Performance of Student Trainees in a Co-operative, Education-Integrated Six-Year Engineering Degree Program

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ABSTRACT

Cooperative Education or Co-op is an immersion program which allows engineering students to gain professional work experience while still in college. Co-op work experience provides students with the opportunity to explore career interests and goals, use the workplace as their classroom, and gain professional development. This paper describes how the CPU College of Engineering Six Year Engineering program integrates Co-op education into its curriculum. This paper is intended to give the description, mechanics and evaluation of the impact of the six-year degree program herein referred to as the Co-operative Education Program. Co-op Education students are allowed to enroll in this engineering program by selection criteria of top (20) percent of the class. Overall student evaluating Co-op experience was 47.78 percent (good). The six-year engineering curriculum and teaching approaches are aligned with and responsive to the needs of the industry.

Keywords: Co-operative Education (Co-op), curriculum, engineering program

Introduction

The constant effort of the government, industry, and academe to provide excellent engineering education and produce competent and globally competitive graduates have inspired the College of Engineering of Central Philippine University to offer a six-year Engineering degree program since 2004. This six-year degree program includes Co-operative Education in its curriculum which is during the senior year. Students are allowed to enroll in the six-year engineering degree program if they belong to the top twenty (20) percent of the class. For the entire duration of the period of the program, the students are allowed maximum of two (2) failing grades; more than two failing grades will exclude the students from the program. Engineering students who opt for internship or company immersion during their last year will have to finish two Co-op work terms to be able to graduate. A co-operative education program integrates career-related work experience into the students' academic studies. Three groups cooperate in this program: the university, the students, and the company. It discusses how the program was implemented, the challenges the program went through,

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and the success it gained. The College of Engineering of Central Philippine University believes that the work term experience is such an important part of educating today's engineer that students under this program are required to complete two Co-op work terms to graduate. The hallmark of co-operative education is the work experiences that provide them the opportunity to enhance their ability to connect theory to a real-life situation. This paper is intended to give the description, mechanics, and evaluation of the impact of the six-year degree program herein referred to as the Co-operative Education Program.

Methodology

Majority or 47.78% of Co-op Students evaluated their Co-op experience as "good". The results/feedbacks were based on the evaluation of the Co-op students and company supervisors. The College of Engineering is well aware of the problem Filipino engineer's face about the practice of their profession in other countries. In the Philippines, it takes a minimum of fifteen years for a student to complete or graduate with an engineering degree while in other countries, engineering degree courses take a minimum of sixteen to seventeen years to finish. Compared to other countries, the Filipino engineer, therefore, lacks one or two more years of education. This discrepancy in the number of years of schooling explains why Filipino engineers' are not allowed to practice their profession in most advance countries. Though Filipino engineers can be capable of doing the job, some countries will not allow them to work as engineers. This reality is mainly the reason why the Philippines finds it difficult to have its engineers recognized by ASEAN and APEC countries in their drive to allow only engineers of member countries to practice the profession in other member countries.

So, in high hopes of giving a remedy to the situation, the Central Philippine University administration offered a six-year degree program in engineering, approved by the Commission on Higher Education (CHED). Table I describes the representation of the program. In the program representation below, AT stands for Academic Term, SAT for Summer Academic Term, and WT OJT for Work Term On-the-Job-Training. The program consists of the necessary academic requirements for a five-year engineering course plus the two work term requirements (minimum requirements 650 hours), which should be undertaken in a Co-op company, preferably in the same company for WT 2 OJT. Work Terms 1 and 2 OJT are each for nine (9) units credit with a minimum requirement of 325 hours. The program was designed for the students to be able to finish it in five (5) years.

Table I.
Co-op Program Representation

Year	First Sem June-Oct	Second Sem Nov.-March	Summer April - May
1	AT-1A	AT-1B	SAT – 1
2	AT-2A	AT-2B	SAT- 2
3	AT-3A	AT-3B	Term off
4	AT-3A	AT-3B	Term off
5	AT-5	WT 1	1& 2 OJT
(minimum requirement-650 hrs.)			

Before students are allowed to proceed with the work terms in the program, they are required to submit the accomplished/signed Parent's/Guardian's request for work term assignment form. It signifies the commitment of their parents or guardian to provide financial support for the entire duration of the co-op program of their child, even with or without allowance from the Co-op company. Also, indicated in this form is their parent's or guardian's geographical preference. The willingness of the parents or guardian of the Co-op students to provide financial support for the program is noteworthy for Co-op students who have remained under the program for their work term 2.

The Engineering Co-op Coordinator is the link between the Co-op company and the students. He is the one responsible for the placement of the students in the companies, monitoring of the conduct of the training and welfare of the students through constant communication and worksite visits. Before the students leave the campus for work, the co-op coordinator should make sure that all requirements are met, forms are accomplished, and necessary documents including essential dates are on hand. The coordinator must conduct an orientation for the students on things to do before leaving the campus, while on work, and when they return to campus. The orientation also includes topics about conflict of interest, copyright, and confidentiality. Moreover, the orientation should remind the students of their responsibilities and give tips for success in their work term. After the evaluation of the academic records of the students under the program and applying for a work term job, a ranking based on the Grade Point Average (GPA) of those qualified students for placement to Co-op companies is made. Only when the accomplished parent's/ guardian's request for work assignment forms are submitted by the applicants is the list of Co-op students for the work term is made final. The Co-op students are then required to submit their resumes to the coordinator.

The Co-op coordinator has a list of Co-op company contacts with Memorandum of Agreement (MOA) for placement of the co-op students. However, the student is also allowed to search and make initial contact for and with a company for his/her work term, but final arrangement and endorsement must be made through the coordinator.

The deployment of students follows the following steps:

1. A letter of request for work term jobs is sent by the program coordinator to each Co-op company.

2. The Co-op coordinator selects the students to be assigned or to be candidates for the Co-op listed companies, by their geographical preference and GPAs.

3. Resumes of the candidates are forwarded, and the company's representative may contact the shortlisted students directly.

4. The Co-op coordinator may be contacted to arrange the date, time, and location of exam/interview of students. Usually, the company uses our campus facilities for examinations and interviews. Telephone interviews can be arranged as well.

5. Confirmation of the placement of students with the company is done

by the coordinator. Once the student is accepted, the Co-op coordinator must provide the student with the list of requirements for him/her to comply with before reporting to work.

6. Enrolment for WT 1 and 2 OJT. Students are required to enroll both WT 1 and 2 OJT once and in the second semester.

7. Endorsement to the Co-op company for work. The students should report to the company with the pertinent documents/requirements including the endorsement letter signed by the Dean of the College, the Coordinator of the program and the Vice President for Academic Affairs.

The Engineering Co-op Coordinator makes work site visits for the students. The student and the company are contacted to arrange the date and time for the visit. Site visit goals include:

- Meeting with the student and the supervisor to ensure that the work term objectives and expectations are being met.
- Becoming familiar with the Co-op company requirements, facilities, and Co-op needs. This knowledge helps in counseling students and grading work term reports.
- Discussing with the Co-op company supervisor the student performance review and making an offer for the student return to the company for the next work term.

The Engineering Co-op Coordinator prepares a detailed Co-op Supervisor Student Trainee Evaluation instrument to be used by the Co-op supervisor for the evaluation of the performance of the Co-op student.

The form is used in two phases: at about the middle of the term, and when the student has completed the work term. The accomplished form is mailed to the coordinator immediately after the work term or may be carried by hand by the student. The Co-op supervisor must approve the work term report topic of the student, affix his signature on the title page, and indicate whether the report is confidential or not. His/her signatures should also appear in the logbook of the student for his/her activities.

Results and Discussion

Table II provides for the overall performance of the Co-op students from 2012 to 2015, using the scale: 1 – unsatisfactory, 2 – uncomplimentary, 3 – Fair, 4 – commendable, 5 – Exceptional.

The final grades of the Co-op student is computed by Students Performance Review (75 percent), Work Term Report (15 percent), and Logbook (10 percent).

Table II-A
Overall Performance of Co-op Students

Leadership and Teamwork	4.06
Professional Qualities	4.26
Overall Average	4.10

The Co-operative Education Program of Central Philippine University began in 2004. It was able to overcome the challenges encountered, and it has survived because the additional investment is justified by the benefits realized. Even if now, as required by CHED, On – the - Job- Training (OJT) is already included as part of the curriculum for most if not all engineering courses, the

duration of 240 hours is too short. The original design for the program had the two work terms in alternation with academics, with Work Term 1 during the summer of the fourth year (240 hours) and Work Term 2 during the second semester of the fifth year (420 hours). From the feedbacks of the supervisors, 240 hours of OJT is not beneficial for it is very short for an immersion program to be effective.

Table II-B
Cooperative Education Supervisor's Evaluation

Skills/Abilities	Average
Communication	4.08
Conceptual and Analytical	4.00
Leadership and Teamwork	4.06
Professional Qualities	4.26
Overall Average	4.10

Thus, the program was redesigned to have Work Terms 1 and 2 to run continuously for 650 hours. The present set up of the program that made it more beneficial to both the Co-op company and the students provides the rationale for those who will opt to be under the said program.

This program provides opportunities mutually beneficial to the Co-op company and students – a win-win situation. The following are the benefits realized by the Co-op students according to the result of their work term 1 and 2 OJT evaluation of the Co-op Education Program:

- The real world experience they had in their work term enabled them to decide on which career track to take.
- There were improvement and development of their communication skills.
- They had learned and experienced the value of teamwork.
- They developed their technical and even interpersonal skills.
- There was an appreciation of the fact that they will graduate with a degree plus professional experience, an edge over graduates and graduating students who have not had co-op experience.
- There was a realization of the importance of hard work, the right attitude, skills development, and human relations.
- They have enhanced their knowledge and application of the firsthand experiences learned in school.
- There was recognition of the importance of one's love and dedication for work.
- The academic and work term requirements in the program have provided them with a better understanding of the need to relate theoretical concepts to real-world situations.
- It improved their leadership and time management skills.

Table III shows the result of the Coop students' evaluation of their Co-op experiences, expressed as the percentage of the total number of trainees from 2012-2015.

Table III.
Overall Student Evaluation of Co-op Experience

Scale	Percentage
Excellent	44.44
Good	47.78
Average	6.67
Fair	1.11
Unsatisfactory	0.00

The list below showed some of the perceived and realized reasons why co-op students are helpful to their organization, based on the comments of the Co-op supervisors in their evaluation of the program:

- A regular supply of well trained, highly motivated students who want to work and learn
- An opportunity to complete short-term tasks or undertake stand-alone projects
- Relief for permanent professionals during peak work periods
- A cost-effective method of evaluating the potential of future employees
- An opportunity to bring the latest technical skills or research techniques in the organization.
- An opportunity for permanent employees to experience supervising a co-op student
- Community recognition for being a partner in education.

Indeed, there is no substitute for real work experience in engineering. By hiring students, the company becomes part of the educational process and helps shape the engineers of tomorrow. It is only through the support of the Co-op company that the Co-operative Education works.

Conclusion

Co-op supervisor evaluation shows that our Co-op students can produce commendable performance results in all the four areas evaluated and for overall performance, signifying that the six-year engineering curriculum and teaching approaches are aligned with and responsive to the needs of the industry. Furthermore, this implies that our students, before they report for work, are ready to demonstrate the skills, knowledge or attributes the industry needs, and they are also ready to meet expectations.

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