

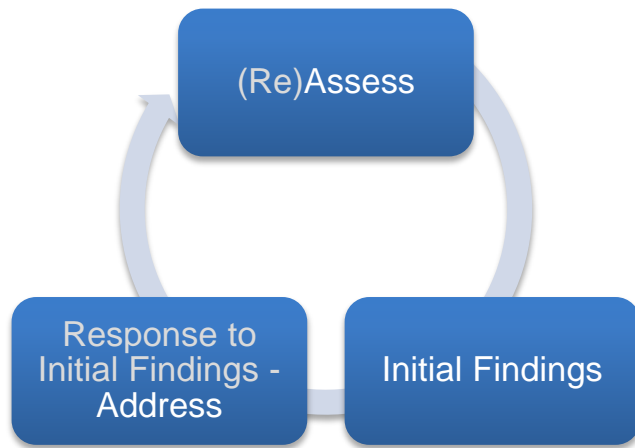
Subject Area Committee Name: ESR

Core Outcome Being Reassessed: Quantitative Literacy

Contact Person:

| <i>Name</i> | <i>e-mail</i> |
|------------------|--------------------------|
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Use this form if your assessment project is a follow-up reassessment of a previously completed initial assessment. The basic model we use for core outcome assessment at PCC is an “assess – address – reassess” model.



The primary purpose for yearly assessment is to improve student learning. We do this by seeking out areas of concern, making changes, reassessing to see if the changes helped.

- Refer to the help document for guidance in filling out this report. If this document does not address your question/concern, contact [Nora Stevens](#) to arrange for coaching assistance.
- Please attach all rubrics/assignments/etc. to your report submissions.
- **Subject Line of Email:** Assessment Report Form (or ARF) for <your SAC name> (Example: ARF for MTH)
- **File name:** SACInitials_ARF_2018 (Example: MTH_ARF_2018)
- SACs are encouraged to share this report with their LAC coach for feedback before submitting.
- Make all submissions to learningassessment@pcc.edu.

Due Dates:

- **Planning Sections of LAC Assessment or Reassessment Reports: November 27th, 2017**
- **Completed LAC Assessment or Reassessment Reports: June 16th, 2018**

Please Verify This Before Beginning this Report:

This project is the second stage of the assess/reassess process (if this is not a follow-up, re-assessment project, use the LAC Assessment Report Form LDC. Available [here](#).)

Initial Assessment Project Summary (previously completed assessment project)

*Briefly summarize the main findings of your **initial** assessment. Include either 1) the frequencies (counts) of students who attained your benchmarks and those who did not, or 2) the percentage of students who attained your benchmark(s.)*

Based on the average scores of 4-5 scorers (PCC internal MSC scoring, Biology SAC scoring and MSC scoring) of the 10 artifacts submitted for Quantitative Literacy, the following numbers are the percentage of students (out of 10) who met the benchmark (set at 2) for each criteria on the rubric: Interpretation (80%), Representation (80%), Calculation (90%), Application (90%), Assumption (20%) and Communication (80%).

Briefly summarize the changes to instruction, assignments, texts, lectures, etc. that you have made to address your initial findings:

I have revised the assignment used in ESR 200 for this assessment. The higher order skills, application, assumption and communication pieces, were especially challenging for students. In particular, I emphasized the need to clarify assumptions made about the data. I also widened the scope of the project, allowing students a bit more flexibility in the types of data they collect and how they display their results. There is a very low level of inter-rater reliability which makes it difficult to draw meaningful conclusions beyond this. In general, scores given by Biology SAC members were lower than those given by internal or MSC scorers.

If you initially assessed students in courses, which courses did you assess:

ESR 200

If you made changes to your assessment tools or processes for this reassessment, briefly describe those changes here:

No, we are still using the quantitative literacy rubric.

(For SACs that participated in the Multi-State Collaborative): Will this reassessment “close the loop” on an assessment you conducted in 2014 – 2015, 2015 – 2016, or 2016 – 2017 for the Multi-State Collaborative?

- Yes
 No

1. Core Outcome

1A. *PCC Core Outcome:* Quantitative literacy

1B. *How does your discipline interpret the outcome you are reassessing?*

The ability to collect data, and then describe, summarize, analyze and present results using graphs, data tables and precise and accurate language.

1C. *Briefly describe how this outcome is/might be important/useful to your students.*

Quantitative literacy is a critical outcome for students in environmental science and studies, whether they are collecting and analyzing their own data or trying to make sense of other people's work in order to identify problems and generate solutions based on sound quantitative evidence.

2. Project Description

2A. *Assessment Context*

Check all the applicable items:

Course-based assessment.

Course names and number(s):

Type of assessment (e.g., essay, exam, speech, project, etc.):

Are there course outcomes that align with this aspect of the core outcome being investigated? Yes No

If yes, include the course outcome(s) from the relevant CCOG(s):

Common/embedded assignment in all relevant course sections. An embedded assignment is one that is already included as an element in the course as usually taught. Please attach the activity in an appendix. If the activity cannot be shared, indicate the type of assignment (e.g., essay, exam, speech, project, etc.): **Please see attached.**

- Common – but not embedded - assignment used in all relevant course sections.** Please attach the activity in an appendix. If the activity cannot be shared, indicate the type of assignment (e.g., essay, exam, speech, project, etc.):
- Practicum/Clinical work.** Please attach the activity/checklist/etc. in an appendix. If this cannot be shared, indicate the type of assessment (e.g., supervisor checklist, interview, essay, exam, speech, project, etc.):
- External certification exam.** Please attach sample questions for the relevant portions of the exam in an appendix (provided that publically revealing this information will not compromise test security). Also, briefly describe how the results of this exam are broken down in a way that leads to nuanced information about the aspect of the core outcome that is being investigated.
- SAC-created, non-course assessment.** Please attach the assessment in an appendix. If the assessment cannot be shared, indicate the type of assignment (e.g., essay, exam, speech, project, etc.):
- Portfolio.** Please attach sample instructions/activities/etc. for the relevant portions of the portfolio submission in an appendix. Briefly describe how the results of this assessment are broken down in a way that leads to nuanced information about the aspect of the core outcome that is being investigated:
- Survey**
- Interview**
- Other.** Please attach the activity/assessment in an appendix. If the activity cannot be shared, please briefly describe:

In the event publicly sharing your assessment documents will compromise future assessments or uses of the assignment, do not attach the actual assignment/document. Instead, please give as much detail about the activity as possible in an appendix.

2B. How will you score/measure/quantify student performance?

- Rubric** (used when student performance is on a continuum - if available, attach as an appendix – if in development, attach to the completed report that is submitted in June)
- Checklist** (used when presence/absence rather than quality is being evaluated - if available, attach as an appendix – if in development, attach to the completed report that is submitted in June)
- Trend Analysis** (often used to understand the ways in which students are, and are not, meeting expectations; trend analysis can complement rubrics and checklist)
- Objective Scoring** (e.g., Scantron-scored examinations)
- Other** – briefly describe:

2C. Type of assessment (select one per column)

- | | |
|--|--|
| <input checked="" type="checkbox"/> Quantitative | <input type="checkbox"/> Direct Assessment |
| <input type="checkbox"/> Qualitative | <input type="checkbox"/> Indirect Assessment |

If you selected 'Indirect Assessment', please share your rationale:

Qualitative Measures: projects that analyze in-depth, non-numerical data via observer impression rather than via quantitative analysis. Generally, qualitative measures are used in exploratory, pilot projects rather than in true assessments of student attainment. Note that the **use of a numerical rubric is considered quantitative analysis**, even if the artifacts under consideration are not based on quantitative calculations (e.g. an essay scored by a rubric counts as quantitative in the context of assessment).

Indirect assessments (e.g., surveys, focus groups, etc.) do not use measures of direct student work output. These types of assessments are also not able to truly document student attainment.

2D. Check any of the following that were used by your SAC to create or select the assessment/scoring criteria/instruments used in this project:

- Committee or subcommittee of the SAC collaborated in its creation
- Standardized assessment
- Collaboration with external stakeholders (e.g., advisory board, transfer institution/program)
- Theoretical model (e.g., Bloom's Taxonomy)
- Aligned the assessment with standards from a professional body (for example, The American Psychological Association Undergraduate Guidelines, etc.)
- Aligned the benchmark with the Associate's Degree-level expectations of the Degree Qualifications Profile
- Aligned the benchmark to within-discipline post-requisite course(s)
- Aligned the benchmark to out-of-discipline post-requisite course(s)
- Other (briefly explain:)

2E. In which quarter will student artifacts (samples of student work) be collected? If student artifacts will be collected in more than one term, check all that apply.

- Fall Winter Spring Other (e.g., if work is collected between terms)

2F. What student group do you want to generalize the results of your assessment to? For example, if you are assessing performance in a course, the student group you want to generalize to is 'all students taking this course.'

ESR 200 students. All students taking this introductory environmental science course intended for potential ESR majors.

2G. *There is no single, recommended assessment strategy. Each SAC is tasked with choosing appropriate methods for their purposes. Which best describes the purpose of this project?*

- To measure established outcomes and/or drive programmatic change**
 To participate in the Multi-State Collaborative for Learning Outcomes Assessment
 Preliminary/Exploratory investigation

If you selected 'Preliminary/Exploratory', briefly describe your rationale for selecting your sampling method:

2H. *Which will you measure?*

- the population** (all relevant students – e.g., all students enrolled in all currently-offered sections of the course)
 a sample (a subset of students)

If you are using a sample, select all of the following that describe your sample/sampling strategy (refer to the Help Guide for assistance):

- Random Sample** (student work selected completely randomly from all relevant students)
 Systematic Sample (student work selected through an arbitrary pattern, e.g., 'start at student 7 on the roster and then select every 5th student following'; repeating this in all relevant course sections)
 Stratified Sample (more complex, consult with an LAC coach if you need assistance)
 Cluster Sample (students are selected randomly from meaningful, naturally-occurring groupings (e.g., SES, placement exam scores, etc.)
 Voluntary Response Sample (students submit their work/responses through voluntary submission – e.g., via a survey)
 Opportunity/Convenience Sample (only some of the relevant instructors are participating)

The last three options in bolded red have a high risk of introducing bias. If your SAC is using one or more of these sample/sampling strategies, please share your rationale:

2J. *Briefly describe the procedure you will use to select your sample (including a description of the procedures used to ensure student and instructor anonymity).*

All assignments will be turned in via D2L, downloaded and given an identification code. A random number generator will be used to select artifacts to assess. The sample size will be determined based on the population size of students submitting the assignment.

2K. Follow this link to determine how many artifacts (samples of student work) you should include in your assessment: <http://www.raosoft.com/samplesize.html> (see screen shot below).

Start with the number of students you estimate will be enrolled in the course(s) from which you will draw the sample – that is your “population.” Enter the other numbers as indicated in the screenshot. The sample size calculator will tell you how many artifacts you need to collect. Enter that number below:

Approximately 35 artifacts depending on class size (population).

Raosoft Sample size calculator

What margin of error can you accept?
5% is a common choice

10 %

The margin of error is the amount of error that you can tolerate. If 90% of respondents answer yes, while 10% answer no, you may be able to tolerate a larger amount of error than if the respondents are split 50-50 or 45-55. Lower margin of error requires a larger sample size. **Use 10% and 90% in these boxes.**

What confidence level do you need?
Typical choices are 90%, 95%, or 99%

90 %

The confidence level is the amount of uncertainty you can tolerate. Suppose that you have 20 yes-no questions in your survey. With a confidence level of 95%, you would expect that for one of the questions (1 in 20), the percentage of people who answer yes would be more than the margin of error away from the true answer. The true answer is the percentage you would get if you exhaustively interviewed everyone. Higher confidence level requires a larger sample size. **Enter the total number of students currently enrolled in all sections of the courses you are assessing here.**

What is the population size?
If you don't know, use 20000

105

How many people are there to choose your random sample from? The sample size does not change for populations larger than 20,000.

What is the response distribution?
Leave this as 50%

50 %

For each question, what do you expect the results will be? If the sample is skewed highly one way or the other, the population probably is, too. If you don't know, use 50%, which gives the largest sample size. See below under **More information** if this is confusing. **Measure this many students.**

Your recommended sample size is

42

This is the minimum recommended size of your survey. If you create a sample of this many people and get responses from everyone, you're more likely to get a correct answer than you would from a large sample where only a small percentage of the sample responds to your survey.

3. Project Mechanics

3A. Does your project utilize a rubric for scoring? Yes No

If 'No', proceed to section B. If 'Yes', complete the following:

Which method of ensuring consistent scoring (inter-rater reliability) will your SAC use for this project?

Agreement – the percentage of raters giving each artifact the same/similar score in a norming session; ideally, that will be 75% agreement or greater.

If you are using agreement, describe your plan for plan for conducting the “norming” or “calibrating” session:

Consensus - all raters score all artifacts and reach agreement on each score

Consistency* – raters' scores are correlated: this captures relative standing of the performance ratings - but not precise agreement. Briefly describe your plan:

Notes: the agreement method is the most frequently used for assessment, but the **calculation of inter-rater reliability is also among the more challenging issues** within assessment as a whole. If your SAC is unfamiliar with norming procedures, contact your assessment coach, or if you don't know who your coach is, contact LAC Vice Chair [Chris Brooks](#) to arrange for coaching help for your SAC's norming session.

The consistency method is not generally recommended; see the help guide for details.

3B. Have performance benchmarks been specified?

The fundamental measure in educational assessment is the number of students who complete the work at the expected/required level. We are calling this SAC-determined performance expectation the 'benchmark.'

Yes

No

If yes, briefly describe your performance benchmarks, being as specific as possible (if needed, attach as an appendix):

Score of 2 for each criteria on the Quantitative Literacy VALUES rubric for more than 75% of artifacts.

If no, what is the purpose of this assessment? (For example, this assessment will provide information that will lead to developing benchmarks in the future; or, this assessment will lead to areas for more detailed study; etc.)

3C. The purpose of this assessment is to have SAC-wide evaluation of student work, not to evaluate a particular instructor or student. Before evaluation, remove student-identifying information (and, when possible remove instructor-identifying information). If the SAC wishes to return instructor-specific results, see the Help Guide for suggestions on how to code and collate. **Please share your process for ensuring that all identifying information has been removed.**

There is no way to remove the instructor identity (as only one instructor teaches ESR 200), but student names will be removed after artifacts are downloaded from D2L.

3D. Will you be coding your data/artifacts in order to compare student sub-groups? Yes No

If yes, select one of the boxes below:

student's total earned hours previous coursework completed ethnicity other

Briefly describe your coding plan and rationale (and if you selected 'other', identify the sub-groups you will be coding for):

Sample size is too small for meaningful analysis of sub-groups.

3E. Ideally, student work is **evaluated** by both full-time and adjunct faculty, even if students being assessed are taught by only full-time and/or adjunct faculty. Further, more than one rater is needed to ensure inter-rater reliability. If you feel only one rater is feasible for your SAC, please explain why: Due to our small SAC size (only three faculty members participating in assessment), and the length of the artifacts (5 – 10 pages) we received permission from the LAC to norm by scoring for a few samples, coming to agreement and then using a single rater for the remaining artifacts.

Who will be assessing student work for this project? Check all that apply.

- PCC Adjunct Faculty within the program/discipline
 PCC FT Faculty within the program/discipline

- PCC Faculty outside the program/discipline
- Program Advisory Board Members
- Non-PCC Faculty
- External Supervisors
- Other:

End of Planning Section – Complete the remainder of this report after your assessment project is complete.

Beginning of End-of-Year Reporting Section – complete the following sections after your assessment project is complete.

4. Changes to the Assessment Plan

Have there been changes to your project since you submitted the planning section of this report? **Yes** **No**

If so, summarize those changes below:

Given the small size of our SAC and the length of the artifacts, we decided to use a single scorer for most of the artifacts (based on email exchange with Chris Brooks).

5. Narrative

Broadly, what did your SAC learn this year from the assessment of the selected core outcome?

The majority of ESR 200 students received scores exceeding the benchmarks (score of 2) for all of the quantitative literacy dimensions: Interpretation (19 students (83%) met benchmark with an average score of 2.2), Representation (18 students (78%) met benchmark with an average score of 2.2), Calculation (22 students (96%) met benchmark with an average score of 2.6), Application and Analysis (17 students (74%) with an average score of 2.1), Assumptions (13 students (57%) with an average score of 1.6) and Communication (15 students (65%) with an average score of 1.8). Even after revising the assignment to explicitly ask for assumptions, scores on this dimension were the lowest. Communication scores were quite variable.

6. Results of the Analysis of Assessment Project Data

6A. Quantitative Summary of Sample/Population

How many students were enrolled in all sections of the course(s) you assessed this year? 39

If you did not assess in a course, report the number of students that are in the group you intend to generalize your results to. (Note that only 33 artifacts were turned in).

How many students did you actually assess in this project? 23

Did you use a recommended sample size (see the Sample Size Calculator linked to in section 2J)? Yes

No

If you did not use a recommended sample size in your assessment, briefly explain why:

6B. Did your project utilize a rubric for scoring? Yes No

If 'No', proceed to section C. If 'Yes', complete the following:

How was inter-rater reliability assured? (Contact your SAC's LAC Coach if you would like help with this.)

- Agreement** – the percentage of raters giving each artifact the same/similar score in a norming session
- Consensus** - all raters score all artifacts and reach agreement on each score
- Consistency** – raters' scores are correlated: this captures relative standing of the performance ratings - but not precise agreement
- Inter-rater reliability was not assured.**

If you utilized agreement or consistency measures of inter-rater reliability, report the level here:

After three scorers were normed on two artifacts, we achieved a high level of agreement (90%). We then immediately proceeded to have each artifact scored by one of the scorers.

6C. Brief Summary of Benchmark Achievement (frequencies and/or averages)

1. If you used frequencies of benchmark achievement, report those here. For example, "46 students attained or exceeded the benchmark level in written communication and 15 did not." If necessary, provide detailed results in an appendix.

Please see answer to question 5 and attached appendix.

2. If you used percentages of the total to identify the degree of benchmark attainment in this project, report those here. For example, "75% of 61 students attained or exceeded the benchmark level over-all in written communication."

Please see answer to question 5 and attached appendix.

3. Compare your students' attainment of your expectations/benchmarks in this reassessment with their attainment in the initial assessment. Briefly summarize your conclusions.

The assignment was revised slightly to explicitly ask for assumptions – this may have improved the results. The students were different, but from the same course (ESR 200). The scorers were also different – in this case we used three ESR faculty members (instead of Biology, PCC-wide and MSC scorers). We saw an increase in the percentage of students meeting the following dimensions of the quantitative literacy rubric: Interpretation (from 80 to 83%), Calculation (from 90 to 96%) and Assumptions (from 20 to 57%). However, we saw decreases in percent of students meeting the benchmark in the following dimensions: Representation (from 80 to 78%), Application and Analysis (from 90 to 74%), and Communication (from 80 – 65%). Overall, for the re-assessment we met our goal of 75% of artifacts scoring at a 2 or higher from the following dimensions: Interpretation, Calculation, and Representation.

Apart from the improvement in the ‘Assumptions’ dimension – we hesitate to draw conclusions from these differences. Many of the changes are very small. Also, last year, science faculty consistently scored artifacts lower than the PCC-wide or MSC scorers. This year, our scorers were exclusively ESR science faculty.

6D. If possible, attach a more detailed description or analysis of your results (e.g., rubric scores, trend analyses, etc.) as an appendix to this document. Appendix attached? Yes No

6E. Do the results of this project suggest that additional academic changes might be beneficial to your students (changes in curriculum, content, materials, instruction, pedagogy etc.)? Yes No

If you answered ‘Yes,’ briefly describe the changes to improve student learning below. If you answered ‘No,’ detail why no changes are called for.

There is great value in engaging students in authentic research opportunities (research papers are the artifact in question). One interesting aspect of this approach is that the rigor of the assignment can affect scores – when we ask students to do harder things, sometimes they don’t meet our expectations, but often they do. We will continue to work hard to revise ESR 200 course materials to prepare students to complete quality work on rigorous assignments. This will not be a major overhaul, but rather incremental improvement in materials and assignments.

If you are planning changes, when will these changes be fully implemented?

Winter 2019.

6F. Has all identifying information been removed from your documents? (Information includes student/instructor/supervisor names/identification numbers, names of external placement sites, etc.)

Yes No

7. SAC Response to the Assessment Project Results

7A. Assessment Tools & Processes: Indicate how well each of the following worked for your assessment:

Tools (rubrics, test items, questionnaires, etc.):

very well some small problems/limitations to fix notable problems/limitations to fix completely inadequate/failure

Please comment briefly on any changes to assessment tools that would lead to more meaningful results if this assessment were to be repeated (or adapted to another outcome).

In the future, we will use a PCC-generated rubric in place of the AAU&C Values rubric for Quantitative Literacy.

Processes (faculty involvement, sampling, norming, inter-rater reliability, etc.):

very well some small problems/limitations to fix notable problems/limitations to fix tools completely inadequate/failure

Please comment briefly on any changes to assessment process that would lead to more meaningful results if this assessment were to be repeated (or adapted to another outcome).

8. Follow-Up Plan

8A. How will the changes detailed in this report be shared with all FT/PT faculty in your SAC? *(select all that apply)*

- | | | |
|--|---|---|
| <input type="checkbox"/> email | <input type="checkbox"/> phone call | <input type="checkbox"/> workshop |
| <input type="checkbox"/> campus mail | <input type="checkbox"/> face-to-face meeting | <input checked="" type="checkbox"/> other |
| <input type="checkbox"/> no changes to share | | |

If 'other,' please describe briefly below.

ESR SAC meeting and Google document sharing

8B. Is further collaboration/training required to properly implement the identified changes? Yes
 No

If 'Yes,' briefly detail your plan/schedule below.

8C. Sometimes reassessment projects call for additional reassessments. These can be formal or informal. How will you assess the effectiveness of the changes you plan to make?

- | | |
|---|--|
| <input type="checkbox"/> follow-up project in next year's annual report | <input checked="" type="checkbox"/> on-going informal assessment |
| <input type="checkbox"/> in a future assessment project | <input type="checkbox"/> other |

If 'other,' please describe briefly below.

8D. SACs are learning how to create and manage meaningful assessments in their courses. This development may require SAC discussion to support the assessment process (e.g., awareness, buy-in, communication, etc.). Please briefly describe any successful developments within your SAC that support the quality assessment of student learning. If challenges remain, these can also be shared.

We have discussed assessment and the new Gen Ed framework in our SAC meetings and faculty members are on board. One challenge is the small size of our SAC and the relatively few full-time faculty. Many part-time faculty members do not attend SAC meetings.