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# Evaluation of the Effectiveness of an Online Program to Help Co-op Students Enhance their Employability Skills

*A study of the University of Waterloo's  
Professional Development Program  
(WatPD)*

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## Executive Summary

Co-operative education was one of the University of Waterloo's (UW) defining characteristics when it opened in 1957 and it remains a foundational pillar today. With the support of its 4,500 employer partners, UW offers alternating terms of academic and workplace experience to more than 16,500 students from more than 120 different academic programs. These figures make UW the largest postsecondary co-op program in the world.

Maintaining strong employer relationships has been a critical success factor for UW's co-op program. Both the relevant literature and the feedback received from employers have indicated that employability skills (communication, interpersonal skills, problem solving, etc.) are essential to success in today's workplace (Hodges & Burchell, 2003; McMurtrey, Downey, Zeltmann & Friedman, 2008; Casner-Lotto & Barrington, 2006). A number of studies also indicate that employers are not satisfied with the employability skills of new graduates (Casner-Lotto & Barrington, 2006; AC Neilsen, 2000; Hart Research Associates, 2010).

To address this concern, co-op students from UW have been taking online professional development courses since 2006 through the University of Waterloo's Professional Development program (WatPD). The goal of WatPD is to enhance students' development of employability skills during their work terms. This report describes WatPD's program evaluation plan, including the evaluation methodology and findings collected to date.

The WatPD program consists of two required courses and either two or three elective courses, depending on a student's area of study. Students take one WatPD course in each work term until they have completed their requirements.

From the outset of the program, developing and implementing an evaluation plan has been a very high priority. It is important to understand whether the program is meeting its objectives and to collect data to understand how the program could be improved.

Consideration was given to different models for program evaluation, including a traditional academic program review process. Given the professional development nature of the courses, the evaluation team found Kirkpatrick's model for evaluating training programs to be most appropriate (Kirkpatrick, 1998). The four levels of the Kirkpatrick model include measuring the reaction of the participants, what they have learned, changes in their behaviour and the overall results relevant to the organization.

The research questions corresponding to each of Kirkpatrick's levels for the evaluation of the WatPD program are as follows:

1. What is the students' reaction to the courses?
2. Are students learning the material presented in the courses?
3. Do the courses lead to behaviour changes in the workplace?
4. What is the impact of WatPD on the measures that are important to UW?

A mixed methods approach was used to answer these questions. End-of-course surveys in each of the courses provided both quantitative data, through Likert scale questions, and qualitative data, through open-ended questions. Data from the course offerings were used to assess students' participation rates and learning. Pre- and post-tests were also used in each of the courses to assess learning. Focus groups and exit interviews were used to provide qualitative data at the reaction, learning and behaviour levels. Employer evaluations of student performance were used to measure behaviour changes in the workplace.

The findings indicate that students are generally receptive to the relevance and value of WatPD courses. Between 2010 and 2012, 24,721 end-of-course surveys were submitted, representing a 65.7% response rate. Across the courses, 61% of students provided an overall rating of the course as “very good” or “good”, 27% rated the courses as “satisfactory” and 12% rated the courses as “poor” or “very poor”. When asked about the courses’ ability to maintain their interest, 47% of students rated the courses as “very good” or “good”.

Qualitative feedback collected through focus groups and exit interviews provides a less positive assessment of the courses. The two most common criticisms voiced by students are that the courses are common sense or that they do not feel they personally need employability skills improvement. It has been difficult to recruit participants for focus groups and exit interviews, with response rates of only 3 to 9% between 2009 and 2013. The individuals who have participated in the focus groups and exit interviews may not be representative of the co-op student population. More research needs to be done to investigate the discrepancy between the qualitative and quantitative results.

There is evidence to indicate that students are learning the content from the WatPD courses and that the knowledge they gain persists at graduation. Courses are graded on a numeric scale even though the final reporting of the grade is a “CR” (credit) or “NCR” (no credit) on their transcript. Course averages are in the mid-70s and roughly normal in their distribution. When students’ knowledge of course material was tested, results indicated that students were more familiar with the material after the course than before it started, with a 23% increase in scores in the post-test than in the pre-test. A self-reported measure of learning on end-of-course surveys indicated that approximately 70% of students believed they had been able to connect the course material to their workplace experience. Finally, a survey administered to all graduating students showed that those who had completed WatPD scored higher on questions related to knowledge of employability skills than did students who did not complete WatPD.

There are indications of some improvement in students’ employability skill performance in the workplace. In self-reports on the end-of-course surveys, approximately 60% of students agree or strongly agree that their skills are better at least in part due to the course and that they are better prepared in the specific skill area(s) of the course for future work terms. Students who participated in focus groups and exit interviews were sometimes able to provide examples of ways in which their behaviour changed in the workplace as a result of something they learned in a WatPD course.

The graduating student survey examined students’ goal setting and reflective/integrative behaviours. These are areas targeted in specific WatPD courses. In examining the three groups of students (Co-op without WatPD, Co-op with WatPD, and No Co-op) across the three years of data, there are significant differences between co-op and non-co-op students in goal setting behaviours while employed, but no differences that could be attributed to the WatPD program. For the reflective/integrative behaviours, there is a significant difference between co-op and non-co-op students. However, there is no pattern in the differences from one year to the next that definitively suggests that the changes are attributable to the WatPD program. Further collection of annual data needs to be done to determine what trend in goal setting and reflective/integrative skills might be attributable to WatPD.

A final source of data on students’ employability skills performance in the workplace is the evaluation that employers complete for each student at the end of each work term. This form includes 19 individual criteria and an overall evaluation rating. While there are acknowledged limitations to this data, such as the reference point employers are using (other co-op students vs. other full-time employees) and the nature of the work itself, there are some interesting results to report in examining trends in the employer evaluations. After aggregating over 96,000 employer overall work term evaluations, it was discovered that, at every work term level, students enrolled in the WatPD program performed slightly better than their pre-WatPD peers. WatPD

courses directly relate to twelve of the dimensions assessed in the performance evaluation form. In analyzing WatPD and pre-WatPD students on those twelve dimensions, WatPD students who had taken the relevant course(s) outperformed the students who had not taken the relevant course(s) in eleven out of the twelve dimensions.

There are two main challenges to measuring the impact of WatPD for co-op students at the University of Waterloo. The first source of difficulty is a lack of pre-program measures. For example, a possible measure of success for the program would be if there were fewer employer complaints of inappropriate behaviour by their co-op student(s). However, that kind of data has not been collected systematically at the institution, so a pre-PD baseline does not exist. Secondly, although some limitations exist at all levels of the evaluation plan, the number of confounding variables is much higher when attempting to analyze the impact at the results level. For example, labour market outcomes are a great example of a result-level investigation for the WatPD program, but extemporaneous factors like the health of the economy are likely to have much bigger impact than four or five WatPD courses. Ideas for research methods that could provide insight at this level despite the abovementioned challenges are presented in the recommendations and next steps section of the report.

The WatPD program uses the data collected through the program evaluation plan to continue making improvements to the program. Going forward, attention should be paid to increasing the percentage of students who react positively to the courses. A careful examination of the differences over time and between courses is recommended to identify best practices. Once best practices are identified, efforts should be directed towards applying those best practices in each course.

Additionally, to address the two common student complaints that the courses are common sense and that they do not feel that they need to improve their employability skills, a communication strategy should be developed to challenge their assumptions by including more literature that references the importance of employability skills, providing employer testimonials and emphasizing the importance of lifelong learning.

# 1 Introduction

The University of Waterloo (UW) was established in 1957 with Canada's first postsecondary co-operative education program as one of its founding characteristics. While originally targeted at engineering students, the co-op program at Waterloo has expanded to be part of more than 120 academic programs in all six faculties. Approximately 60% of the undergraduate students at Waterloo participate in the co-op program. Last year, students completed over 16,000 work terms with 4,500 employers.

The University of Waterloo Professional Development Program (WatPD) offers online courses that all UW co-op students are required to take during each of their work terms until they have completed the required number of PD courses for their program. Students take two required WatPD courses followed by two or three elective courses, depending on the requirements for their program. There are between 4,500 and 6,000 students taking one of the WatPD courses each term. Additional details about the WatPD program are available on its website.<sup>1</sup>

As a new and innovative program, it was important to develop an evaluation plan that could provide necessary accountability data to key stakeholders as well as data to support the continuous improvement of the program.

A standard academic program review format was considered as a way to evaluate WatPD. However, the measures included in that type of review focus primarily on quantitative results of inputs and outputs (e.g., number of students admitted, number of graduates, etc.). For any given course, an academic program review often does not extend beyond considering how students perform on content assessments for particular courses. An examination of whether the WatPD courses impact students' attitudes and behaviours in the workplace requires a more in-depth analysis. Without the ability to assess the impact of the program by assigning experimental and control groups, an evaluation plan was developed to collect data from several different sources and look for indications of convergence.

The WatPD evaluation plan was developed in the first year of the program and data collection began with the first class of students. Given the nature of the courses, the Kirkpatrick model for evaluating training programs seemed to provide the most suitable framework. It evaluates training programs at four levels: reaction, learning, behaviour and results (Kirkpatrick, 1998). The application of the Kirkpatrick framework to WatPD resulted in the following questions to guide program evaluation efforts:

1. What is the students' reaction to the courses? For example, is the content interesting? Do the courses involve too much/too little work? Are students able to connect their workplace experiences with the content presented?
2. Are students learning the material presented in the courses?
3. Do the courses lead to behaviour changes in the workplace?
4. What is the impact of WatPD on the measures that are important to UW?

This report presents evidence gathered to address each of these questions.

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<sup>1</sup> See [watpd.uwaterloo.ca](http://watpd.uwaterloo.ca)

## 2 Context for the WatPD Program

### 2.1 Student Employability Skills

This study began with an examination of the literature to identify skills that employers believe are most important for new graduates' success in the workplace and to gauge employers' assessment of students' and new graduates' abilities in those important areas.

A 2006 report titled *Are they ready to work?* lists the five most important skills for successful job performance for new graduates of four-year colleges according to U.S. employers. These include oral communication, teamwork, professionalism/work ethic, written communication and critical thinking/problem solving. The report also suggests that approximately one-quarter of employers noted deficiencies in written communication and leadership among four-year college graduates. In another survey, almost one-fifth of employers also reported deficiencies in professionalism and work ethic (e.g., demonstrating personal accountability and effective work habits) (Casner-Lotto & Barrington, 2006).

Similar findings were reported in a biennial study conducted by the Business Council of British Columbia. Employability skills, often referred to as soft skills, including speaking/listening, judgment/decision making, teamwork, problem solving and writing, were consistently listed among the top skills that employers sought in job applicants (Business Council of British Columbia, 2010). Yet these are also the skills employers are finding to be lacking in students and recent graduates. For example, 29% of employers who participated in work-integrated learning in Ontario reported that students' lack of soft skills posed a challenge for them (Sattler & Peters, 2012).

The emphasis on the importance of employability skills and the concern with the level of employability skills that graduates possess are not unique to North America. An Australian study completed in 2000 reported that employers found graduates to be deficient in problem solving skills, oral business communication skills and interpersonal skills (AC Nielsen Research Services, 2000). In 2007, the English newspaper *The Guardian* reported on the results of a survey conducted by the Association of Graduate Recruiters in which "43% of employers were unable to fill all their graduate vacancies last year – up more than 10% on 2005 – because students had failed to match academic achievement with leadership, teamwork and communication skills" (Ford, 2007).

These studies rely on employers' perceptions of the level of employability skills required to join the labour market, as well as of graduates' level of competence in this area. These assessments may be incorrect, and their expectations may be unreasonable. However, when operating a co-operative education program, acknowledging employer perceptions of student preparation is critical to establishing partnerships.

While completing their undergraduate studies, UW co-op students have the opportunity to develop their employability skills through interactions in the workplace during four to six four-month work terms. While there is agreement that employability skills cannot be learned exclusively in an online environment without any practice (Alexander, 2012), the literature recognizes that "an online soft skills program can shorten the learning curve" (Kapp, 2007) when paired with a work term experience.

The premise of the WatPD courses is similar to that of a science course: the theory and examples of application are presented in the lecture – or online, in the case of WatPD – and then students observe and practice the theory in the science lab – or, in the case of WatPD, on the job.

## 2.2 Program Overview

Oversight for the WatPD program is provided by the University of Waterloo's Co-operative Education Council (CEC). Its members include associate deans from each of the six faculties, the executive director of co-operative education and career action (CECA), other CECA directors and elected student representatives. The CEC is chaired by the associate provost, resources.

The CEC established three main objectives for the WatPD program:

- To enhance the overall work-integrated learning experience of co-op students by providing engaging and relevant online courses to improve students' employability and workplace productivity
- To promote the integration of what is learned at work with what is learned during academic terms through critical reflection
- To enable peer learning and foster a sense of community among co-op students

Twelve WatPD courses have been developed in total since 2006 and are now being offered as listed in Table 1. Each student must take two required courses. A pair of required courses was created for engineering students and another pair of required courses for students in the other five faculties. Students also select two or three elective courses, depending on the requirements set out by their faculty. At the end of 2012 there were six elective courses from which students could choose; at the end of 2013 there were eight. Full course descriptions from the university's undergraduate calendar can be found in Appendix A.

**Table 1: WatPD Courses**

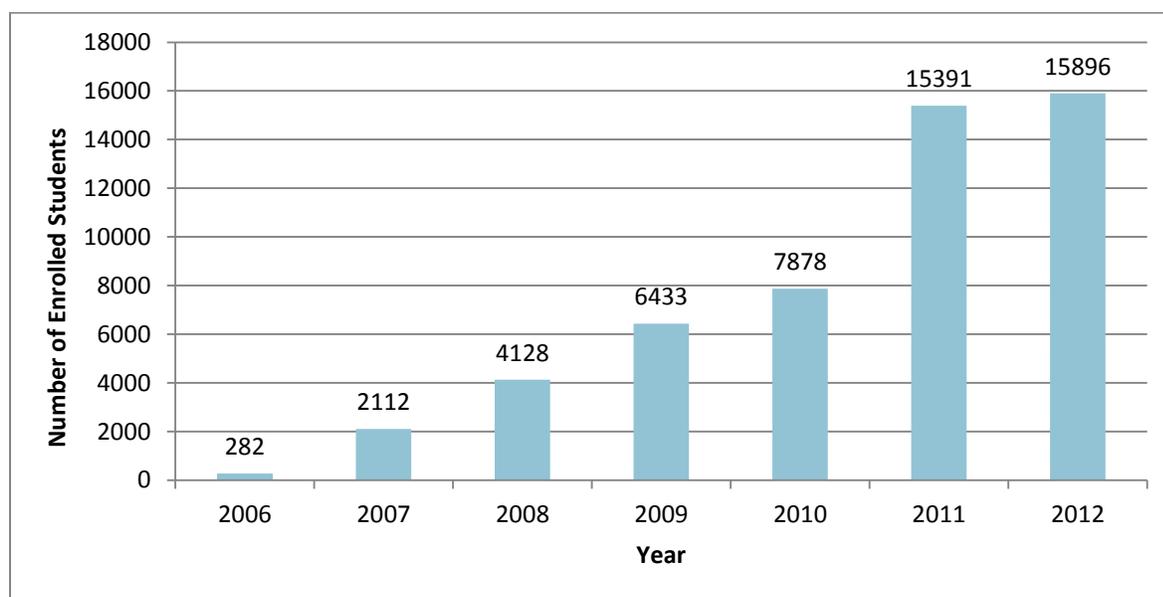
<b>Course Title</b>	<b>Brief Description</b>	<b>Audience</b>
PD1: Co-op Fundamentals	Preparing for the first work term: job search, résumés, interviews, success on the job	Required first course for co-op students in applied health sciences (AHS), arts (ART), environment (ENV), mathematics (MAT) and science (SCI)
PD2: Critical Reflection and Report Writing	Understanding the value of reflection during a work experience and preparing for the first work term report	Required second course for co-op students in AHS, ART, ENV, MAT, SCI
PD20: Developing Reasoned Conclusions	Introduction to critical thinking in the workplace for engineering students	Required first course for engineering students
PD21: Developing Effective Plans	Introduction to problem formation and solving in the workplace for engineering students	Required second course for engineering students
PD3: Communication	Understanding elements of effective communication to assess, monitor and improve workplace communication skills	Elective for all
PD4: Teamwork	Understanding principles and roles of effective teams in the workplace	Elective for all
PD5: Project Management	Applying basic project management techniques and practices and understanding the complexity of the human dimension in project management	Elective for all
PD6: Problem Solving	Applying problem solving models to analyze and categorize problems in order to propose and implement solutions	Elective for all

Course Title	Brief Description	Audience
PD7: Conflict Resolution	Analyzing and understanding typical sources of conflict in the workplace	Elective for all
PD8: Intercultural Skills	Understanding how cultural values shape everyday behaviours, attitudes, thinking processes and communication styles	Elective for all
PD9: Ethical Decision Making	Understanding the theory required to objectively evaluate and discuss ethical issues in the workplace.	Elective for all
PD22: Professionalism & Ethics in Engineering Practice	Understanding professionalism and ethics within society as reflected through practice in the field of professional engineering	Elective for all

### 2.3 Program Enrolment

Enrolments in each of the courses since their creation are shown in Figure 1. The program began with 282 students from mathematics taking their first WatPD course in September 2006. 394 arts students began taking WatPD in January 2007, followed by 192 applied health sciences students, 252 environment students and 251 science students in September 2008. The significant growth in the program in 2011 resulted from the inclusion of 2,236 engineering students. Engineering was the last of Waterloo's six faculties to join the WatPD program (in January, 2011).

**Figure 1: WatPD Annual Enrolments**



Details about the course development life cycle and program operation can be found in Appendix B and Appendix C, respectively.

### 3 WatPD Program Evaluation Overview

Discussions about the need for comprehensive program evaluation began in early 2007 and it was determined that the Waterloo Centre for Advancement of Co-operative Education (WatCACE) would oversee the program evaluation efforts. Gary Waller, WatCACE director, and Judene Pretti, WatPD director, developed and implemented a plan for program evaluation with the support of several WatCACE research assistants.

Many different approaches and models of program evaluation were considered. Developing a plan to measure impact would have been more straightforward if co-op students could have been randomly split between treatment (WatPD) and control (non-WatPD) groups. Had this been the case, pre and post measures could have been taken and the results could have been analyzed. Unfortunately, conducting an experiment of this nature was not possible since the program is a graduation requirement for all co-op students.

Unable to implement a true experimental method, the goal for the WatPD evaluation plan became the identification and creation of a variety of measures that would provide information on what the program is and is not accomplishing. The program evaluation team was looking for converging evidence from multiple relevant sources.

Due to the nature of the program and its courses, the evaluation team, with the support of the CEC, selected the Kirkpatrick model (1998) for evaluating training programs as a framework for the WatPD evaluation plan. The Kirkpatrick model consists of evaluation at four levels:

**Reaction:** How do participants react to the course(s)/program? Are they positive or negative about it? Was it too hard or too easy? Do they feel that it is useful or not?

**Learning:** What do participants learn from the course(s)/program? Do they know more than they did before completing the course(s)/program?

**Behaviour:** Does the participant use the acquired knowledge?

**Results:** What are the performance consequences of any behaviour changes? Do any changes lead to tangible, measurable consequences?

In the WatPD context, the critical evaluation questions, corresponding to each of Kirkpatrick's levels, are:

1. What is the students' reaction to the courses? For example, is the content interesting? Do the courses involve too much/too little work? Are they able to connect their workplace experiences with the content presented?
2. Are students learning the material presented in the courses?
3. Do the courses lead to behaviour changes in the workplace?
4. What is the impact of WatPD on the measures that are important to UW?

The Kirkpatrick model is designed such that evaluations need to be done at previous levels before findings from subsequent levels can be attributed to the training program. In the WatPD context, the training program is the set of courses. For example, in order to conclude that behaviour changes in the workplace are, at least

in part, attributable to the WatPD program, there needs to be evidence that students learned something while participating in their courses. With the progression from one level to the next, the information collected provides more value in terms of identifying the benefits of the program; however, the progression from one level to the next also increases the complexity and expense of data collection.

Consultation with the Office for Research Ethics confirmed that data collected within the program for the purposes of program improvement did not require research ethics approval. Research ethics was sought and approval given for elements of the evaluation program plan that required non-co-op-student participation. For example, research ethics approval was received for the graduating student survey administered to co-op and non-co-op students.

## 4 Program Evaluation Methodology

Table 2 highlights the data that were collected through WatPD's program evaluation plan and how each source of data was used to address questions from the Kirkpatrick training model. Further details about the methodologies used to collect the data are described throughout this section.

**Table 2: Sources of Program Evaluation Data**

Source of Data	Are students receptive?	Are students learning?	Do students put learning into action?
End-of-Course Surveys	•	•	•
Completion Rates and Course Averages	•	•	
Course Pre-/Post-Tests		•	
Focus Groups and Exit Interviews	•	•	•
Graduating Student Survey		•	•
Employer Evaluations of Student Work Term Performance			•

### 4.1 End-of-Course Surveys

End-of-course surveys have existed in all of the WatPD courses since the first course was offered in fall 2006. Students' responses are collected anonymously at the end of each term through the university's learning management system and are compiled by WatPD's program evaluation and project coordinator. While there are slight variations between courses, most surveys include 21 Likert-type or multiple choice questions and an invitation for students to provide feedback through three open-ended questions. The items are worded similarly across all courses so that cross-course comparisons can be made. A template for the WatPD surveys is included in Appendix D.

Between winter 2010 and fall 2012, 25,721 of the 39,165 WatPD students completed the end-of-course surveys, representing an overall response rate of 65.7%. Participation is encouraged using reminder messaging, a note on the course schedule and automatic redirects<sup>2</sup>, although UW changed learning management systems at the end of 2011 and lost the redirect functionality as a result. This change affected the response rate, which dropped dramatically in 2012. Table 3 shows the breakdown of response rates by year.

**Table 3: End-of-Course Survey Response Rates**

Year	Responses Received	Response Rate
2010	6,064	77.0%
2011	11,400	74.1%
2012	8,257	51.9%

The end-of-course surveys include both quantitative and qualitative feedback. Informal reviews of students' qualitative comments were performed continually between 2006 and 2008. The comments were read every term and specific compliments, concerns and recommendations were extracted from the data and passed on as appropriate. As course enrolments continued to grow, however, a more formal coding process became desirable so that it would be easier to share the qualitative results with others, compare courses and monitor trends over time. Strauss' (1987, p. 33) in vivo coding method was selected in winter 2009, and the unit agreed upon was one student response to one of the three open-ended end-of-course survey questions. This method ensured that the arrangement of codes used in the final codebook remained as close to the students' own words as possible.

The original creation of the codes and categories was completed by a WatPD co-op student, under the supervision of the WatPD program evaluation and project coordinator. The university's instructional developer, consulting and research was also consulted. A full description of the development process is included in Appendix E and an up-to-date copy of the codebook itself is presented in Appendix F. Because of the time required to systematically review the qualitative comments, coding is now done once a year. Most recently, for example, 9,088 codes were assigned to the winter 2012 student comments. There were 3,358 students who completed the winter 2012 end-of-course surveys, which represents 57% of the total student population that term. During terms in which systematic coding is not performed, the comments are still read and key messages are still shared with the course teams. Unlike the Likert questions on the end-of-course surveys, the open-ended feedback is not analyzed at the faculty level.

## 4.2 Completion Rates and Course Averages

Pass rates and course averages have also been documented every term since fall 2006. The WatPD instructors and instructional support coordinators compile these data every term before they submit final standings to the UW Registrar's Office so that students' records can be updated accordingly. Pass rates represent students who were still enrolled in the course at the end of the term; students who dropped the course during the term are excluded from the data. Data from students who drop a course and from students

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<sup>2</sup> A redirect is a function in certain learning management systems that allows staff to have certain pages appear automatically once students complete certain tasks. In this case, the end-of-course survey page appeared on a student's screen as soon as the final assignment was submitted.

who remain enrolled but do not participate in the course whatsoever (received 0%) are also excluded from the course averages. This is done so that the monitoring of performance trends can remain focused on students who actually attempt the activities. Drop rates range from 0 to 2% in all courses except for PD4: Teamwork, which has a drop rate range between 1% and 8%. The percentage of students who do not submit anything in their courses is also usually less than 2%.

Recently, WatPD's program evaluation and project coordinator has also started analyzing the percentage of students in each class who complete work that they are not required to complete. The courses are credit or no credit by nature, so a "CR" or "NCR" is all that appears on students' transcripts at the end of each term. Since it is impossible to differentiate on students' transcripts between those who earned 51% in a course and those who earned 99%, completion beyond the minimum requirements is a possible indicator of value or interest in the course. To calculate these statistics, the percentage of students who fulfill the course requirements is determined after each assignment and differences between subsequent assignment completion rates are calculated and compared.

### 4.3 Focus Groups and Exit Interviews

In addition to end-of-course student comments, additional qualitative feedback was collected from students through focus groups and exit interviews in 2009, 2011 and 2013. Focus groups were the initial method by which additional student feedback was solicited, but low response rates and difficulties coordinating schedules with students in different faculties eventually resulted in the focus group format being replaced by individual interviews. More specifically, the 2009 interviews reflected a 9% response rate, (nine individual interviews out of exactly 100 invitations), the 2011 interviews had a 4% response rate (one focus group of five, one focus group of six, and 21 individual interviews out of 853 invites), and the winter 2013 round of individual interviews recruited a 3% response rate (17/618).

In 2009, all students who completed their WatPD requirements were invited to provide additional feedback through a 30-minute exit interview. Remuneration was provided in the form of \$10 added to their student ID cards (which could be used at various locations across and close to UW campus).

In 2011 and 2013, students who had completed their WatPD requirements but were not graduating in the current year were invited to participate. In 2012, graduates were excluded because they received other survey and focus group requests from the university and the evaluation team wanted to minimize survey and/or interview fatigue. In 2011, remuneration for the 30-minute interviews was once again \$10 on students' ID cards. Focus group participants, who were scheduled to meet for up to 60 minutes, received \$20 on their ID cards as well as pizza and pop for dinner. In 2013, WatPD was able to increase the exit interview remuneration amount to \$15 on students' ID cards.

The coordinating, interviewing, recording, transcribing and reporting of all focus group results was completed by a WatCACE co-op student under the joint supervision of the WatCACE director and the WatPD program evaluation and project coordinator. The focus groups and interviews were held in closed-door meeting rooms on campus that were far away from the WatPD staff offices.

### 4.4 Pre- and Post-Tests

Each WatPD course includes a ten-question multiple choice test that is presented to students before they access any of the course content, and then again at the end of the term. The two tests are titled the "audience analysis" and the "final response" but, from a program evaluation perspective, they are considered pre- and post-tests. The tests were created as multiple choice items such that they would not require an extensive

amount of student time and the grading process could be automated within the learning management system. Each question typically corresponds to one week of content and the tests were piloted with student focus groups before they were added to the course. Student performance on these items has no impact on course grades and the questions are worded such that students are encouraged to select "I am not sure of the answer" rather than take a guess when they are unsure of the answer.

Response rates on the pre-tests are nearly 100%. This is achieved by putting a release condition on all of the course content that requires students to look at the pre-test before the rest of the course (except for the syllabus) is unlocked. Students do not have to answer any of the questions after they open the pre-test to move on, but nearly all of them do anyway. High post-test completion rates are harder to achieve. The aggregated post-test response rate between 2010 and 2012 was nearly identical to that of the end-of-course survey rate at 65.3%. Post-test completion is encouraged in the same ways as end-of-course survey completion, but a 1% bonus mark is also awarded to students who complete this activity. The bonus mark has never affected the final credit status of a student, but the appearance of the "bonus mark" field in students' online grade books seems to remind them about the availability of the activity. The bonus item is a true participation mark; students receive it regardless of the score they receive on the post-test itself.

Unlike the end-of-course surveys, post-test response rates are increasing over time (65.4% in 2010, 65.8% in 2011, and 67.4% in 2012). This is believed to be largely attributable to the grouping of items within the toolbars in the learning management system. Pre- and post-tests appear on the same page with other course quizzes, while surveys appear in a separate tab.

#### 4.5 Graduating Student Survey

A graduating student survey was developed and tested in 2010 to be administered to all graduating undergraduate students, both co-op and non-co-op. The program was introduced for first-year students in arts and math in 2006 and to students in applied health sciences, environment and science in 2007. That staggered introduction provided a window of opportunity to collect data from graduating students, both co-op and non-co-op, who had not taken WatPD courses. The intention was to run the survey for three consecutive years to capture a sample of three groups: non-co-op students, co-op pre-WatPD students and co-op students who had completed WatPD. Because of two other surveys being administered to graduating students in the spring of 2012, the third iteration of the survey was run in March 2013 instead of March 2012. The average response rate for this survey was 17% (483/2,831) in 2010, 16% (643/4,009) in 2011 and 14% (616/4,289) in 2013. Because engineering students were not part of the first three cohorts of WatPD students, their data were not included in the analysis for the graduating student survey.

The invitation to participate in the survey was sent to all students who submitted their Intent to Graduate forms. Data were collected anonymously through the online surveying tools SurveyMonkey and Zoomerang. Students who completed the survey were offered \$8 on their student ID cards as remuneration in 2010 and 2011. In 2013 WatPD was able to increase the remuneration amount to \$10.

Responses to subsets of questions on the graduating student survey were aggregated to create a score for each respondent (e.g., an employment goal setting score, an employment reflection score, a knowledge score). The knowledge score is the number of correct answers to the 26 factual questions. Therefore the maximum score possible is 26. All respondents are included in the knowledge score analysis. A missing answer was considered to be a wrong answer.

The goal setting during employment score is the aggregate score from three questions with a maximum score of 3.67:

- During the summer terms (or work terms) when I was employed, I set goals: every term, more than half of the terms, less than half of the terms, I never set goals for myself with respect to my employment
- During the summer terms (or work terms) when I was employed and set goals, I revisited them to check on my progress: several times over the term, once or twice over the term, I never revisited my goals
- During my summer employment (or work terms), when I did set goals, I achieved them: often, sometimes, rarely, never

The reflection during employment score is the aggregate score for four questions with a maximum score of 4:

- During my undergraduate career, during my summer employment (or work terms), I was encouraged to think reflectively and make connections to other experiences or academic courses: often, sometimes, rarely, never
- During my undergraduate career, during my summer employment (or work terms), I took the opportunity to think reflectively and make connections to other experiences or academic courses: often, sometimes, rarely, never
- In my summer employment (or work terms), when I took the time to think reflectively and make connections, I found it: very natural, somewhat natural, somewhat unnatural, very unnatural
- In my summer employment (or work terms), when I was encouraged to think reflectively and make connections, I found it: highly valuable in discovering new insights about the workplace or myself, somewhat valuable in discovering new insights about the workplace or myself, little value in discovering new insights about the workplace or myself, no value in discovering new insights about the workplace or myself

Response options for the goal setting and reflection questions were ranked from most frequent to least frequent, most valuable to least valuable, or the most natural to the least natural, with the highest value assigned to the most frequent, most valuable and most natural response. The mean of the rankings is the score used for the analysis. Cases were excluded if they did not answer all of the questions required for calculation of the corresponding score or they did not work during their summer or co-op work terms.

T-tests were conducted to identify significant differences in scores between co-op students and non-co-op students or between co-op students who completed WatPD courses and those who did not complete WatPD courses.

## 4.6 Employer Evaluations of Student Work Term Performance

At the end of every co-op term, employers are required to complete a work term evaluation form for each of their students. Between 2005 and 2012, a total of 96,408 evaluations were received from employers and documented by UW's Co-operative Education and Career Action department. This student evaluation database includes information about co-op students both before and after WatPD courses became required. Consequently, the data set provides a comparison of students at the same work term level who did and did not complete the WatPD program.

The 96,408 evaluations analyzed in this study are split approximately 40/60 between WatPD and non-WatPD populations (38,940 = 40.4% WatPD student evaluations and 57,468 = 59.6% non-WatPD student evaluations). The evaluations were first cross-referenced with the WatPD credit database to identify which evaluations forms came from WatPD students. The data were then filtered by work term number to allow for

comparisons. Once the overall comparisons were completed at each work term level, the evaluation data were filtered once again based on students' faculties. Average WatPD and non-WatPD work term evaluations were once again compared by work term number, this time at the faculty level.

## 5 Program Evaluation Findings

This section presents the findings of the program evaluation work, grouped according to the four levels of the Kirkpatrick model: reaction, learning, behaviour and results.

### 5.1 Engaging Students: Are Students Receptive?

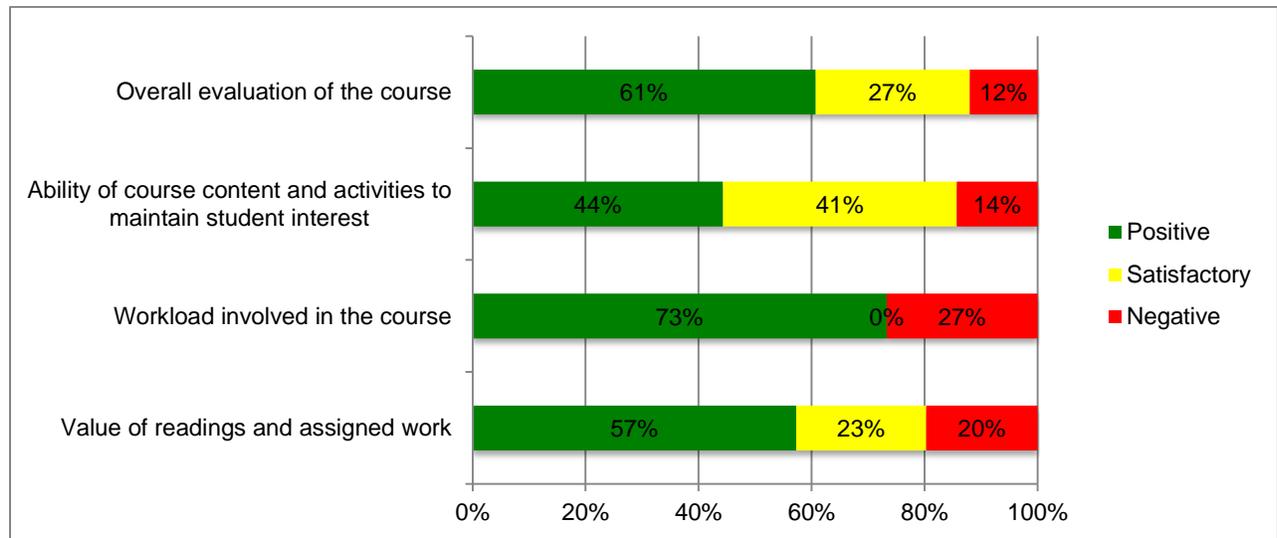
Measuring the receptivity of students to the courses was an important first step. In order to benefit from professional development courses, students need to believe that they can benefit from them. Three measures were used to gauge the receptivity of students to the courses:

- End-of-course surveys
- Course completion statistics
- Focus groups and exit interviews

#### 5.1.1 End-of-Course Surveys: Engagement Ratings

WatPD and WatCACE staff analyze students' end-of-course survey responses to monitor reaction trends over time and collect student input on how the courses can be improved. Results are analyzed both overall and at the faculty level, but we have yet to find statistically significant faculty differences in end-of-course survey responses. Figure 2 highlights the aggregated results of items from the 2010-2012 surveys that most closely relate to student engagement: workload, value of readings and assigned work, ability of the course to maintain student interest, and overall evaluation. For the workload questions, "just right" and "too little" replies were categorized as positive and "too much" or "slightly too much" were categorized as negative. With the other items, "very good" and "good" were combined as positive responses and "poor" or "very poor" were combined as negative responses. Additionally, each course was given equal weight when aggregating the results from 2010-2012; the data were not adjusted for the number of responses received per course.

**Figure 2: End-of-Course Survey – Engagement Results**



The majority of the students (57.3%) rate positively the value of readings and assigned work. Nearly three-quarters of students have no concerns about the workload. Fewer students (44.3%) report that the course is able to maintain their interest. Additional data from the end-of-course surveys are included in Appendix G (overall results by term) and Appendix H (results by course).

### **5.1.2 End-of-Course Surveys: Engagement Comments**

The feedback received through the open-ended survey questions aligns with the quantitative feedback collected through the Likert questions. Some students report feeling very engaged, some report that they do not find the courses engaging at all, and most fall somewhere in between. Additionally, several students include responses that have the “it depends” factor: they respond well to some aspects of the courses and less well to others. Table 4 presents sample feedback from each of the codes in the Application and Engagement categories of the WatPD survey codebook.

**Table 4: End-of-Course Survey Open-Ended Feedback**

<b>Application Examples</b>		
<b>Code</b>	<b>Example</b>	<b>Source</b>
Relevant	"I feel that the content of the course was really its strength. Once it really started focusing on critical reflection it helped me focus on what I need to do in my co-op job. The report writing training was also helpful."	PD2: Critical Reflection and Report Writing
Irrelevant	"Since the content is for all faculties, some examples were not applicable to many students. E.g. I wont have to clean up chemical spills in my office positions, so that material is difficult to engage with."	PD1: Co-op Fundamentals
Reflective	"Teaching me to think critically about my past work"; "It taught me different ways of thinking and handling certain types of situations"	PD20: Developing Reasoned Conclusions
Valuable (this example was also coded as Interesting)	"Much of the content was extremely useful for someone like me who has never had formal communication training, and a lot if it was actually pretty interesting, especially the material on tenor and tailoring one's communication style to the audience."	PD3: Communication
Useless	"Some contents covered are very basic. I expected the course to go a bit deeper into Project Management concepts. For example, aside from the Work breakdown structure (which I find to be new to me), most of the other materials (e.g. time management and leadership traits) are very straightforward and can relate to other fields or area of studies."	PD5: Project Management
<b>Engagement Examples</b>		
Motivating	"I feel that the true value of this course comes from practicing team work through the Team Tasks. I felt motivated to apply myself more to those activities."	PD4: Teamwork
Discouraging	"I felt that lectures were not engaging, or enjoyable. With PD20 the lectures were audio recordings and with instructor's tone, emphasize and humor made the lectures enjoyable to watch."	PD21: Developing Effective Plans
<b>Engagement Examples</b>		
Interesting	"The comics and stories introducing the topic (Ex. problems with processes and things) were interesting and helped get me interested in the reading material."	PD6: Problem Solving
Boring	"Some topics were boring"	PD20: Developing Reasoned Conclusions
Enjoyable	"Love the case approach - this is similar to the techniques used in business schools and is a phenomenal way to learn about project management."	PD5: Project Management

The frequency distribution of each course's application and engagement comments follows in Table 5, and Appendix I presents the full summary of all comments received and coded in winter 2012. The data in Table 3

and Appendix I were compiled from the winter 2012 student surveys, except for PD4 which was compiled from both the winter 2012 surveys and the fall 2011 surveys due to comparatively lower enrolment numbers.

An examination of the number of positive and negative comments reveals results similar to the quantitative survey on the dimensions of relevance, value and interest. For most courses, more students provide positive than negative comments with respect to relevance and value, but more negative than positive comments are reported with respect to interest and enjoyment of the courses. There are some noticeable differences in how the students react to different courses. Examining the comments categorized in this way is a useful tool for instructors and course developers as they make changes to the courses.

**Table 5: Counts of Coded Responses from End-of-Course Surveys**

	Application	Relevant	Irrelevant	Reflection	Value	Useless	Engagement	Motivating	Discouraging	Interesting	Boring	Enjoyment	Dissatisfying
PD1		52	41	0	294	58		0	15	14	54	19	10
PD2		26	49	8	189	107		1	38	6	82	43	31
PD20		61	49	8	129	53		5	6	96	90	101	6
PD21		35	33	0	20	29		1	7	17	62	1	6
PD3		67	22	3	112	29		4	2	55	41	25	2
PD4		14	11	3	55	10		3	7	14	16	9	13
PD5		22	13	1	62	36		4	10	26	35	23	6
PD6		60	40	4	78	48		0	1	35	36	26	4
PD7		33	17	6	57	19		0	10	15	23	6	1

### 5.1.3 Focus Groups and Exit Interviews: Engagement Comments

Appendix J summarizes the feedback received from participants in three rounds of focus groups/interviews conducted between 2009 and 2013. The overall results from these sessions are less positive than the feedback collected through the end-of-course surveys and the completion rate investigations. At the engagement level, most of the students think that the workload of each course is reasonable, and some gained a new skill or two, but many commented that the courses could be more interesting and/or that the course topics are common sense. Focus group discussions about engagement often turned into discussions about how to improve certain aspects of the course and students have provided WatPD with many ideas about specific components of the various courses that they would like to see changed. Nearly all student suggestions fit into one of the following themes: increase the amount of multimedia, embed additional

program-specific examples, make the courses numerically graded rather than credit/no credit, and better demonstrate how the course topics connect to the workplace.

### 5.1.4 Completion Beyond Requirements

Despite the fact that students are not rewarded on their transcripts for excelling in the courses, over 80% of students who earn a course credit before the end of the term continue to complete assignments anyway. This finding may indicate that many students are finding value in completing the assignments. The statistics from 2012, broken down by course, are displayed below in Table 6.

**Table 6: Students Who Complete More Than Required for Credit**

	PD1	PD2	PD3	PD4	PD5	PD6	PD7	PD8	PD20	PD21
Grade required to pass	N/A – students do not know if they pass before the final assignment	N/A – students do not know if they pass before the final assignment	50%	50%	50%	50%	N/A – students must complete their final assignment to get their credit	50%	60%	60%
Number of students enrolled			1,874	425	2,235	2,120		140	1,504	1,537
Total with pass before a final activity			1,754	369	2,135	1,980		121	1,357	1,415
Total who completed an additional activity			1,615 (92%)	327 (89%)	1,772 (83%)	1,671 (84%)		97 (80%)	1,200 (88%)	1,146 (81%)

### 5.1.5 Summary

Results from the end-of-course surveys, focus groups and the analysis of requirement completion data indicate that while there are some students who do not believe the PD courses are useful to them, the majority of students are receptive to the relevance and value of WatPD courses. After collecting and analyzing data related to students' reaction, the next step in the program evaluation plan is to analyze data about what students were actually learning in the courses.

## 5.2 Teaching Students: Are Students Learning?

This study evaluated student learning in WatPD using five measures: pass rates, student average marks in the courses, pre- and post-test scores, student self-reports and a graduating student survey. The concern here is whether or not students are actually more knowledgeable about the course topic at the end of ten weeks of lessons and assignments than before.

### 5.2.1 Pass Rates and Averages

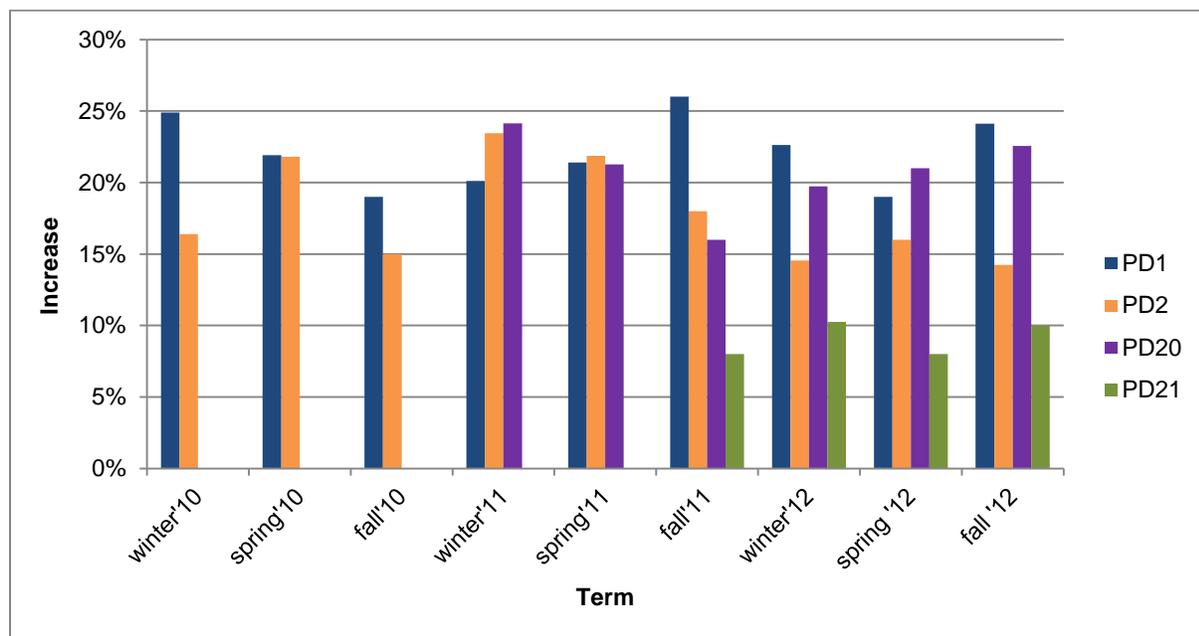
With few exceptions, pass rates and course averages have been consistent over time. Pass rates are over 90% in the elective courses (PD3-PD8) and between low-80 to low-90% in the required courses. Many of the

students who fail their WatPD courses never log in to the course. Students earn a credit if they meet the passing criteria for the course, indicated as “CR” on their transcript. There is no acknowledgement on their transcript for how well they did in the course. However, most students who do engage in the course go well beyond the minimum expectations in the course and continue to complete assignments even after they have accumulated sufficient marks to pass (see section 5.1.4). The averages across all courses are typically in the mid-70% range and are roughly normal in their distribution, with a slight negative skew. Faculty-specific differences are monitored but have never been statistically significant. Additional details about the course pass rates and averages from 2010 to 2012 are available in Appendix K and Appendix L, respectively.

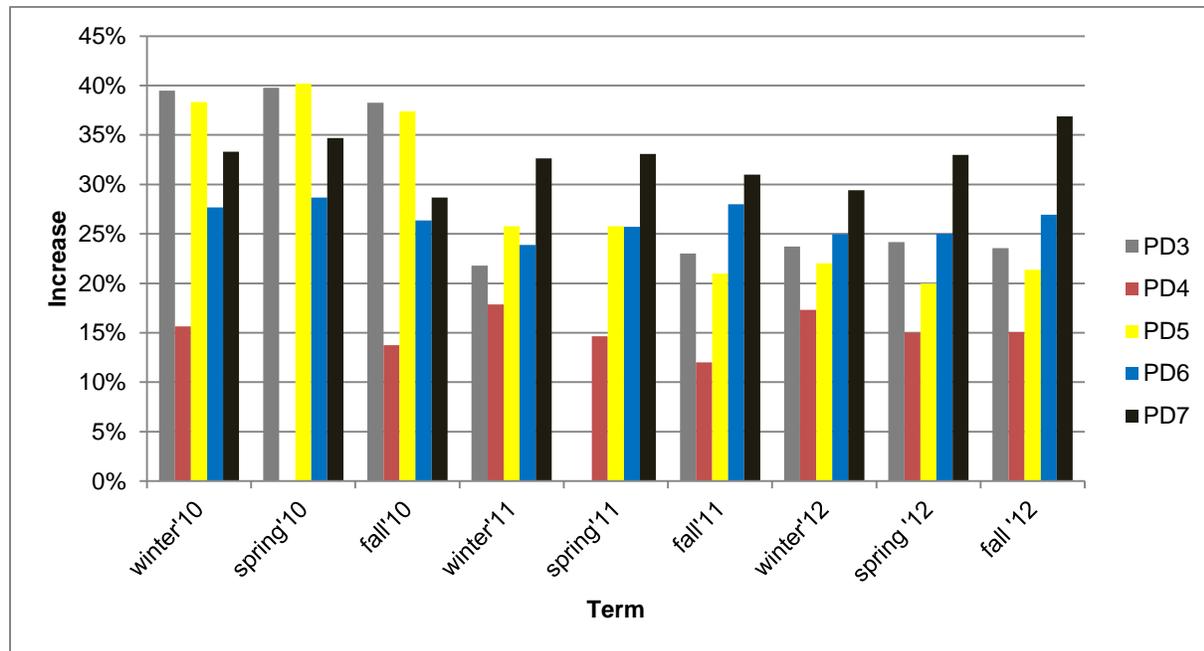
### 5.2.2 Pre- and Post-Tests

While there are acknowledged limitations to the data collected from pre- and post-tests, mainly the fact that learning is measured through multiple choice tests, the improvement in test scores from before the course to after is significant ( $p < 0.001$  using paired t-tests on every course in every term), has been consistent over time, and provides some insight into the knowledge students have coming into the courses and the knowledge they have gained after ten weeks in the course. Figure 3 shows the increases in post-test scores at the end of the term for the required courses and Figure 4 shows the increases in the post-test scores for the elective courses. All courses show a minimum of an 8% increase from pre-test to post-test, with an average difference across courses between winter 2010 and fall 2012 of 23%.

**Figure 3: Differences Between Pre-/Post-Test Scores – Required Courses**



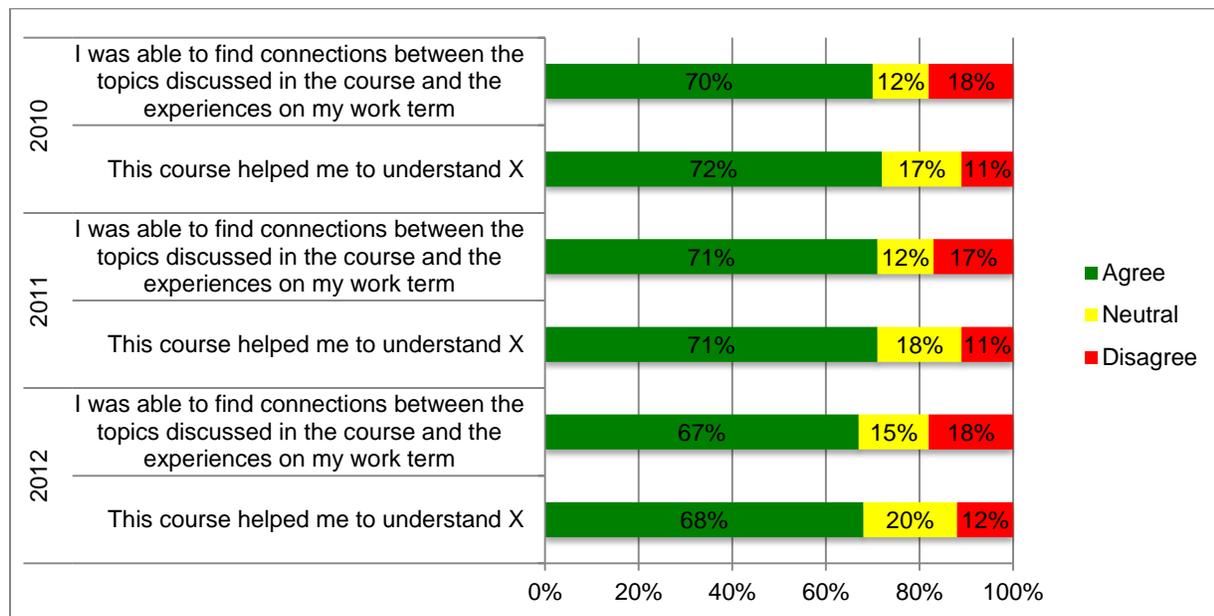
**Figure 4: Differences Between Pre-/Post-Test Scores – Elective Courses**



### 5.2.3 End-of-Course Surveys: Learning

Self-reports of student learning are also collected as part of WatPD's program evaluation. The end-of-course surveys provided in Appendix D include two questions about whether students believe they gained new knowledge from the courses. As illustrated in Figure 5, approximately 70% of students agree or strongly agree that they were able to find connections between the topics in the course and their work term experience. Similar levels of agreement were reported when students were asked if they believed that their understanding of the course topics had improved.

**Figure 5: End-of-Course Survey – Learning Results**



Some students also reported gaining new skills in the open-ended section of the end-of-course surveys. A winter 2012 PD1 student, for example, shared his or her opinion that "... (the exercises) were excellent as it made you think about different situations you will encounter in your co-op term. The questions were very applicable to real life work situations. I thought the interactive office politics activity was a superb way to show students what it's like to be in an office environment." Feedback from a PD3 student from the same term also highlighted that WatPD students were gaining new knowledge: "The assignments were the right length and depth. They weren't just testing knowledge and theory (multiple choice). Instead it allows the student to apply the knowledge in relative scenarios."

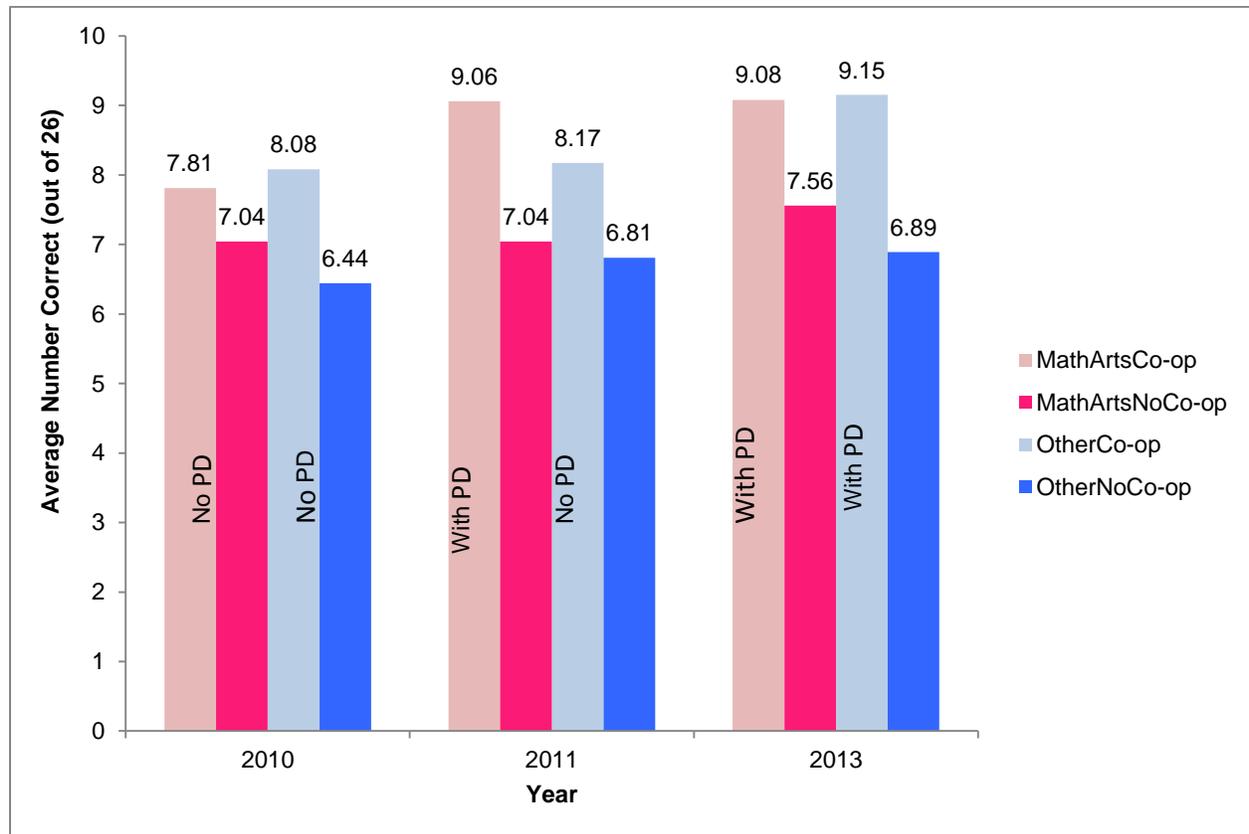
Not all students agreed that they had gained new knowledge in their WatPD courses. Many students suggested that the WatPD course content is common sense and unnecessary for university-level students, especially those who are native to North America. A math student articulated this belief during a 2009 interview when s/he answered a question about applying knowledge gained in WatPD courses during the work term: "... being through the [Canadian kindergarten to grade 12] school system, I already knew everything. Because I'm going through CS (computer science) in bioinformatics, I didn't find a situation where I could apply it... communicating with people and body language is second nature to me, growing up in Canada. I didn't see any improvement or any difference in it; it didn't help me."

### 5.2.4 Graduating Student Survey: Learning

One section of the graduating student survey included questions about the knowledge presented in specific WatPD courses, similar to the questions presented in the ten-question multiple choice pre- and post-tests. These questions do not measure students' application of employability skills in the workplace; they measure knowledge of the content presented in WatPD courses. Note that even students who did participate in the WatPD program will have taken four or five of the PD courses by graduation and therefore would not be expected to know the content from all PD courses.

Figure 6 shows the results of the three years of data. Math and arts co-op students began taking the WatPD courses a year before students from the other faculties, so the results have been split between math/arts and “other”, which includes students in applied health sciences, environment and science. Engineering students were not included in the analysis due to their late introduction to WatPD. For the 2010 data, no students had taken the WatPD courses. For 2011, the math/arts co-op graduates had taken WatPD, but co-op students in the other faculties had not. In 2013, all co-op graduates had taken WatPD.

**Figure 6: Graduating Students' Scores on WatPD Knowledge Questions**



The graduating student survey results suggest that there is a difference between the scores of non-co-op and co-op students on the WatPD knowledge questions<sup>3</sup>, even without taking WatPD courses (light colours vs. dark colours in Figure 6). Over time, the scores for students in all non-co-op programs remained fairly stable; however, knowledge scores on PD course topics for co-op students who completed PD (M=9.08) were

<sup>3</sup> In 2010, math and arts co-op students did not score higher in knowledge than their non-co-op counterparts ( $t(100.91) = -1.51, p = 0.13$ ). Co-op students from the other faculties scored higher in knowledge during employment than their non-co-op counterparts ( $t(110.30) = -3.48, p < 0.05$ ). In 2011, both math and arts co-op students and co-op students from the other faculties scored higher in knowledge than their non-co-op counterparts (math and arts:  $t(254.56) = -5.35, p < 0.05$ ; other faculties:  $t(253.93) = -3.88, p < 0.05$ ). In 2013, both math and arts co-op students and co-op students from the other faculties scored higher in knowledge than their non-co-op counterparts (math and arts:  $t(258.6) = -3.79, p < 0.05$ ; other faculties:  $t(231.81) = -6.11, p < 0.05$ ).

greater than the knowledge scores for co-op students who had not completed PD ( $M=7.98$ ;  $t(930)=-5.06$ ,  $p<0.05$ ).

### **5.2.5 Summary**

Students' pass rates, average course grades and improved scores between their pre- and post-tests present evidence that students are learning the WatPD course content. Furthermore, the knowledge students receive from the courses appears to persist over time, since the graduating student results suggest that WatPD differentiates graduating co-op students not only from non-co-op students graduating from the same programs, but also from co-op students in the same programs who did not take WatPD. Once evidence was uncovered suggesting that students are learning new content in their courses, it became important to investigate whether WatPD is having an impact on students' behaviour during their co-op work terms.

## **5.3 On the Job: Do Students Put Learning Into Action?**

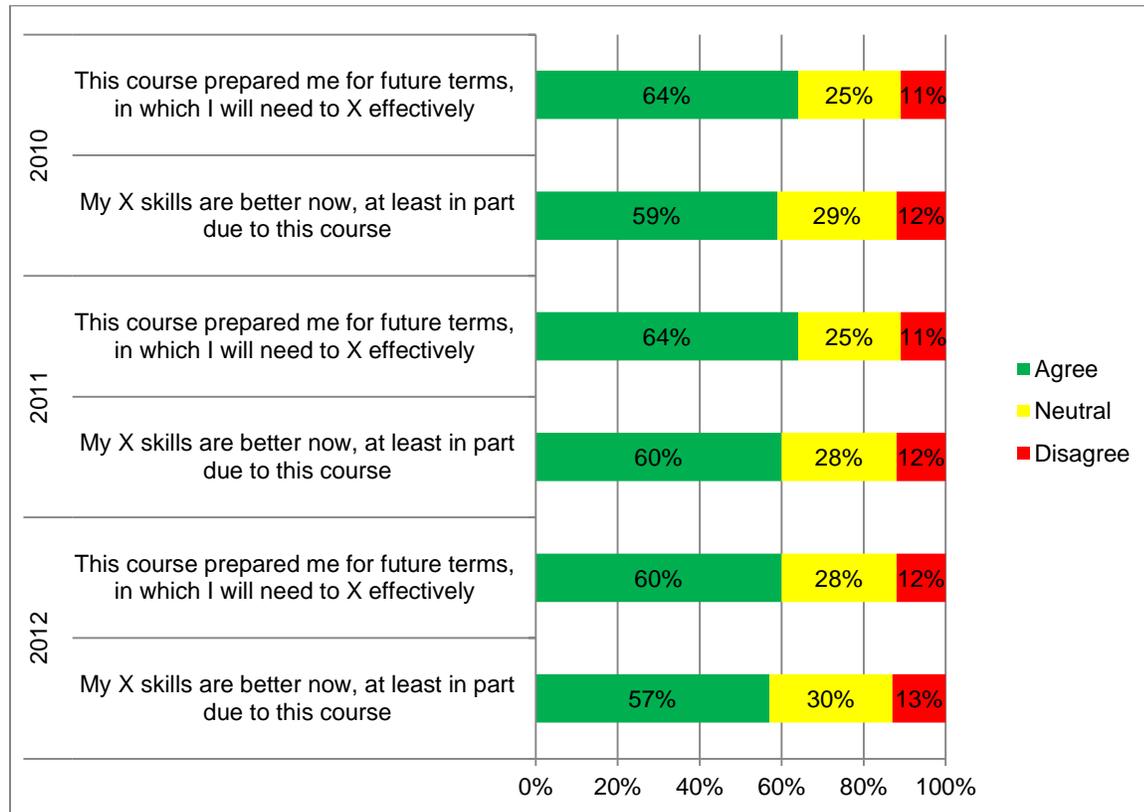
The measures developed for assessing the engagement and learning of students through the WatPD courses are relatively straightforward. Measuring potential changes in behaviour as a result of the WatPD program has proven to be much more difficult. There are three sources of data used to measure potential behaviour changes resulting from the WatPD program. They include self-reports on end-of-course surveys, responses to a set of questions on a graduating student survey, and trends in ratings on employer evaluations of student work term performance.

### **5.3.1 End-of-Course Surveys: Behaviour Changes**

One way that WatPD measures whether the knowledge that students gain in their WatPD courses translates into behaviour changes on the job is through reports from the students themselves. There are two items on the end-of-course surveys that inquire about behaviour changes. The first is a direct question that asks students if they think their skills are better, at least in part due to the course; the second asks students if they think the courses prepared them for future situations in which they would need to apply the skills taught in the course. In both questions, approximately 60% of students agreed or strongly agreed with the statements and only about 12% disagreed or strongly disagreed. The exact distribution of response for these items is presented in Figure 7.

Additionally, students reported changes in their behaviour directly through the open-ended questions at the end of the surveys and during focus groups or individual interviews. Five examples are included below in Table 7. Students who did not believe that their skills were impacted by the WatPD courses usually suggested that this was because the course concepts were common sense.

**Figure 7: End-of-Course Survey – Behaviour Results**



**Table 7: Example Feedback from End-of-Course Surveys**

Skill	Quote	Source
Conflict Resolution	"The course has taught me how to act in future conflicts. Keeping attention on the problem and not on the person is definitely a concept I will keep in mind. Also, I like how the course talks about apologizing and trying to solve conflicts when we are calm, not when we are nervous."	Winter 2010 PD7 student survey
Written Communication (email)	"PD3 I found really useful, especially about how to communicate with other people using email. I didn't just learn from PD3, I also learned from reading other people's emails, but I actually received a comment from my co-worker a few weeks ago; he said he likes the way I write my emails: not just writing randomly whatever comes to mind."	2011 graduating student interviews
Critical Thinking	"Before I was not exactly sure what the kind of arguments were and how to evaluate them. However now I am better equipped to understand arguments and thus have better critical thinking. The course does a good job of clearly outlining the basics of an argument what makes it good and how to evaluate and tie the reasoning behind the argument to develop a strong well-constructed conclusion."	Winter 2011 PD20 student survey
Problem Solving	"It was actually very useful stuff that we learned. This course really taught me new ways to approach a problem and if I don't remember exactly what the steps were, what I'll take away from this course is to analyze a problem, break it down in to simpler pieces (5 whys, or 5 W's) and then tackle these simpler issues."	Winter 2012 PD6 student survey
Interpersonal Skills	"A big thing I got out of PD was, you know, learning about proper ways to communicate with management or with senior members on the team in general. In order to do your job well, especially as a co-op – because you haven't been around the company for a while and you don't know a lot of the policies or a lot of the tools or whatever it is that's associated with your job – so especially at the beginning, there's a huge learning phase and you need to be able to communicate properly in order to become an effective co-op student as soon as possible."	Winter 2013 graduating student interviews

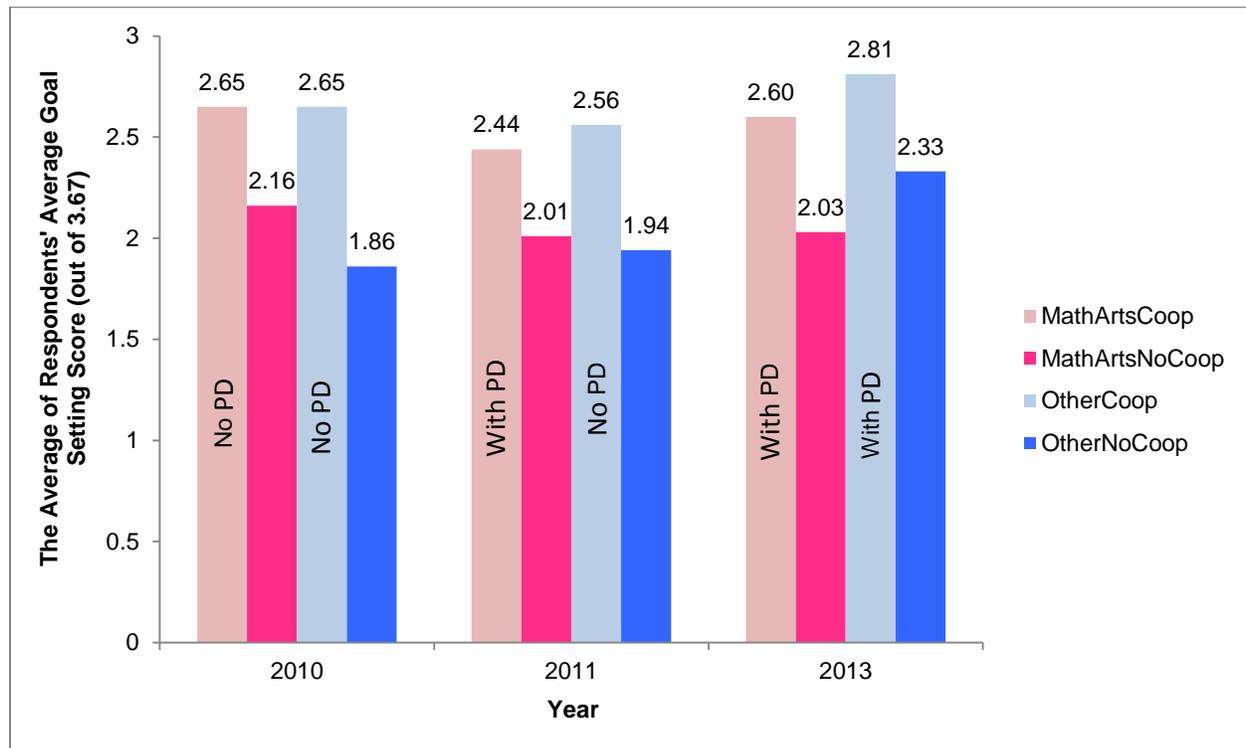
### 5.3.2 Graduating Student Survey: Behaviour Changes

The graduating student survey described in section 4.5 includes questions that inquire about students' goal setting and reflective/integrative behaviours. Goal setting is a skill directly targeted in several of the courses. In some of the WatPD courses, students are setting one or more goals specifically related to self-improvement on the particular course topic. With respect to measuring reflective/ integrative behaviours, an objective of the WatPD program is to increase students' awareness of their workplace environment and their interactions with co-workers so that they can better reflect on their experiences and integrate those experiences with others they have had.

With respect to goal setting, the survey asks students about the frequency with which they set, revisit and achieve goals during employment, whether during work terms or summer employment. Figure 8 shows the

aggregated score of goal setting behaviours for non-co-op students, co-op students before WatPD, and co-op students with WatPD.

**Figure 8: Graduating Students' Reports of Goal Setting Behaviours**



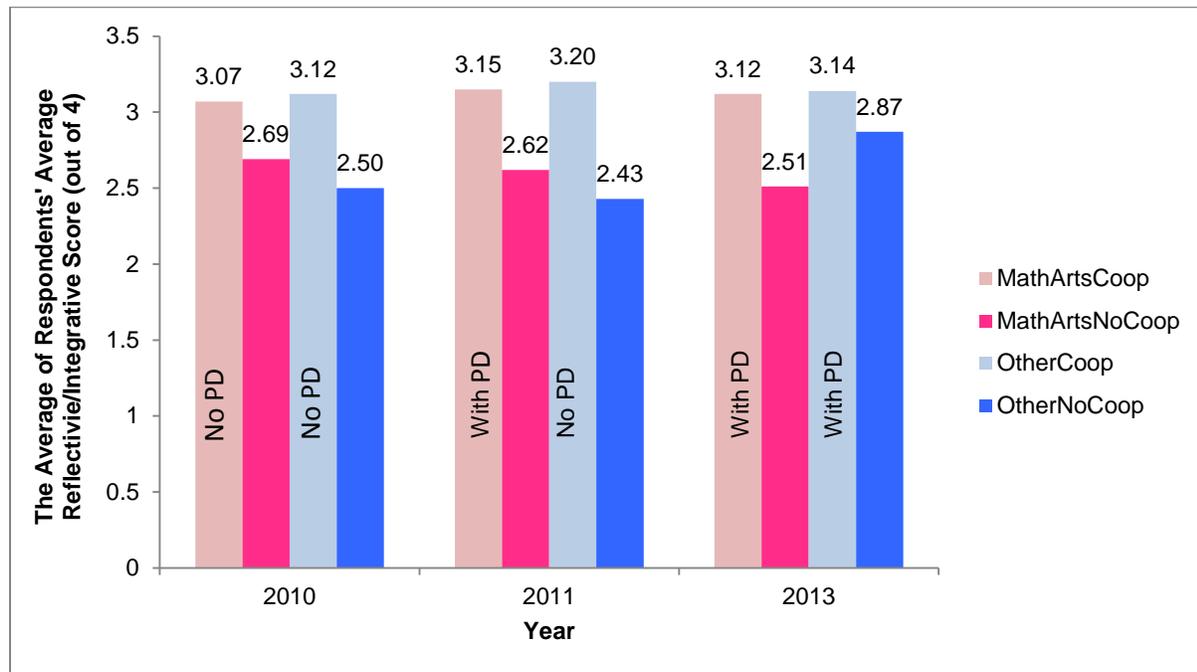
While there are significant differences between co-op and non-co-op students in terms of their goal setting behaviours while employed<sup>4</sup>, there is no increase in goal setting behaviours for co-op students from 2010 to 2011 and 2013, the time period during which they would have taken the WatPD courses. There is an increase in the goal setting behaviours of WatPD students from the other faculties (applied health sciences, environment, science) between 2011 and 2013. This might be attributed to those students taking WatPD; however, there was also an increase in the reported goal setting behaviours of non-co-op students from those faculties in the same time period. These results imply that the WatPD program does not seem to be having a positive impact on students' goal setting behaviours based on student self-reports.

On the topic of reflection and integration, the survey asks students how often they were encouraged to reflect/connect their knowledge/experience during their work experience, how often they actually did reflect/connect, how natural it was for them and how useful it was. Figure 9 shows the reflection/integration

<sup>4</sup> In 2010, both math and arts co-op students and co-op students from the other faculties scored higher in goal setting behaviours during employment than their non-co-op counterparts (math and arts:  $t(104) = -2.73$ ,  $p < 0.05$ ; other faculties:  $t(142) = -4.25$ ,  $p < 0.05$ ). In 2011, both math and arts co-op students and co-op students from the other faculties scored higher in goal setting behaviours during employment than their non-co-op counterparts (math and arts:  $t(235) = -2.71$ ,  $p < 0.05$ ; other faculties:  $t(241) = -4.27$ ,  $p < 0.05$ ). In 2013, both math and arts co-op students and co-op students from the other faculties scored higher in goal setting behaviours during employment than their non-co-op counterparts (Math and arts:  $t(196) = -3.72$ ,  $p < 0.05$ ; Other faculties:  $t(204) = -3.31$ ,  $p < 0.05$ ).

behaviours during work experiences of non-co-op students, co-op pre-WatPD students and co-op students with WatPD.

**Figure 9: Graduating Students' Reports of Reflective/Integrative Behaviours**



There is a significant difference between the reflective/integrative behaviours of co-op and non-co-op students.<sup>5</sup> While the scores from 2011 and 2013 for co-op students are higher than 2010 scores, it is not possible to attribute this result to the WatPD program. Additional samples of graduating students will need to be collected in upcoming years to determine if any of the trends in reflective/integrative behaviours can be attributed to WatPD.

### 5.3.3 Employer Evaluations of Students' Work Term Performance

In most training programs, evidence of changes in behaviour can be collected from a relatively objective third party such as the trainee's supervisor. Typically, the supervisor is familiar with the skills of his/her employee and can report on changes that he/she sees after the training is complete. The structure of the co-op program, however, makes it difficult to use supervisor feedback as a measure of a change in student behaviour. Most co-op students are new to their supervisor when they begin a WatPD course. The supervisor is not likely to be familiar with the level of skill that a co-op student has when s/he begins the work term.

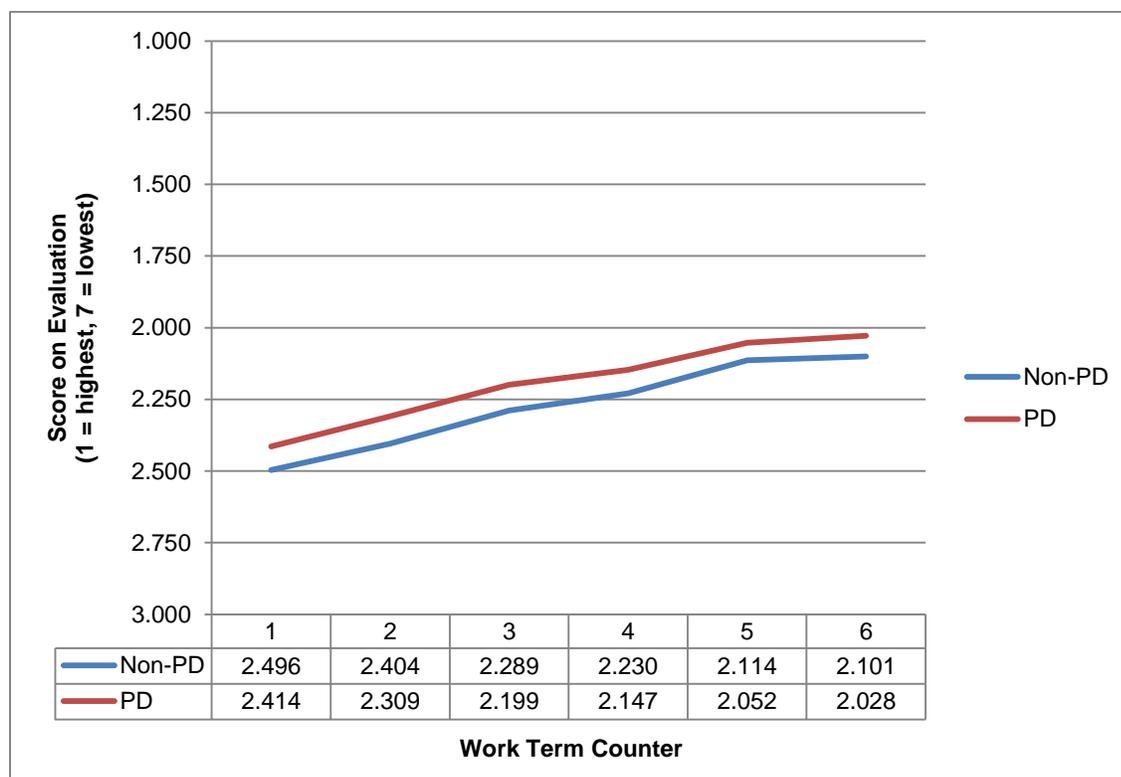
<sup>5</sup> In 2010, both math and arts co-op students and co-op students from the other faculties scored higher in reflective behaviours during employment than their non-co-op counterparts (math and arts:  $t(107) = -2.80, p < 0.05$ ; other faculties:  $t(142) = -4.32, p < 0.05$ ). In 2011, both math and arts co-op students and co-op students from the other faculties scored higher in reflective behaviours during employment than their non-co-op counterparts (math and arts:  $t(229) = -5.09, p < 0.05$ ; other faculties:  $t(213) = -7.06, p < 0.05$ ). In 2013, both math and arts co-op students and co-op students from the other faculties scored higher in reflective behaviours during employment than their non-co-op counterparts (math and arts:  $t(160) = -5.39, p < 0.05$ ; other faculties:  $t(209) = -2.61, p < 0.05$ ).

Additionally, the co-op student finishes his or her WatPD course and work term at roughly the same time; this means that there is no opportunity to follow up with the employer after the completion of the course to report on any changes in the student's behaviour after the completion of WatPD "training".

Still, some relevant information can be gleaned from these evaluation forms, which employers complete at the end of every student's work term (see Appendix M). This form is used every term and includes 19 criteria according to which students are evaluated, as well as an overall rating. Employers are also invited to share their thoughts on the students' top three strengths and top three areas for development.

Figure 10 compares the average overall evaluation ratings (1-outstanding, 7-unsatisfactory), sorted by work term number, for WatPD and non-WatPD students who received employer ratings between winter 2005 and fall 2012.

**Figure 10: Work Term Performance of WatPD and Non-WatPD Students**



At every work term level, students enrolled in the WatPD program performed slightly better than their pre-WatPD peers. The differences are statistically significant ( $p < 0.001$  using paired t-tests). Students in math and engineering typically complete six work terms. Students in the other faculties typically complete four or five work terms.

In addition to comparing overall ratings, impacts of the WatPD program were also analyzed at the individual criterion level. The criteria used on the performance evaluation form were mapped to the WatPD course(s) that target(s) that skill. The mapping of evaluation criteria to WatPD courses is provided in Appendix N. After

students take the two required WatPD courses, they choose a set of two or three elective courses and the order in which they wish to take them. The graphs in Appendix O display the results of work term evaluations on specific dimensions mapped to relevant WatPD courses for students who have/have not taken those courses. For example, employers provide a rating for students' written communication skills. Improving written communication skills is targeted in PD2, PD21 and PD3. In the Appendix O graph titled "Written Communication", there are three sets of data: performance ratings for students who have previously taken one of PD2, PD21 or PD3; performance ratings for students who were taking one of those courses during the term in question; and performance ratings for students who had not taken any of those courses. Of the twelve criteria on which WatPD was believed to have an influence, students who had completed a course related to that topic in the past outscored students who had not in every category except for "Reflection and Integration from Prior Learning". In the Reflection category, students who had taken a relevant course outscored their non-WatPD peers in work terms 5 and 6 but not in work terms 2, 3 or 4. Furthermore, students who were currently enrolled in a course related to an evaluation criterion outscored non-WatPD students on six of the twelve items, with the remaining six having mixed results depending on the work term in which the comparison was being made.

### 5.3.4 Summary

While behaviour changes in the workplace as a result of the WatPD program are difficult to assess, there are indications that the program is having some impact. Approximately 60% of students report on end-of-course surveys that they believe their skills related to the course topic to be improved, at least in part due to the course. In examining the overall performance score on employers' work term evaluations, WatPD students slightly outperformed students who did not complete WatPD. The data collected from students on the graduating student survey about their goal setting and reflective/integrative behaviours during work experiences also show a difference between co-op students and non-co-op students, but they do not conclusively demonstrate that the WatPD program has had an impact on these behaviours.

## 5.4 Results Level: What is the Overall Impact of the WatPD Program?

The final, "results" level of the Kirkpatrick model provides evidence, not proof, that the training program has had an impact on students. In some contexts, such as when measuring the effectiveness of safety training, for example, the results of the program could be assessed by calculating the difference in the number of workplace injuries both before and after implementation. In our case, however, such direct measures were not possible. As Kirkpatrick notes, "It can be difficult if not impossible to measure final results for programs on such topics as leadership, communication, decision making" (1998, p. 23).

Two main challenges were encountered in our attempt to conduct a results-level analysis of the overall impact of the WatPD program. The first lies in the absence of pre-program measures. The desire to evaluate the WatPD program provided the motivation to begin collecting more extensive data on measures such as student abilities, employer satisfaction, etc.; these data were not available prior to the beginning of this study. In the absence of proper baseline data, it is impossible to measure what impact the program might have had.

Another challenge was presented by the many confounding variables that could also explain changes in results-level data. For example, one could compare the labour market outcomes of co-op students who graduated before WatPD to those who have graduated with WatPD. However, the health of the economy might also correlate with labour market outcomes and could mask the effects of the WatPD program.

Ideas for further analysis using Kirkpatrick's model are presented in the Recommendations and Next Steps section of this report.

## 6 Limitations

There are, of course, limitations to the results of this study. Without a true experiment, it is not possible to isolate the effect of the WatPD program. We did not have a randomly assigned control group, nor did we have a common set of employers evaluating the same group of students before and after taking the WatPD courses.

The nature of the program has placed limitations on the development of measures for the evaluation. For example, given the size of the program, the pre- and post-test measures had to be designed as multiple choice tests that could be graded automatically. With almost 16,000 students in WatPD courses each year, it is not feasible to provide open-ended questions and manually verify students' knowledge of course materials.

There are several limitations to the use of the data from the student performance evaluation form that employers complete each term. Three of the dimensions (conflict resolution, reflection/integration and goal setting) were added to the evaluation form in 2008, so there are fewer data for those questions in the pre-WatPD student sample. The transition to WatPD courses becoming a required component for students' degrees began in 2006 for math and arts students; 2007 for applied health science, environment and science students; and 2011 for engineering students. It might be the case that students' performance evaluations are increasing over time regardless of the impacts of WatPD.

Additional limitations relate to the performance evaluation form and to the student evaluation process itself. These problems led to a new evaluation form being introduced in 2013. Prior to 2013, the form came with minimal instructions to employers about how to complete the form, so the employer ratings can be quite subjective. Benchmarks for assessing performance are not provided, so employers may be using different standards when drafting their evaluations. Furthermore, the nature of co-op jobs varies both across and within fields. One math student in his sixth work term might spend a term as a teaching assistant, while another might work for a software company writing code for its products. These students might be evenly matched in skills, but one might receive a higher evaluation simply because of the nature of his/her work.

The declining response rate on end-of-course surveys has also posed a challenge. Before the university introduced a new learning management system in winter 2012, end-of-course survey response rates were consistently over 70%. Now, however, it is more common for the response rates to be slightly over 50%.

Even more difficult than increasing the response rate to surveys has been recruiting students to participate in focus groups and exit interviews. Despite the large enrolments in the courses and offers for remuneration, it has been difficult to recruit even 10 to 15 students to provide feedback on the program through interviews or focus groups.

An additional consideration for the graduating student survey is a possible spillover effect of students who began their studies in a co-op program and took WatPD courses but then dropped the co-op option and are considered to be non-co-op students at graduation.

Limitations such as the above warrant the collection of multiple data sources to address each research question. While results from individual investigations may be inconclusive, the converging results from multiple sources lend credence to the results of the evaluation.

## 7 Conclusions

This report has addressed four research questions to evaluate the effectiveness of the WatPD program at the University of Waterloo.

### 7.1 Are Students Receptive?

The majority of students are positive about the value and relevance of the WatPD courses as reported through end-of-course surveys, but less than half of the students report that the courses are able to maintain their interest. While the feedback is mixed, more students report in focus groups and exit interviews that the courses are not useful than students who report finding value in the courses. Given the relatively high response rates and the consistency of the ratings on end-of-course surveys over several years, it is believed that the inconsistency between the reports of value and relevance between the two sources of data is more likely an issue with the representativeness of the students willing to participate in focus groups and exit interviews. More investigation should be done to confirm that assumption.

### 7.2 Are Students Learning?

Students are gaining knowledge about employability skills from the WatPD courses. Increases in scores on pre- and post-tests within the courses and also on the graduating student survey indicate an increase in students' knowledge about the WatPD course content. In addition, the majority of students report that the courses help them improve their understanding of a topic and that they feel prepared to practice certain skills in the future.

### 7.3 Do Students Put Learning Into Action?

While it is difficult to attribute changes in workplace behaviour directly to knowledge gained in the WatPD courses, there are some indications that the WatPD program is having an impact on workplace performance. At the end of WatPD courses, the majority of students report that their skills targeted by that course are improved, at least in part as a result of the course.

There are differences in self-reported goal setting behaviours between co-op and non-co-op students, as investigated through a graduating student survey. There was an increase in the goal setting behaviours of students from applied health sciences, environment and science after taking the WatPD program, but there was no increase for math and arts students who had taken WatPD. Thus, it is not possible to conclude that the WatPD program has had an impact on students' goal setting behaviours.

There are differences between the self-reported reflective/integrative behaviours of co-op students and non-co-op students as investigated through a graduating student survey. There is a slight increase in the reflective/integrative behaviours of students who have taken WatPD over those who have not, but more investigation will need to be done to determine if those differences can be attributed to WatPD.

In analyzing the trends in work term performance evaluations completed by employers over the last eight years, students who took WatPD slightly outperformed those who did not on the overall performance evaluation rating. Additionally, when an analysis was performed to map the course objectives to specific dimensions of the work term performance evaluation form, in most cases the employer ratings of students who had taken or who were taking the WatPD course were higher than students who had not taken that WatPD course.

## 8 Recommendations and Next Steps

There are a number of recommendations for improvements that arise as a result of the evaluation to increase student satisfaction with the program.

1. Identify best practices from courses that have the highest ratings and determine how those elements can be applied to other courses. For example, PD8: Intercultural Skills has 70% of students reporting that the course maintained their interest.
2. Develop a communication strategy to address the recurring comment from end-of-course surveys and focus groups that “course content is common sense”. This assumption could be challenged by providing employer testimonials, outlining the expected learning outcomes of specific WatPD courses and identifying the value of lifelong improvement of employability skills.

There are also a few recommendations for the next steps of the program evaluation.

1. Continue to monitor engagement and learning measures and pursue an investigation into the discrepancy between the data from the end-of-course surveys and the exit interviews/focus groups.
2. Investigate options for increasing the participation rates on end-of-term surveys to previous levels.
3. Consider investigating whether the difference between how students perceive the value of the courses is correlated with background characteristics of the students.
4. Consider administering graduating student surveys again to monitor the trend in students' reflective/integrative behaviours and determine if increases can be attributed to the WatPD program.
5. Consider an investigation into National Survey of Student Engagement (NSSE) scores to identify which dimensions of engagement might be affected by WatPD participation and examine the data collected for co-op and non-co-op students before and after the WatPD program was introduced.
6. Consider following up with alumni to collect feedback on what, if any, impact their WatPD courses have made once they have been working for some time.
7. Continue building partnerships with employers and other work integrated learning researchers to improve the methods by which the WatPD program is evaluated.

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