

## ESR SAC Annual Report for Assessment of Outcomes 2012-13

Subject Area Committee Name: \_\_\_ESR\_\_\_\_\_

Contact person: \_Kevin Lien – Tom Robertson\_\_\_\_\_

For LDC/DE: Core outcome(s) assessed: \_\_self reflection and critical thinking/problem solving\_\_\_\_\_

For CTE: Degree or certificate\* assessed: \_\_\_\_\_

Please address the questions below and send to [learningassessment@pcc.edu](mailto:learningassessment@pcc.edu) by **June 21, 2013** with Annual Report in the subject line

*Note: Information provided in this report may be inserted into or summarized in Section 2C Program Review Outline.*

1. Describe **changes that have been implemented** towards improving students' attainment of outcomes that **resulted from recent outcome assessments**. These may include but are not limited to changes to content, materials, instruction, pedagogy etc. Please be sure to describe the connection between the assessment results and the changes made.

This is the fourth year that the ESR SAC has evaluated PCC core outcomes.

The outcome assessed last year was self – reflection. As noted in last year's assessment report, the assessment experience involved the following:

- The value of keeping a notebook on lab experiences and its value in environmental science.
- The value of students working through revisions of their notebook entries from the first ½ of the term to the second ½ of term.
- The students incorporated comments and we especially focused on the self-assessment section at the end of each lab.
- The students were given comments relative to this section of the notebook and incorporated these comments for their more detailed evaluation of self-assessment for the second ½ of term.

We suggested several instructional changes as a result of the 2011-2012 assessment of self-reflection:

- We decided to simplify the approach to the self-reflection outcome. We selected 2 labs for the second evaluation (2012-2013) of this core outcome rather than focusing on the entire notebook for the term. The two labs ran over 2 weeks and involved 2 labs on very different urban streams.
- The two streams reflected two very different management systems – one stream being heavily impacted and poorly managed in Washington County and the other stream in forest park (Multnomah County) – which is being protected by the City of Portland Parks.
- Students evaluated the streams using public documents and also had lectures on “healthy urban streams and unhealthy urban streams”. They then applied information from lecture in lab. In lab they sampled the chemistry and biology of both streams giving them an intense hands-on experience.

- After each of the labs the students discussed how humans have interfered with these ecosystems and focused on their personal actions and how they could improve their “life style” to help prevent further degradation of the watersheds. Their self-reflection also was based on their feelings about overall human impacts on streams and their potential future role in dealing with social and technical issues.
- Streamlining this evaluation had several other benefits. It emphasized the importance of the scientific method in descriptive field studies (especially relative to hypothesis testing), application of course materials to daily lives, improvement in communication skills and team building for problem solving.

For each outcome assessed this year:

2. Describe the assessment design (tool and processes) used.

- We evaluated two outcomes this year including both self-reflection and critical thinking and problem solving. By implementing the streamlined process discussed above both of the core outcomes could be assessed with the same exercises. The assessment (lab notebook/portfolio) allowed direct assessment for a very intensive two week lecture/lab experience. The students went to two field sites – one was Bronson Creek in Washington County and the other was Balch Creek in Multnomah County. The students had a prior introduction to impacts of urbanization on watersheds and specific introductions to the above two watersheds (Bronson Creek and Balch Creek). The physical/biological/chemical characteristics of the two stream systems were documented. The results of their observations were discussed as a class, including data collection, techniques used, critical evaluation of the techniques. Each student kept a journal on personal observations (self-reflection) on human impacts on each of these streams. In their lab notebooks the students presented the data, answered questions about the data, compared the two stream systems and reflected on their feelings about society’s management of the streams.
- We decided to re-visit the 2010 assessment of the core outcome for critical thinking and problem solving by using the above streamlined process and implementing this core outcome before the students enrolled in the 200 level classes the following year. This will hopefully improve their skills in this critical core outcome before entering second year classes.
- The sample size for Fall 2012 ESR 160 was 20 students. Though this is a small sample size, only one section of ESR 160 is taught for ESR majors during fall term. These students were selected because ESR 160 is the first lab based class for ESR majors in which they are introduced to the scientific analyses of environmental problem solving. This course is the foundation class for students before they take the 200 level classes and transfer to 4 year schools. Because of last year’s evaluation on self – reflection we were able to compare two years’ worth of data. Last year’s data included 18 students, giving a total of 28 students over both classes over two years.
- We used the same rubric as was used for the 2012 assessment report. We made a few minor changes in the wording in the rubric.
- The rubric for critical thinking and problem solving was modified to fit the new format for the above changes.

## ESR Self-Reflection Rubric

| Objective (Learning)  | Level 4 (high pass)   | Level 3 (pass)  | Level 2 (low pass)  | Level 1 (non-pass)  |
|---|---|---|---|---|
| Did this component of your lab notebook impact your evaluation of environmental events? Reflect in detail on how labs impacted your thinking about interpreting and understanding environmental problems. | Understanding of environmental issues has been fully enhanced and personal learning is fully explained.<br><br>Both attainment of technical expertise and interpretation have been applied accurately | Understanding of environmental issues has been enhanced and personal learning is explained.<br><br>Both attainment of technical expertise and interpretation have been applied. | Understanding of environmental issues has not been enhanced and personal learning is poorly explained.<br><br>Both attainment of technical expertise and interpretation have been poorly applied. | No understanding of environmental issues has been enhanced.<br><br>Neither attainment of technical expertise nor interpretation has been applied. |
| Reflect on your own personal attitudes towards environmental issues. Did your work in labs cause those attitudes and interpretations to change?   | Reflection on personal attitudes towards env. Issues are identified and are clearly and thoroughly linked to lab application to identify causes.  | Reflection on personal attitudes towards env. Issues are identified and are clearly linked to lab application to identify causes.   | Reflection on personal attitudes towards env. Issues are identified but only partially linked to lab application to identify causes.  | No clear identification of changes or reflection on attitudes towards env. Issues.  |

### ESR – Critical Thinking Rubric

| Objective (Learning)  | Level 4 (high pass)  | Level 3 (pass)  | Level 2 (low pass)   | Level 1 non-pass)   |
|---|--|---|--|---|
| 1) Reflect on basic chemical, physical and biological differences between the two stream ecosystems. Were there quantitative differences? | Understands the environmental impacts on the two streams and identifies details of these impacts in a quantitative way.<br>Technical expertise and interpretation have been applied accurately | Understands the environmental impacts on the two streams and identifies details of these impacts.<br>Technical expertise and interpretation have been applied | Understands the basic environmental impacts on the two streams.<br>Both attainment of technical expertise and interpretation have been poorly applied. | No understanding of environmental issues has been enhanced.<br>Neither attainment of technical expertise nor interpretation has been applied. |
| Identify places where you would change the design of the field studies. What changes would be made and why would you make these changes?  | Suggested improvements are identified and are clearly and thoroughly linked to lab application to identify causes.   | Suggested improvements are identified and are clearly linked to lab application to identify causes.   | Suggested improvements are identified but not linked to lab application to identify causes.  | No suggested improvements are identified  |

- How you analyzed results, including steps taken to ensure that results are reliable (consistent from one evaluator to another)?

Only one evaluator used the rubric. One section of ESR was taught in Spring 2012 and Fall 2012. The same instructor taught both sections. So consistency was not an issue.

3. Provide information about the results (i.e., what did you learn about how well students are meeting the outcomes)?
  - If scored (e.g., if a rubric or other scaled tool is used), please report the data, and relate to any appropriate benchmarks.

Only one instructor teaches ESR 160 (Introduction to Environmental Systems) and there is only one section for the course. Data reported are based on student averages for the entire class. The range was 2 – 4 with average for self-reflection of 2.5 and 2.9, and critical thinking ranged from 1 - 4 with average of 2.4 and 3.0. The averages are given below. From the data below, the students found it easier to evaluate the different quality of stream systems after having a chance to compare the first (heavily impacted stream) with the much less impacted stream.

| Objective               | Self-Reflection #1 | Self-Reflection #2 | Critical Thinking #1 | Critical Thinking #2 |
|-------------------------|--------------------|--------------------|----------------------|----------------------|
| Student Score (Average) | 2.5                | 2.9                | 2.4                  | 3.2                  |

This new simplified approach for evaluating a more reduced number of labs – vs. the entire notebook as in previous years resulted in the students being able to focus on one single environmental issue – that of human management in urban watersheds. Specifically the students were able to make determinations and recommendations relative to land use decisions made historically in two different locations in the Portland Metropolitan area which had different historical decision making criteria. From the students’ comments in their lab notebooks it became obvious that they understood how watersheds can vary once they had the opportunity to compare both watersheds in sequence. Thus by week 2 they understood how poorly managed the watershed visited in the previous week had been once they visited the “well managed” watershed. Meeting the outcome assessment was based on a score of 2 or above.

One student wrote “I really did see that Bronson Creek and its watershed was not in good condition and that poor decisions had been made historically in its management. However it was not until we visited the second stream Balch Creek, that I understood just how bad the conditions were at Bronson Creek.”

Another student commented on the extent of damage to Bronson Creek “I did not realize that humans have had such an impact on an entire watershed like we have at Bronson Creek. Seeing Balch Creek which is also an urban watershed, made me realize that it does not have to be this way. I would like to have an influence on changing the way we impact the environment. I realize I am also guilty in that my lifestyle has to change”.

- Results should be broken down in a way that is meaningful and useful for making improvements to teaching/learning. Please show those specific results.

The above results suggest that an evaluation of many different topics together during the term was not as productive as sequencing related labs and evaluating those as a unit. The scores indicated that the students were better prepared to focus on one environmental issue and seeing it in the next related lab sequence rather than attempting to get the students to interpret an entire ½ term of lab topics.

The students were best able to evaluate watershed conditions as a single environmental issue when first shown the watershed that historically has had poor land-use management applied vs. one where urbanization occurred but in a better regional planning process. Student comments about the 2 lab sequence comparing and contrasting two watersheds increased their understanding of the issue. Several students actually went a step further and commented on streams near where they lived and compared them to the streams studied in this 2 lab sequence.

4. Identify any changes that should, as a result of this assessment, be implemented to help improve students' attainment of outcomes. (These may include, but are not limited to, changes in curriculum, content, materials, instruction, pedagogy etc).

Changes from this assessment that will be applied to not just this course (ESR 160) but also to other courses taught include:

- The instructor will re-evaluate the approach to the lab portion of the course and make an attempt to better link related labs.
- Students will be asked to evaluate these linked labs and compare and contrast the environment in the related sites. This will allow students to focus on one environmental issue at a time.
- The concept of linked labs and journaling as well as the traditional post-lab questions and evaluations will be implemented for all labs in this course and where applicable in other ESR and biology courses.
- I will also be suggesting to other instructors that they take advantage of links in both their lectures and labs to local, regional, state and federal agency websites.
- The CCOG's for some of the ESR classes need to be modified to reflect increased use of student journaling.

5. Reflect on the effectiveness of this assessment tool and assessment process. Please describe any changes to assessment methodology that would lead to more meaningful results if this assessment

were to be repeated (or adapted to another outcome). Is there a different kind of assessment tool or process that the SAC would like to use for this outcome in the future? If the assessment tool and processes does not need to be revised, please indicate this.

Though the assessment process does require a faculty member to look in detail at the approach they are taking in teaching – for the most part the changes that have resulted are not large. ESR is by nature a field where students do comparisons within ecosystems while studying environmental perturbations. So if an instructor is dedicated to teaching and their teaching techniques are evolving, then the assessment process is inherent. Completing end of year reports is time consuming and the report itself probably has little influence on the quality of the learning experience for students. For the above outcomes, the assessment tools do not need to be revised.