



PLO No. 4 Report

Assessment Measures and Results

At Cal Poly's Construction Management Department, PLO 4 (create construction project cost estimates) is assessed using four different instruments, listed below.

Assessment Measure 1: Exercise with Rubric

Direct Measure

An estimating exercise is implemented in the CM 314 – Heavy Civil Construction Management course. All students must complete this course to graduate, so all students are assessed. The exercise initiated in Fall 2017, and results from the embedded assignment are collected each quarter.

Our goal is that at least 80% of all students create an estimate and come up with pricing within 15% of known costs for the project. In each of the assessment quarters, with the exception of Spring 2018, students have not met this target.

Assessment Measure 2: Survey – Industry Employer

Indirect Measure

At the end of each academic year, surveys are sent out to industry members who recruit and employ Cal Poly Construction Management graduates assessing graduates' abilities to create construction project cost estimates. Surveys have been sent out in the spring of 2016 and each spring from 2108 through 2020.

Our goal is that at least 50% of employers assess students' ability as good or above. In all years, employers assessed students' abilities higher than the target goal of 50%, with 70% (2016), 54% (2018), 72% (2019) and 67% (2020).

Assessment Measure 3: Survey – Graduating Senior/Recent Alumni

Indirect Measure

At the end of each academic year, surveys are sent out to graduating seniors assessing personal abilities to create construction project cost estimates. Surveys have been sent out in the spring of 2016 and each spring from 2108 through 2020.

Our goal is that at least 65% of students indicate their ability as good or above. Since 2018, we have met our target, with a positive trend year over year. For each year, 62% (2016), 67% (2018), 89% (2019), and 83% (2020) of students answered good and above.

Assessment Measure 4: AIC Exam Results

Indirect Measure

Starting in academic year 2018-2019, as part of CM 461, all students must complete the AIC exam in order to graduate. Although a few students completed the AIC prior to Fall 2018, most of the results are from Fall 2018 onward.

Our goal is that our students perform either at or above the national average at each exam date. For the last two exams, students have scored less than the national average by 5% (2019) and 2% (2020).

Evaluation of Assessment Data



This PLO is of medium concern. Students are performing above expectations for the surveys, and have been performing close to the national average with the AIC exam. However, the direct assessment shows that we are not meeting our goal. Although, in



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the two quarter prior to COVID-19 (Fall 2019 and Winter 2020), results were improving. This assessment should continue to be monitored.

The direct assessment instrument is considered valid for this evaluation. Some of the weaknesses identified are student concepts of profit, contingency and risk, as well as profit based on project size. Student knowledge brought into this course is limited in regards to advanced estimating methods like contingency setting, profit, etc., which is reflected in the weaknesses.

Student results are further explained later in this report.

Quality Improvement Plan

Data for this PLO is collected quarterly by the PLO Champion and provided to the Outcomes Assessment Committee.

Industry and graduating senior surveys are collected each spring. Results from the AIC exam are collected after each exam is conducted (November and April). Results from surveys and the AIC exam are housed by the Outcomes Assessment Committee.

Every three years, the annually collected data will be analyzed by the faculty, with identification of strengths, weaknesses, and recommendations for curricular change, program change, or assessment instrument modifications. This analysis will happen in the following years:

2020/2021

2023/2024

2026/2027

2029/2030

Actions Taken

As a result of the assessment data collected, the department has taken the following actions:

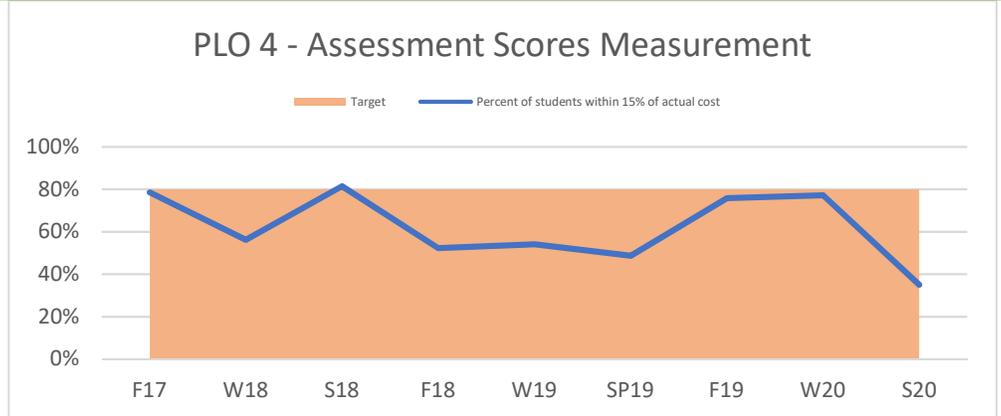
- In Fall 2018, the assignment was evaluated by three faculty members within the construction management department; adjustments were recommended to revise the assessment measure document for clarification and compliance with ACCE requirements as well as align the assessment rubric to address five specific grading categories. The grading rubric will be implemented in Winter 2019.
- During the Fall 2019 retreat, the assessment instrument and preliminary results were reviewed.
- The curriculum was evaluated and this material is sufficiently introduced and reinforced throughout the curriculum to scaffold this knowledge prior to assessment.
- During Fall 2019 retreat, it was determined that the assessment is embedded in the correct class, but, since the assignment was not included with the student's overall grade, it might not be given their best effort.
- During the Fall 2020 retreat, the assessment results were reviewed by faculty representatives. Strengths realized from the assessment are a well-defined scope of work and completion of quantity take-offs. However, advanced estimating with considerations for contingency setting and profit, are weak. Students may not be entering the course with a solid foundation of these more advanced estimating methods.

Assessment Summary

PLO No. 4 – Create Cost Estimates

Assessment Measure 1

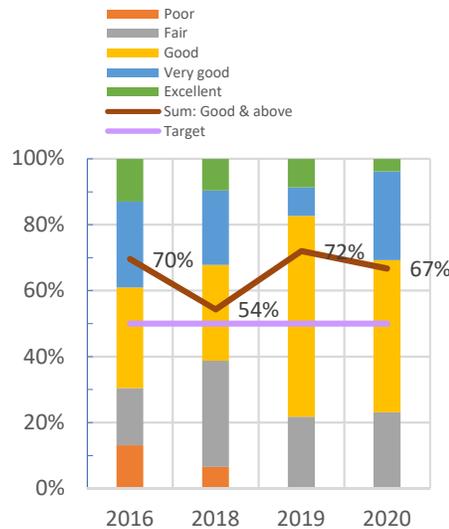
Assessment Method: Assignment with rubric
Type of Measure: Direct
Goal: 80% of students produce an estimate within 15% accuracy to known costs



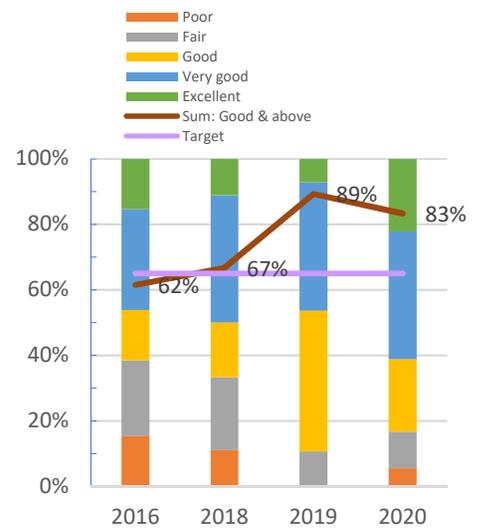
Assessment Measures 2 & 3

Assessment Method: Surveys
Type of Measure: Indirect
Goal: 50% of employers answer good or above
 65% of graduating students and recent alumni answer good and above

Employer Survey Summary - PLO No.4

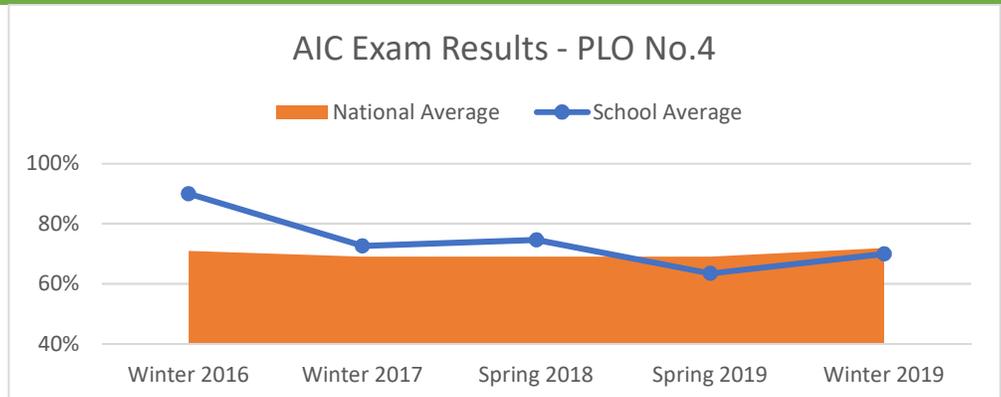


Graduating Seniors & Recent Alumni Results - PLO No.4



Assessment Measure 4

Assessment Method: AIC exam
Type of Measure: Direct
Goal: School average is higher than national average



Resulting Actions and Follow-Up

PLO No. 4 – Create Cost Estimates

Original Assessment Measure

Fall 2017 First assessment measure implemented

Modifications to Original Assessment Measure

Winter 2019 Revise PLO 04 Assessment Measure document for clarification and compliance to ACCE requirements.
Revise rubric to align with assessment document and address five specific grading categories

Assessment Measure 1: Background

PLO No. 4 – Create Cost Estimates

PLO Number and Description

PLO 04 – Create Estimates: Understand construction methods for developing an effective construction estimate.

Method of Assessment

An exercise for developing a construction estimate for a slab-on grade concrete drive for a fire station. Both printed copy and pdf. file are provided to the students. Additionally, the students are provided with written instructions defining the scope of the estimate to be undertaken and to state provisions for subcontract bids, contingency and profit.

Assessment Reasoning

For construction estimating, the assessment reflects a “real-life” exercise to provide a realistic cost for construction prepared within the limited time constraint of three hours. The students were given the option to perform the estimate via pencil calculations or to utilize university provided software at their disposal. The assessment was undertaken to evaluate five separate categories listed below that are important for the understanding of the subject and performance in the construction industry:

1. Interpret construction documents and perform quantitative take-offs material.
2. Determine multiple trades required to perform construction tasks.
3. Understand realistic time frames required to execute work activities
4. Show imitative and resourcefulness of employment of university provided software.
5. Execute a task under time constraint.

Data Collection and Distribution

At the end of the class session, student estimates will be collected and evaluated. These results will be summarized in an excel document listing the provided cost estimate the +/- percentage deviation from the know cost.

Result Expectations

The goal is that each estimate will be answered within +/- 15% accuracy of the actual known construction cost of \$64,000, and that 80% of students develop an estimate within this range.

Assessment Measure 1: Questions and Results

PLO No. 4 – Create Cost Estimates

Questions

A pdf. File of the drawings for estimate preparation and a WORD file of the assessment are provided in the assessment folder.

Assessment Results by Quarter:

	F17	W18	S18	F18	W19	SP19	F19	W20	S20
Total number of CM students	29	17	27	42	27	39	30	22	17*
Total students assessed	28	16	27	42	24	39	29	22	14**
Total number of students within 15% of actual cost	22	9	22	22	13	19	22	17	5
Percent of students within 15% of actual cost	79%	56%	81%	52%	54%	49%	76%	77%	35%
Target	80%	80%	80%	80%	80%	80%	80%	80%	80%

*Two sections of CM314 were offered during Spring 2020. The delivery format was virtual due to COVID-19 restrictions. Data was collected from students enrolled in CM314-03-2204.

**Potential sample population = 17. One (1) CM minor participated in assessment but data is excluded from this summary. Two students did not submit an estimate for evaluation. Total number of assessed students =14.

Note: No confirmation to the validity of student adherence to assessment criteria that this be an individual assessment can be provided due to the virtual administration required by COVID-19 restrictions.

Assessment Measures 2 & 3: Details

PLO No. 4 – Create Cost Estimates

Method of Assessment

Surveys are sent out each year to industry employers, graduating seniors, and recent alumni. Surveys ask respondents to rank each of the 25 PLOs against student performance with the scale of (1) unable to assess; (2) poor; (3) fair; (4) good; (5) very good; (6) excellent.

Industry employers are asked to rate their perception of Cal Poly student performance for each of the 25 PLOs.

Graduating seniors and recent alumni are asked to rank their individual performance in each PLO area based on their individual perception.

Assessment Reasoning

The surveys are used to identify overall how the program is perceived by industry and how students perceive their attainment of each individual PLO.

Data Collection and Distribution

Annually, each spring, a member of the outcomes assessment committee sends out a survey to (1) industry employers; (2) graduating seniors; and (3) recent alumni using Survey Monkey. Results are collected from each group, shared with the outcomes assessment committee, and shared with the department at the fall retreat.

Result Expectations

The goal is that 50% of employers answer good or above and 65% of graduating students and recent alumni answer good and above.

Employer Survey Results by Year

	2016	2018	2019	2020
Number of Responses	23	35	25	30
Unable to assess	0%	11%	8%	13%
Poor	13%	6%	0%	0%
Fair	17%	29%	20%	20%
Good	30%	26%	56%	40%
Very good	26%	20%	8%	23%
Excellent	13%	9%	8%	3%
Sum: Very good & Excellent	39%	29%	16%	27%
Sum: Good & above	70%	54%	72%	67%
Target	50%	50%	50%	50%

Assessment Measures 2 & 3: Details

PLO No. 4 – Create Cost Estimates

Graduating Seniors and Recent Alumni Results by Year

	2016	2018	2019	2020
Number of Responses	13	18	28	19
Unable to assess	0%	0%	0%	0%
Poor	15%	11%	0%	6%
Fair	23%	22%	11%	11%
Good	15%	17%	43%	22%
Very good	31%	39%	39%	39%
Excellent	15%	11%	7%	22%
Sum: Very good & Excellent	46%	50%	46%	61%
Sum: Good & above	62%	67%	89%	83%
Target	65%	65%	65%	65%

Assessment Measure 4: Details

PLO No. 4 – Create Cost Estimates

Method of Assessment

Students will take the American Institute of Constructors (AIC) Level 1 Certification Exam during their junior or senior year.

Assessment Reasoning

The AIC exam has mapped ACCE student learning outcomes to questions in their exam; these results can be used to assess ACCE's 20 student learning outcomes.

Data Collection and Distribution

Upon completion of the exam (held twice a year), results are sent from the AIC to a designated faculty member. These results include individual student performance by each ACCE SLO as well as national averages. The faculty member distributes the results to the data team for recording and results are shared at departmental meetings.

Result Expectations

The goal is that the school average is higher than the national average for each test period.

AIC Exam Results by Date

AIC Exam Results - PLO No.4						
	Winter 2016	Winter 2017	Spring 2018	Spring 2019	Winter 2019	Spring 2020**
School Average	90%	73%	75%	64%	70%	#N/A
National Average	71%	69%	69%	69%	72%	#N/A
Number of students who took the exam	1	9	10	4	97	0
Number of Students who Passed Exam	1	6	6*	0	79	0

*one student left the exam early and this student's results are not included in the results

**Exams cancelled due to COVID-19