UNIVERSITY OF SAN FRANCISCO | College of Arts and Sciences

Science, Technology, Engineering and Math Education Minor

ASSESSMENT REPORT
ACADEMIC YEAR 2018 – 2019
REPORT DUE DATE: 11/01/2019

- **Who should submit the report? – All majors, minors (including interdisciplinary minors), as well as graduate and non-degree granting certificate programs of the College of Arts and Sciences.**
- **Programs can combine assessment reports for a major and a minor program into one aggregate report as long as the mission statements, program learning outcome(s) evaluated, methodology applied to each, and the results are clearly delineated in separate sections.**
- **Undergraduate, graduate and certificate programs must submit separate reports**
- **It is recommended that each assessment report not exceed 10 pages. Additional materials (optional) can be added as appendices.**
- **A curricular map should be should be submitted along with each assessment report (we suggest that the curricular map should be informed by recent assessment outcomes).**

Some useful contacts:

1. Prof. Alexandra Amati, FDCD, Arts – adamati@usfca.edu
2. Prof. John Lendvay, FDCD, Sciences – lendvay@usfca.edu
3. Prof. Mark Meritt, FDCD, Humanities – meritt@usfca.edu
4. Prof. Michael Jonas, FDCD, Social Sciences – mrjonas@usfca.edu
5. Prof. Suparna Chakraborty, AD Academic Effectiveness – schakraborty2@usfca.edu

Academic Effectiveness Annual Assessment Resource Page:

https://myusf.usfca.edu/arts-sciences/faculty-resources/academic-effectiveness/assessment

Email to submit the report: assessment_cas@usfca.edu

Important: Please write the name of your program or department in the subject line.

For example: FineArts_Major (if you decide to submit a separate report for major and minor); FineArts_Aggregate (when submitting an aggregate report)

I. LOGISTICS

1. Please indicate the name and email of the program contact person to whom feedback should be sent (usually Chair, Program Director, or Faculty Assessment Coordinator).

Michael Rozendal, UTEC Academic Director, marozendal@usfca.edu &

Mary Coen, UTEC Administrative Director, mlcoen@usfca.edu

2. Please indicate if you are submitting report for (a) a Major, (b) a Minor, (c) a Major and Minor aggregated report (in which case, each should be explained in a separate paragraph as in this template), (d) a Graduate or (e) a Certificate Program

Minor program

3. Please note that a Curricular Map should accompany every assessment report. Have there been any revisions to the Curricular Map?

No revisions. Map included in supporting documents.

II. MISSION STATEMENT & PROGRAM LEARNING OUTCOMES

1. Were any changes made to the program mission statement since the last assessment cycle in October 2018? Kindly state "Yes" or "No." Please provide the current mission statement below. If you are submitting an aggregate report, please provide the current mission statements of both the major and the minor programs

Mission Statement (Minor):

Yes, we have made changes to the Mission Statement:

The STEM Education minor is designed to train students to become enthusiastic, well-grounded teachers who will inspire students and advocate for STEM education in classrooms and communities. The minor includes a range of science and mathematics courses and a concentration in one particular subject.

2. Were any changes made to the program learning outcomes (PLOs) since the last assessment cycle in October 2018? Kindly state "Yes" or "No." Please provide the current PLOs below. If you are submitting an aggregate report, please provide the current PLOs for both the major and the minor programs.

Note: It is expected that PLOs will vary in level of mastery between different programs in the same discipline (e. g., a major and minor in the same subject area). Major revisions in the program learning outcomes need to go through the College Curriculum Committee (contact: Professor Joshua Gamson, gamson@usfca.edu). Minor editorial changes are not required to go through the College Curriculum Committee.

PLOs (Minor):

No changes.

Students will:

1. Communicate a range of STEM disciplines to broad audiences
2. Demonstrate focused understanding of a single STEM discipline
3. Apply educational models, theories, and resources to teaching STEM disciplines
4. Articulate connections between STEM disciplines and social justice

3. State the particular program learning outcome(s) you assessed for the academic year 2018-2019. What rubric did you use?

The Role of Rubrics

The rubric is the single most important thing you need for assessment, and putting time and thinking into designing a good rubric is going to make the entire process a lot easier, faster, and meaningful. Your rubric should break down your chosen PLO into the smallest measurable components, so that the assessment of each piece of work becomes linear and easy, and the calibration among different faculty assessing more objective. If you still have to debate a while whether that one line of the rubric has been fulfilled or not, chances are your rubric item is still an aggregate and can be broken down further into smaller components. Once you have made a detailed rubric, then not only the "grading" work will be faster and straightforward, but at the end of it you will have data that is significantly more meaningful. For example, some parts of the PLO may be in tiptop shape while others may need to be massaged or tweaked, with more attention given to that particular item in class. Conversely, your data may show you that the PLO itself is not what you thought it should be—it may be that it duplicates something other PLOs include or that a crucial part of what you teach is getting lost in the cracks between your PLOs. So do make sure that the rubric is as detailed and thorough as you possibly can manage (a short rubric in fact makes the grading longer, as counterintuitive as that seems).

PLO(s) being assessed (Minor):

3. Apply educational models, theories, and resources to teaching STEM disciplines

Rubric attached as supporting document.

III. METHODOLOGY

Describe the methodology that you used to assess the PLO(s).

For example, "the department used questions that were inputted in the final examination pertaining directly to the <said PLO>. An independent group of faculty (not teaching the course) then evaluated the responses to the questions and gave the students a score for responses to those questions."

Important Note – WSCUC advises us to use "direct methods," which consist of a direct evaluation of a student work product. "Indirect methods" like exit interviews or student surveys can be used only as additional complements to a direct method.

For any program with fewer than 10 students: If you currently have fewer than 10 students in your program (rendering your statistical analysis biased due to too few data points), it is fine to describe a multi-year data collection strategy here. It would be important to remember that every 3 years, we would expect you to have enough data to conduct a meaningful analysis.

Important: *Please attach, at the end of this report, a copy of the rubric used for assessment.*

Methodology used (Minor):

Student work products (elementary level lesson plans) were assessed by the faculty instructor using a rubric based on Next Generation Science Standards (NGSS) for teachers. The NGSS are "a set of research-based, up-to-date K-12 science standards [which] give local educators the flexibility to design classroom learning experience that stimulate students' interests in science". These standards foreground both content and "key skills—communication, collaboration, inquiry, problem solving, and flexibility" (nextgencience.org).

The products assessed were group projects; students worked in groups of 2-3, and there were seven groups total.

The rubric included three categories: 3D Design, Instructional Supports, Monitoring NGSS Student Progress, with multiple areas of assessment within each Category (see Rubric).

IV. RESULTS & MAJOR FINDINGS

What are the major takeaways from your assessment exercise?

This section asks you to highlight the results of the exercise. Pertinent information here would include:

a. how well students mastered the outcome at the level they were intended to,
b. any trends noticed over the past few assessment cycles, and
c. the levels at which students mastered the outcome based on the rubric used.

Results (Minor):

Group	Lesson Title	Total score	Mastery of Outcome
1	Energy	100	Complete
2	Erosion	100	Complete
3	Light Energy	95	Mastered Outcome in most parts
4	Magnets	100	Complete
5	Renewable Energy	100	Complete
6	States of Matter	100	Complete
7	Water	87	Mastered Outcome in some parts

In general, the rubric scores indicate that students demonstrated a comprehensive understanding and met the learning outcome with this particular assignment.

The areas for improvement centered in Categories I (3D Design) and II (Instructional Supports) from the rubric for the two groups (Group 3 and Group 7) who earned fewer than 100 points. Category II, Area E - "Differentiated instruction" was the common area for both groups in which planning was incomplete or inadequate. Group 7 also lost at least 1 point in each area of Category I, with Area F - "Math and ELA" receiving an inadequate score. This indicates that more development may be needed in supporting students to create differentiated instruction for diverse learning styles, and provide grade-appropriate connections to the Common Core standards for subject matter, specifically in Math and English/Language Arts.

V. CLOSING THE LOOP: ACTION PLAN BASED ON ASSESSMENT RESULTS

1. Based on your analysis in Section 4, what are the next steps that you are planning in order to achieve the desired level of mastery in the assessed learning outcome? This section could also address more long-term planning that your department/program is considering and does not require any changes to be implemented in the next academic year itself.

Closing the Loop (Minor):

Given that the results show a high level of mastery overall, significant changes to the course are probably not needed. Perhaps, as preparation for this final activity, additional class time and/or assignments could be devoted to increasing student understanding of differentiated instruction, as well as applying Common Core Standards in lesson planning. Stepping back, these results are encouraging confirmation of the design of the minor, drawing from the science content already existing within the College of Arts and Science departments and then synthesizing this material in focused, hands-on seminars (2 units) such as the one that produced these assignments.

As almost all of the STEM Education minor students are part of the Dual Degree in Teacher Preparation Program (primarily multiple subjects or K-8 candidates), these students are already taking part in a robust pedagogical curriculum, so they seem well prepared to take full advantage of seminars like Teaching the Life Sciences.

For the two groups that struggled a bit with these assignments, it would be useful to know if these students were earlier in the minor (fewer science classes already taken) or in the program (fewer Teacher Education courses taken).

2. What were the most important suggestions/feedback from the FDCD on your last assessment report (for academic year 2017-2018, submitted in October 2018)? How did you incorporate or address the suggestion(s) in the more recent assessment discussed in this report?

Suggestions (Minor):

- Last report assessed a different learning outcome. So, while this report did not show similar disparities in learning (or mastering the outcome), it's not quite comparable.
- The assignment and rubric we used this time was more detailed and "polished". Using a rubric that is from the Next Generation Science Standards with students reinforced the important learning in the course and aligns our program with the evolving best practices in the field.
- This year's assessment utilized the final course assignment, which seems to allow for more measurable data collection and the rubric was more complex, allowing for a deeper analysis of student learning (as opposed to the journal entry assignment assessed last year).

VI. BIG PICTURE

What have you learned about your program from successive rounds of assessment? Is a picture of the whole program starting to emerge? For example, what areas of strength have emerged? What opportunities of improvement have you identified?

- Big Picture (Minor):

Lessons learned:

1. Assessing major projects or final projects provide more comprehensive measures of learning outcomes than smaller assignments.
2. Whenever possible, be sure faculty assess student work, using a rubric of their choice.
3. Proactively involving faculty early in the process, rather than retroactively looking for student assignments, benefits both the process and the learning outcomes for students.

Opportunities include:

1. Aligning mission statement and outcomes to broader USF mission and values.
2. Starting assessment project earlier in the year and allowing ample time over the summer for analysis.
4. Bringing the adjunct faculty into the process earlier and incorporating any feedback and suggestions from them.
5. Helping faculty to incorporate the results of this assessment into their course planning (e.g., allotting more time for teaching specific components of lesson planning).

VII. Feedback to your Assessment Team

What suggestions do you have for your assessment team (the Faculty Directors of Curriculum Development and the Associate Dean for Academic Effectiveness)? What can we do to improve the process?

ADDITIONAL MATERIALS

(Any rubrics used for assessment, relevant tables, charts and figures should be included here)