

Annual Reassessment 2018-2019

The purpose of SAC-level assessment at PCC is to identify the levels of student achievement of course- or program-level outcomes in the name of improving those levels of achievement. The second part of that process is the reassessment of an outcome that has been assessed in a previous year.

In an initial assessment of an outcome, a SAC should identify any areas of student achievement of an outcome that could be improved. The SAC should then target those areas with a teaching strategy appropriate to its discipline during the reassessment year. The reassessment of the outcome then determines if the strategy was effective by measuring any changes to student achievement.

This process, of assessing, analyzing, creating a teaching strategy, and reassessing, is called "closing the loop." It is how assessment can be useful for instructors and, by extension, for students.

On completing the form, please e-mail it to learningassessment@pcc.edu.

Note that questions marked with an asterisk* indicate that the accompanying help document includes information relevant to that question.

The planning section that follows is to be completed and submitted Fall Term. If your SAC is unable to complete it in fall, please fill out the planning section when completing the final report in spring.*

Planning Section: To be completed and submitted in Fall Term

SAC Assessment Contact:

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1. What SAC do you represent?

Chemistry

2. What outcome(s) do you plan to reassess?

Quantitative Reasoning

3a. What were the results of the outcome's initial assessment (in a past year)?

Three course-specific learning objectives were examined by the Chemistry SAC. The benchmark set by the SAC for all three objectives was 85%. Unfortunately, the benchmark was not achieved for any of the objectives. The objectives and results are as follows:

1. Given a balanced chemical equation and a table of standard enthalpies of formation, bond dissociation energies, or standard enthalpy of atom combination, calculate the standard enthalpy change associated with the reaction. **81.97% of students answered correctly.**
2. Given the ideal gas constant and any three of the four following data (volume, pressure, temperature, and amount), calculate the fourth. **62.10% of students answered correctly.**
3. Given the molecular structure of several compounds, put them in increasing order of physical properties such as boiling point, melting point and vapor pressure. **51.22% of students answered correctly.**

3b. What area(s) of outcome achievement did the initial assessment identify that might benefit from additional focus by the SAC?

When completing last year's assessment, the Chemistry SAC subcommittee found it difficult to draw conclusions about why students were answering questions incorrectly and not meeting the benchmark. Three problems arose when looking at last year's data:

1. One multiple choice question required students to complete multiple steps in reasoning to arrive at the correct answer. For students who answered the question incorrectly, it was impossible to reconstruct which step they missed.
2. Another question was found not to align well with the learning objective it was supposed to assess.
3. Most significantly, the assessment subcommittee realized that incorrect answers potentially included a wealth of information about why students were not succeeding. Frustratingly, not all the incorrect answers in the instrument could be tied to mistakes in reasoning or calculations. The subcommittee realized that if the incorrect answers to the multiple choice questions were more thoughtfully designed, significant information could be gleaned about what changes to instruction would improve student learning.

4. What changes to teaching might the SAC explore this year to address the areas in need of additional focus?

Before changes to teaching are implemented, the SAC needs to understand why benchmarks are not being achieved. This assessment is designed to give us information about why students are making the mistakes that prevent them from achieving the course-specific learning objectives.

5. What course(s) will your assessment focus on?

CH222 General Chemistry II

6. How will you sample student work?*

The four assessment questions agreed upon by the SAC will be included as the first four questions on final exams being administered by CH222 instructors during Winter Term. The scantrons will be collected and analyzed by the assessment subcommittee. This assessment will sample the complete population: all students taking CH222 Winter Term will be part of the assessment.

7. Will the student work be part of the regular graded assignments for the course(s)?*

Yes, the student work will be part of the final exam.

8. How will you redact student work (i.e. make it anonymous)?*

After the scantrons are collected, they will be run and the results downloaded into an Excel document. Neither students names nor identifying information about the sections they came from will be included in the Excel document. All analysis will be done using the data in the Excel document. Scantrons will be either returned to instructors or shredded, depending on instructor preference.

9. Will your project be a direct or indirect assessment of student work? (Include an explanation if relevant.)*

Direct assessment.

10. In what term(s) will you collect student work?*

Winter 2019

11. In general terms, describe the reassessment project for the year. What steps will you take in carrying out the project?

Last year, the Chemistry SAC built a method for efficiently assessing our course-specific learning objectives by including a small number of multiple choice questions on final exams across the district. We plan to reuse this successful method this year. The changes this year will focus on redesign of the questions:

1. Questions will be rewritten to better align with the course-specific learning objectives where necessary.
2. Complex questions will be broken into two simpler questions where necessary. This strategy will provide more information about why students are not meeting benchmarks.
3. A key will be written to accompany the incorrect answers for the questions. This key will explain the mistakes students are making that lead them to choosing an incorrect answer. This should give the Chemistry SAC more information about what parts of instruction need to be improved.

12a. What are the benchmarks (minimum acceptable level of student outcome achievement)?*

Since multiple choice questions are being used, answering the questions correctly is considered the minimum acceptable level of achievement.

12b. What percentage or frequency of students do you hope to see achieve the benchmarks?*

The Chemistry SAC has set a benchmark of 85% for each of the course-specific objectives being investigated.

12c. Have your benchmark levels changed based on the results of the initial assessment? If so, why?*

They have not changed. A better understanding of why the benchmark isn't being achieved is necessary before making any changes.

13. Describe the tools (e.g. rubrics, checklists, standardized exams) you will use in the project to evaluate student work.

Since multiple choice questions are being used, evaluating the percentage of students achieving the benchmark is objective. Building on our experiences last year, a key will be written that goes with the incorrect answers for each question. This key will help us evaluate why students who answer incorrectly are making mistakes.

14. Describe how the SAC will ensure that the evaluation of student work is consistent (e.g. norming rubrics, verifying inter-rater reliability).*

Since multiple choice questions are being used, this is not an issue.

15. Different SACs and individuals have different training in assessment. Your LAC coach is available to help with any step. What might you need help with moving forward?

Any literature that exists on similar assessments in STEM disciplines would be useful.

Please submit the completed planning section (leaving the following end-of-year report section blank) to learningassessment@pcc.edu by the November deadline.

Annual Reassessment Report 2018-2019

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If your SAC was unable to complete the planning section, above, during Fall Term, please fill that section out before completing the following end-of-year report.

16. Were any changes made to the reassessment plan submitted in Fall Term? If so, please briefly describe them.

There were no intentional changes made. One instructor, however, did not include the assessment questions on their final exam. That instructor taught two sections of the class. Another instructor only included three of the four assessment questions on their final exam.

17. Did the SAC implement a teaching strategy and/or curricular change to improve student outcome achievement? If so, describe it here. If not, what were the barriers to such a strategy's development?*

Several problems were evident with last year's assessment instrument. The purpose of this year's reassessment was to improve the instrument so that the results from this assessment could be used to guide improvements in instruction.

18. Please provide a summary of your results; include only key data points and your overall findings regarding student learning.

Question 1: 65.65% of students answered correctly.

Question 2: 62.60% of students answered correctly.

Question 3: 73.28% of students answered correctly.

Question 4: 94.83% of students answered correctly.

19a. What were the benchmark levels (minimum acceptable level of student achievement of the outcome) for the project?*

The benchmark was set at 85% for the learning objective assessed by each question.

19b. What percentage or frequency of students achieved the benchmark levels?*

Question #1: The benchmark was *not* met district-wide. One section out of eight met the benchmark.

Question #2: The benchmark was *not* met district-wide. Three sections out of eight met the benchmark.

Question #3: The benchmark was *not* met district-wide. Four sections out of eight met the benchmark.

Question #4: The benchmark was met district-wide. All sections met the benchmark.

20. Please accompany your report with the actual results of your project as an appendix (i.e. along with this report, send the project results themselves as a spreadsheet or document) if possible. If that is not possible, please explain.*

Please see appendix.

21. How did changes to teaching or curriculum affect student outcome achievement?

N/A: The whole purpose of this assessment was to rework the assessment instrument because the last year's instrument was flawed.

22. How was student work redacted (i.e. made anonymous)?*

Artifacts were submitted in Scantron form. The Scantrons were run through a Scantron machine, removing all student identification. The results were put into an Excel document without any accompanying information about the campus or instructor that generated the results for each section.

23. In general terms, describe the level of SAC involvement in the project (e.g. were both PT and FT faculty involved in contributing and/or scoring artifacts? Did all instructors or a representative sample of instructors contribute student work to be evaluated?) Identify any barriers to participation within the SAC.

Both part-time and full-time instructors were involved in generating and analyzing artifacts. Four of the six instructors submitting artifacts were part-time. Three of the five instructors composing the assessment subcommittee were part-time.

We were striving to have all instructors teaching CH222 to contribute artifacts, but fell short of this goal due to instructor forgetfulness.

24. Do the results justify reassessing the outcome again or that the SAC should now move on to another outcome?*

A second reassessment would allow us to modify instruction and see if it improved the number of students surpassing the benchmark. Since question 2 had the lowest percentage of correct answers, hydrogen bonding would be an ideal topic to try teaching in a different manner. Introducing a new intermolecular forces activity district-wide and then reassessing with this same instrument could assess if the activity actually improved instruction. Such an activity would include either having students draw Lewis structures of two molecules that illustrate how hydrogen bonds occur (or don't occur) between molecules or build models of molecules for the same purpose.

This reassessment also engendered a lively debate about what equations should be provided on exams by instructors and an even livelier debate about the use of student memory aids (flashcards brought to exams). Clearly, there is some inconsistency across the district. Standardizing approaches between instructors and then reassessing would also give useful information to the SAC. The SAC is

going to revisit this issue in our fall meeting whether we are allowed to reassess these same learning objectives or not.

Furthermore, discussions in both the assessment subcommittee and the SAC as a whole also touched upon the benefit of all instructors adopting a system like this individually on our final exams to keep track of how well we are teaching the learning objectives. The SAC decided to start collecting multiple choice questions (each tied to a learning objective, each with an instructional guide that indicated what elements of instruction need to be improved) in a shared folder to build a pool that all instructors can use. Again, this improvement in instruction will be made whether or not a second reassessment occurs.

25. Please explain how results have been shared, or will be shared, with members of your SAC.

Data and the conclusions of the assessment subcommittee's analysis were shared with the chemistry SAC during the spring SAC meeting. The data and final report was also posted on the chemistry SAC's shared Google Drive.

26. Please comment briefly on any changes to the reassessment process that would lead to more meaningful results.

We apparently need to assess the same outcomes three years in a row for "closing the loop" to be successful. We need the first reassessment to perfect our instrument, and then the second reassessment to actually implement changes in instruction. Allowing two reassessments would be beneficial.

27. Based on your experience with reassessment this year, are there any areas that you might want help with from your LAC coach?

We are still unclear on the exact meaning of the benchmark. Additionally, we are not sure if we can do a second reassessment or not.

28. Is there anything else you want to share with reviewers about your reassessment project that has not been captured in the form?

This form is much easier to use than those used in previous years. Thank you!

Please submit your report to learningassessment@pcc.edu by the June deadline.