CONTINUOUS IMPROVEMENT OF A PROFESSIONAL SKILLS DEVELOPMENT COURSE

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1. INTRODUCTION

One key requirement in the CEAB accreditation criteria is the demonstration of a process of continual program improvement. It is expected that this process will be based on monitoring the program outcomes to guide iterative improvement and to measure the impact of program changes. This same process can be applied at the course level. In this presentation a course improvement process will be described for an online professional skills development course taken by Waterloo Engineering students during their second work terms. After a brief description of the course, the presentation will outline the course assessment process and its underlying theoretical foundation and then conclude with a description of its operation in the first two offerings of the course.

PD 21: Engineering Workplace Skills 2 – Developing Effective Plans

In May 2010, Waterloo Engineering embarked on the development of a 2nd generation online professional skills development program, WatPDEngineering. Like its predecessor, PDEng, the program is composed of five online courses taken by Waterloo Engineering students while they are on work terms. Students take one course per work term until they have met the professional skills component of their degree requirements. Each course is expected to take a total time commitment of 20 to 30 hours over a 10 week period and students work on the courses outside of work hours.

The WatPD-Engineering program consists of two core courses: PD 20 Engineering Workplace Skills 1 – Developing Reasoned Conclusions, and PD 21 Engineering Workplace Skills 2 – Developing Effective Plans, followed by three elective courses from the WatPD suite of elective courses: PD 3 Communication, PD 4 Teamwork, PD 5 Project Management, PD 6 Problem Solving, and PD 7 Conflict Resolution. The two core courses, PD 20 and PD 21, had to be developed and implemented over an 18 month period. PD 21 was offered for the first time in Fall 2011 and for the second time in Winter 2012. By the completion of PD 21 students should be better able to:

- analyze engineering problems by defining objectives, assessing and integrating client criteria, and researching topics;
- construct and analyze solutions to engineering problems;
- contribute to or lead project management;
- present their findings and products;
- communicate effectively with clients and team members;
- read and write materials relevant to the development of effective plans; and
• articulate the purpose and give examples of CEAB graduate attributes.

Like the other PD courses, PD 21 is broken into ten units. Each unit is nominally expected to be completed each week: 1) course introduction, 2) communicating with clients and colleagues, 3) problem definition, 4) identifying functions and requirements, 5) doing research, 6) generating solution concepts, 7) evaluating solution concepts, 8) project management, 9) presenting product, and 10) course conclusion. In each unit there is content delivery through course notes and multimedia materials, suggestions for student practice, and student assessment activities. The assessments for Units 2-9 are each worth 10% and the comprehensive assessment for Unit 10 is worth 20%. Students are graded on a numerical scale (0 -100). However the course is reported as credit, CR, or no credit, NCR, on the students’ transcripts and academic records. A course grade of 60% is required to earn a CR.

2. COURSE ASSESSMENT PROCESS

As with other PD courses, the PD 21 course assessment is based on the Kirkpatrick (Kirkpatrick, 1998) training model. The Kirkpatrick model has four levels of evaluation:

i. Reaction: Do students like the course? How do students perceive the course difficulty? How much time does it take?

ii. Performance: What do students learn in the course? Do they know more than they did before the course/program?

iii. Behavior: How does student behavior change after taking the course, and

iv. Results: How does the students’ effectiveness in the workplace change after taking the course?

For the initial course offerings the focus has been on the reaction and performance levels of this model.

Student performance has been assessed from weekly homework submissions, the final comprehensive exercise, course pre- and post testing, and student perception of their learning of the intended course outcomes.

3. RESULTS

As an example of the course assessment process, it is illustrative to consider the unit 3-5 sequence. In the first offering the average grade for Unit 4 was 5.8/10 (the average grades for Units 2 and 3 were 8.7 and 8.3 respectively). There were a lot of student questions during the Unit 5 submission time indicating that the students did not understand the particular expectations for their assessment activity and did not recognize the continuity and applicability of knowledge from earlier units. The immediate response to these issues was for the course instructors to provide comments on common errors and misunderstandings to the class when returning graded submissions.

Prior to the second offering, the course content in Units 3-5 was modified slightly to emphasize the carry forward of concepts between units and the wording of assigned assessment activities was refined to more accurately align with the course content materials and overall course expectations. In the second offering the average grade for Unit 4 was 8.4/10. Further evidence of the impact of these changes, in particular on the continuity of concepts between units, is evident in the average grade for Unit 5 which went from 6.9 in the first offering to 7.3 in the second offering. While there is small positive change in student performance, it is more noteworthy that in the second offering the students required minimal support from the teaching assistants while completing the Unit 5 activities.

Further examples and plans for future course improvements will be covered in the conference presentation.

Reference