

# The Co-Op Portfolio: An Essential Tool for Assessment and Student Development in Co-operative Engineering Programs

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***Abstract:** The Centre for Career Education at the University of Windsor has recently introduced a learning portfolio as part of its cooperative education program. The portfolio doubles as a reflective activity for students and a resource for assessment of learning outcomes achievement. The portfolio provides evidence of students' accomplishments, skills and abilities; and documents the scope and quality of their experience and training throughout the cooperative education program. An assessment rubric has been developed for reviewing each student's co-op portfolio, assessing the format, organization, and included documents. In addition, by reviewing key portfolio inclusions, the Centre for Career Education uses a random sample of portfolios to assess the extent to which students have achieved a series of pre-set learning outcomes.*

## Introduction

In recent years, the Centre for Career Education at the University of Windsor has been working diligently to develop learning outcomes along with supportive activities and assessment tools (Johrendt, Northwood, Benzinger, Salinitri, and Jaekel, 2007; Watters, Johrendt, Benzinger, Salinitri, Jaekel, and Northwood, 2008). As part of the revised program, a learning portfolio component was introduced in 2006. The portfolio serves as a conduit for reflective activities for students and a resource for assessment of learning outcomes achievement for the University. Each student's portfolio acts as a tool for learning and is updated as their experiences change, expand, and grow. Students include copies of their resumes, profile of skills, work samples, work term reports, performance evaluations, and more. In their senior year, students complete a summative reflective assignment on their co-op experiences, referencing the learning portfolio. They answer a number of questions including some that touch on how the creation of a portfolio has benefited them in their career development process. Portfolios are assessed using a rubric and a random sample of portfolios is targeted for closer examination of key components as a way of evaluating student success in achieving program learning outcomes. The first complete portfolios were submitted in the winter 2009 semester for assessment.

## Literature Review

Today's engineering students face increasing demands on developing skills and competencies that are consistently being redefined in the 21<sup>st</sup> century. Students not only need to understand the basic knowledge of their discipline, they also need to be able to think critically and make inferences. These skills require changes in the assessment culture and the assessment practice in higher education and the work environment (Segers, Dochy, and Cascallar, 2003; Dochy, Segers, Gijbels, and Struyven, 2007). Stemming from Kolb's experiential learning theory (1984), learning is continually modified by experience. Thus learning outcomes must be assessed by applying authentic assessment strategies. According to McInnis and Devlin (2002), the clarity of assessment criteria and standards significantly influence the effectiveness of student learning. Critically designed assessment contributes to the way

students approach the discipline, to the quality of that learning, and to the learner's readiness for professional life. At the forefront of higher education models that address the changing skills and competencies required for the workplace and the pedagogical shift in learning-based assessment are the cooperative education programs (Parsons, Caylor, and Simmons, 2005).

To address North American outcomes-based accreditation criteria, a continuous quality improvement process requires an evaluation protocol that documents progress towards achievement of goals and use of evaluation information for program improvement. The implementation of a portfolio assessment can be used to assess program effectiveness (Creighton, Johnson, Penny, and Ernest, 2001). In engineering, portfolios provide an authentic assessment tool for both student learning and development of technical expertise. Christy and Lima (1998) assigned portfolios to freshmen and senior engineering students as a design component for their courses. It was found that the portfolio, in fact, helped the students to shift their focus from assessment of learning to assessment for learning.

According to Brumm, Michelson, Steward and Kaleita (2006), portfolios demonstrate student learning as an organic process involving: collection, reflection, and selection of key artefacts. Further, they are a powerful learning tool requiring the student to revisit their accomplishments over a specific time period, selecting artefacts for the collection that are relevant and reflecting on their growth and development. This assessment tool provides instructors with the opportunity to assess how instruction is being interpreted and evaluated by student learning (Hamp-Lyons and Condon, 2000).

Tillema (2001) confirms that portfolios are effective learning tools for competence development because they provide opportunities to monitor and appraise changes in performance. Furthermore, the portfolio provides a framework to monitor and coach performance improvement making it especially suitable as a tool for learning. In examining three portfolio designs (a dossier portfolio, a course-related learning portfolio, and a reflective learning portfolio), Tillema (2001) found that the reflective portfolio showed the most gains correlating with the highest function feedback by the student, thus giving the students the skills to reflect on their learning.

Mourtos (1999) stressed the importance of portfolios in an aerodynamics course in improving student learning. Portfolios allow students with different backgrounds and learning styles to flourish as demonstrated in a significant GPA increase when they are included in the summative assessment. Further, as suggested by other authors (Weisz and Smith, 2005), workplace experience alone is not enough to achieve deep level learning. Students require continuous feedback to grasp how concepts are formulated and lead to further effective decision making and critical thinking. Deep learning includes the learning opportunities provided by the co-op employers and supervisors, while also highlighting the importance of the students' level of commitment and the ability of the academic community to support them. Reflecting on the process and outcomes through portfolio assessment helps students to achieve deep level learning.

Assessment of portfolios through self-reflection and peer evaluation also enhances students' critical thinking skills (Liu, 2006). Ongoing group-based learning through group composition, group-based peer assessment and self assessment, and personal advancement through individual assignments presented by portfolio enhances the authenticity of the assessment.

Romaniuk and Snart (2000) further substantiate the importance of portfolios to support the learning and development of workers. As a comprehensive collection of information that documents learning and provides exemplars, portfolios are used for the promotion of both personal and professional growth. The challenge as suggested by the authors for any portfolio development is to distinguish between experience and learning. For the portfolio, learners must extract learning from experience, and in reviewing the portfolio, assessors must judge the evidence of learning rather than experience. Further reflecting holistically on learning provides an opportunity to integrate identity, reinforce confidence and enhance adaptability through motivation to learn. Thus the portfolio assists the individual to acknowledge learning needs and set further learning goals. Finally, the advantages created by portfolios foster independence, accountability and responsibility.

The value of the reflection that takes place as a result of generating a portfolio in any work-based learning program such as a cooperative engineering program has been underscored by Chisholm, Harris, Northwood, and Johrendt (2009). Individuals do not learn by simply being in a knowledge-

based work-based environment. In work-based learning, it is the reflective-experiential cycle that underpins effective learning.

## The Co-op Portfolio

Participation in the cooperative education program requires a significant commitment from the students. Their introduction to the portfolio takes place very early in the program during a Co-op 101 online introductory course. The online course takes place over six weeks during their first semester in co-op. The students are introduced to the concept of the portfolio in the first week by viewing an online educational tool and are required to submit their initial portfolio elements during the third week of the course.

Students are taken through the definition of a learning portfolio, the value of the portfolio in general, and specifically for co-op students. They learn that a portfolio:

- is a collection of materials that documents learning over time;
- provides evidence of accomplishments, skills, and abilities;
- illustrates scope and quantity of the students' experience/training; and
- can be adapted upon program completion to serve as a professional portfolio for a job search by presenting personal and professional skills in a concrete way.

Students learn that they will gain the following from developing a learning portfolio:

- confidence through recognition of their achievements and experiential learning experiences;
- insight into their accomplishments and personal successes;
- clarity and documentation of their qualifications, with a chronological account of academic and professional achievements;
- greater understanding of themselves, and their career goals and expectations; and
- direction in defining areas where improvement or change is needed.

## Portfolio Requirements

The requirements outline both the format and inclusions of the learning portfolio. As they build their portfolio, students are reminded of the need to obtain permission for use of employer information and warned against divulging potentially confidential company information.

It is suggested that the portfolio is divided into four sections, namely:

### Section 1: Employability Skills

- Resume from each job competition (3 to 4 in total)
- Cover letter from each job competition (3 to 4 in total)
- Individual Employment Readiness Review Assessment Form (part of Co-op 101)
- Behavioural Interview Assignment (part of Co-op 101)

### Section 2: Workplace Readiness Skills

- Profile of Skills for each work term (3 to 4 in total)
- Learning Objectives for each work term (3 to 4 in total)
- Employer Performance Evaluations (3 to 4 in total)
- Work Samples (optional)
- Work Term Reports (one for each work term; optional)
- Work Term Report Evaluations (one for each work term; 3 to 4 in total)
- Work Term Presentation Evaluations (one for each work term; 3 to 4 in total)

### Section 3: Career Planning & Networking

- Statement of Career Objectives/Plan (one for each work term; 3 to 4 in total)
- Reference List (one for each work term; 3 to 4 in total)
- 3 Networking Assignments (one for each work term)

### Section 4: Other

- Case Studies (at senior level)
- Copies of Portfolio Assessment Forms

- Additional items: transcripts; awards, honours and certificates; writing samples/academic projects; certificates/licenses; publications; letters from clients, customers, faculty; news clippings

Students are advised regarding the creation of their Profile of Skills (Section 2), with suggestions for organization and level of specificity for effective presentation. In addition, students are instructed how to create a Statement of Career Objectives/Plan (Section 3). The objective and plan are reviewed and revised following each work term. Students are to add the updated documents to their portfolio, keeping previous versions in the portfolio for the purpose of periodic reflection and final assessment. Students are provided with a checklist to assist them in ensuring that they have included all portfolio components.

### Senior Summative Reflective Assignment

While reflection is performed by each student upon their return to school following each co-op work term, an additional reflective assignment is issued to the senior students who have completed their final work term. The assignment is designed to facilitate reflection over the whole of their co-op experiences over the previous three to four years. It also documents the students' feelings about their achievement of the learning outcomes. The first question relates to the portfolio section regarding employability skills, the second through fifth questions concern workplace readiness, and the last three questions are about networking and career planning.

1. How have your employment readiness knowledge and skills (resume writing, cover letter writing, interview skills, job search skills) improved over time?
2. What knowledge, skills or attributes have you developed throughout your co-op experiences?
3. Taken all together, what type of opportunities have your work terms provided for integrating classroom theory with workplace practice?
4. Review a sample of your work and/or your work term report from your junior level and compare it to your work from your intermediate level. Do you notice any differences? Explain.
5. How has your understanding of the role and importance of the workplace culture changed due to your participation in co-op?
6. Do you have a stronger sense of what you do and don't want to do in the future as a result of your participation in the co-op program? Explain.
7. Has your career objective changed from when you first created your portfolio? If so, how so? In not, why not?
8. Comment on the network of contacts you have developed through your participation in co-op. How many contacts have you made? What is the value of these contacts? How do you plan to use them in the future? Explain.

### Assessment

Two levels of assessment occur with regard to the portfolio. All portfolios and reflective assignments are graded using a rubric to determine if the requirements are met with regard to the inclusion of the required items. Following the grading process, a select number are analysed (each along with the corresponding student file and work term assessments) to assess the evidence of learning outcomes achievement.

While some elements of completing the Learning Outcomes Across Activities Assessment Data Collection Form is merely data transfer from the various forms in the student file, in some areas the reviewer is required to interpret the level of achievement with regard to the quality of portfolio elements. One section of the form is shown in Table 1 to illustrate an example of the rubric employed.

The completed form summarizes the students' achievement of all learning outcomes:

1. Integrated classroom theory with workplace practice,
2. Developed greater clarity regarding academic and career goals,
3. Developed workplace professional and employment readiness knowledge and skills,
4. Greater understanding of workplace culture,
5. Created and maintained network of contacts in their field, and
6. Made an effective contribution to the workplace.

Once the form is complete for each of the selected portfolios, the data is entered into a spreadsheet for tracking.

**Table 1: Learning Outcomes Across Activities Assessment Data Collection Form for Learning Outcome 2 - Developed greater clarity regarding academic and career goals**

Senior Work Term Assessment Question: How has this work term affected your academic plans and career goals? Explain. (from Final Assessment Package)	Very Strong Impact (4) Provided full and total confirmation of plans or identified definite new path	Strong Impact (3) Provided some confirmation of plans or identified possible new path	Satisfactory Impact (2) Provided some insight into appropriateness of current plans or led to realization that other paths exist	Little or no impact (1) Made no difference either way
Change in Statement of Career Objective & Plan (from Portfolio)			Yes (2) – Plan showed a change in direction, an increase in detail or evidence of other enhanced clarity	No (1) – Plan remained exactly the same
Senior Summative Reflective Assignment Question: Do you have a stronger sense of what you do and don't want to do in the future as a result of your participation in the co-op program? Explain. (from Portfolio)			Yes (2) This could either come via a confirmation of initial goals, questioning of initial goals, or discovery of new goals	No (1) No impact

## Conclusion

The importance of the portfolio in learning outcomes assessment for cooperative education at the University of Windsor has become paramount. In particular, the portfolio provides a vehicle for displaying development of attributes over time. Not only is this useful for assessing student learning outcomes by the University, but it also provides a way for the student to reflect on their own personal and professional development. Having a record of student learning outcomes achievement provides tools necessary for continual program improvement, crucial to the success of the program and its graduates. The revised program has been in place since 2006, with the first portfolios submitted in Winter 2009. As portfolio assessment data accumulates, knowledge of the learning outcomes achievement will be used to improve co-op program activities, modify the process of portfolio development, or reassess the validity of the learning outcomes themselves.

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