i.e., we do not simply develop assignments before a co-op period, but year-round. This constant assignment development allows for rapid adjustment to changes in the industry, development of assignments which are "popular" with our students, and feedback to faculty on skill sets which may be needed by our students as the field changes.

Responsiveness to Employers

Working closely with existing employers and new leads is absolutely critical. Employers provide us with complete descriptions of their needs via online job submission forms; regular feedback by phone, email, and in meetings; and evaluations at the end of each term.

Assessment

We assess both skill sets and quality of the assignments at the graduate and undergraduate level. We have developed an online student assessment instrument and employer assessment instrument. These tools allow us to assess the students' skill level and compare it to the employers' expected skill level of their individual co-op students, across a wide variety of categories (See Appendix of Website Links).

Along with assessing skill levels we have recently embarked on developing metrics for determining the Quality of Assignments. Through an extensive review of the literature, we have developed two working definitions for quality assignments.

Co-op Quality Definition (used for marketing purposes): A challenging assignment should have positive supervision and mentoring which attempts to match the student's technical, developmental & professional abilities and allows the student to excel in one or more of the above. [2]

Quality Definition (using academic terminology): A quality assignment would reflect curriculum outcomes: outcomes which measure level of success in accomplishing pre-specified programmatic goals and objectives; having benchmarks and measures of success. By defining quality we have been able to develop metrics that allow us to assist employers in developing and maintaining quality assignments. [3]

Summary

Commitment both in philosophy and financial support to the graduate program from all levels of the organization is an absolute necessity if the program is to be successful. Graduate students require more preparation time and in the activity

portion of the learning cycle, in large part because they have different needs from undergraduates. Having enough quality assignments can be a major concern. Establishing program policies and standards that are enforced consistently with both domestic students and international students is necessary. Establishing relationships with employers is crucial, along with a clear understanding that the graduate co-op program is not only a way for the employer to identify qualified candidates for future employment but also a learning environment for the student.

For anyone committed to having a successful graduate program, a strong desire to forge ahead facing all obstacles will be an asset. In closing, though we have developed what seems to be a growing successful program, we still have many questions to be resolved, such as: (1) "Assignment squatters", in which students choose to continue working for the company beyond the co-op term, thus losing positions for the future (2) International student issues, such as the need to integrate Curricular Practical Training, Pre-Occupational Practical Training, and Occupational Practical Training with the structure of the academic program. All of these questions must be tackled in order to have a strong educationally grounded graduate cooperative education program.

**Appendix of Website Links of Interest
Northeastern University, College of Computer and Information Science (CCIS)**

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| Website for the College of Computer and Information Science: | http://www.ccs.neu.edu/ |
| Website for CCIS Graduate Program: | http://www.ccs.neu.edu/graduate/index.html |
| Website for the CCIS Graduate Co-op Program: | http://www.ccs.neu.edu/coop/grad.html |
| Website for the International Students and Scholar Institute: | http://www.issi.neu.edu/ |
| Assessment Instruments for Students and Employers | http://www.ccs.neu.edu/co-op/surveys.html |

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References

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- [3] Simms, M; Erickson, M.; and Jemison, N: "*High Quality: Defining and Systematically Assessing Co-op to Improve Work Integrated Learning*", presentation at the WACE Symposium, Orlando Florida. (2005).
- [4] Rowe, P., "*WACE 2005 Paper Presentation: Co-Operative Education at the Master's and Doctoral Level*", Waterloo Centre for the Advancement of Co-operative Education University of Waterloo, Waterloo, Ontario, Canada. (2005).