UNIVERSITY OF SAN FRANCISCO | College of Arts and Sciences

Science, Technology, Engineering and Math Education Minor

ASSESSMENT REPORT
ACADEMIC YEAR 2020 – 2021

I. LOGISTICS

1. Contact Information for Faculty/Director

Michael Rozendal, UTEC Academic Director, marozendal@usfca.edu
Mary Coen, UTEC Director, mlcoen@usfca.edu

2. Program

Minor program

3. Revisions to Curricular Map

No revisions. Map included in supporting documents at the end of this report.

II. MISSION STATEMENT & PROGRAM LEARNING OUTCOMES

Mission Statement

No changes.

The STEM Education minor trains 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.

PLOs

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

PLO Assessed Since Last APR

2. Demonstrate focused understanding of a single STEM discipline (2017-18)

3. Apply educational models, theories, and resources to teaching STEM disciplines (2018-19)

1. Communicate a range of STEM disciplines to broad audiences (2019-20)

PLO being Assessed in This Report

4. Articulate connections between STEM disciplines and social justice

PLO to be assessed Before Next APR

2. Demonstrate focused understanding of a single STEM discipline

III. METHODOLOGY

Methodology Used

We sent a survey to the seven STEM Ed minors to put learning outcomes in their own terms and to reflect on what they've seen in the program, to see how students experience coherence and synthesis. (Survey text and results can be found at the end of this document.)

IV. RESULTS & MAJOR FINDINGS

Results

Of the four students who responded to the survey, all of them stated learning outcome (4) was present in at least one of their minor classes.

Results were shared among UTEC team: Director Mary Coen, Academic Director Michael Rozendal, and Program Manager Amy F. Joseph. Results reinforced STEM Ed modules' success in supporting PLO's and will influence us when advising students, such recommending CS 107 Computing, Mobile Apps & Web.

Big Picture

We are interested in coherence for students and see real value in students' experiences, especially because the minor is made up of different disciplines and departments.

Lessons Learned

In doing this survey, we were interested in how students experience the minor's learning outcomes, specifically outcome (4). We thought social justice may be most evident because of USF being so mission-focused. Given our survey results, CS 107 Computing, Mobile Apps, and Web is a good option for our students, given that it does address social justice issues. We will encourage our students to take the course.

Opportunities

We want to celebrate the instructors who are teaching the modules, as they are doing an exceptional job in fulfilling our learning outcomes.

We based this survey on a Communication Studies survey that was shared with us. In their survey, they asked students' direct experience with their classes. We felt it was important to survey our students' direct experiences with the STEM Ed minor, especially because the courses are so varied and in so many different departments. There is no synthesizing track as in a major, so it all the more valuable in discovering what the learning outcomes mean to the students.

We want to highlight our small cohort's experiences. More than half of our seven STEM Ed minors responded to our survey.The benefit of a survey such as this one is learning how students are experiencing the learning outcomes. How do the pieces fit together and make meaning of social justice? We want to analyze how they understand social justice in terms of STEM Ed.

In terms of the courses mentioned, only one student discussed social justice outside of our STEM Ed module classes (CS 107 Computing, Mobile Apps, and Web). Given this, we will encourage our students to take this class during advising.

The question for us was what are some of the themes that stand out, and student's self understanding of them? Are there any tensions or omissions in that? Or any areas we might want to highlight or celebrate?

The STEM Ed course modules stood out. A lot of social justice work is done while not having a lot of resources. Through inexpensive home projects, students learn how to do STEM and tie it to relevant issues, including making STEM culturally relevant in under resourced communities. CS 107 is both using STEM for community needs, while also raising up the community. STEM is then responsive to community needs.

Our hope for the minor is that students have a coherent understanding of principles. While the survey doesn't entirely get to that, it does show that students have a sense of the learning outcome, and everyone has some sense that this is part of the minor.

V. Feedback to your Assessment Team Last Year

Feedback on Last Report

"I would like to remind you that for this academic year, 2020-2021, the expectation is that some form of direct data analysis resumes. If direct data assessment is not feasible, then it is acceptable to have a year of reflection for your annual assessment. This means that so long as your program assesses each and every PLO at least once per Academic Program Review cycle, it is acceptable to have a periodic reflection of those results that promotes further evaluation and continuous improvement of your PLOs and assessment plans"

Response to Feedback

After doing direct analysis last year by analyzing student papers, this year we followed the Communication Studies model shared in College Council and had students reflect on one of the PLOs.

ADDITIONAL MATERIALS

STEM Education Minor Curriculum Map 2019-20

	Courses	
Program Learning Outcomes	Teaching Life Sciences (INTD 320)	Exploring Physical Sciences (INTD 321)
1. Communicate a range of STEM disciplines to broad audiences	Intermediate Advanced	Intermediate Advanced
2. Demonstrate focused understanding of a single STEM discipline	Intermediate Advanced	Intermediate Advanced
3. Apply educational models, theories and resources to teaching STEM disciplines	Intermediate Advanced	Intermediate Advanced
4. Articulate connections between STEM disciplines and social justice	Intermediate Advanced	Intermediate Advanced

No Rubric; Survey Text and Results

STEM Survey

Learning Assessment & Skills Translation

The STEM Education Minor prepares you to communicate about the sciences to diverse audiences. Toward this end, it is important to reflect on your STEM Ed courses, turning experience into learning that can be shared with others.

We ask you to reflect on the following STEM Education Minor learning outcome in light of **one** STEM Education course that you have already taken. (all the minor learning outcomes and courses are here)

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

Feel free here to reflect on classes that you have taken in the STEM disciplines (like *Math for Educators* or *Introduction to the Environment*) or the hands-on pedagogical courses (like *Teaching the Life Sciences*).

Consider how you have demonstrated this STEM Ed Learning Outcome:

1. In a couple sentences, interpret what this outcome means. That is, explain in your own words what you understand the outcome to be measuring.
2. Offer two to three bullet points on how your work in one of your STEM Ed classes (name the class specifically) addresses this learning outcome.

Survey Results

In a couple of sentences, interpret what the fourth outcome about social justice means. That is, explain in your own words what you understand the outcome to be measuring.	**Offer two or three bullet points on how your work in one of your STEM Ed classes (name the class specifically) addressed this learning outcome.**	**4 respondents out of 7**
I think the 4th one means bringing the knowledge we learn in stem outside of class, applying it to solve issues of inequality or unequal access.	In teaching life sciences, Tim provided us with resources on how to navigate science experiments when we are underfunded. He also talked about the ways in which the areas we live in will effect what we have access to and how to support students who can't buy their own resources. We applied the knowledge we learned about the environment and plants into how to make areas more livable. In understanding our environment, we learned about the unequal distribution of water and food.	

I understand the fourth outcome to mean how can we make sure we are including social justice into our STEM Education. Since social justice impacts all parts of life, we can focus on the STEM aspect of it. For example, we can look at issues like environmental racism or food deserts, etc and work with our students on addressing issues and understanding why these issues are occurring.	I am not sure that any of my classes so far have specifically addressed this. In Teaching Life Sciences we got to see a plethora of different ideas we can use in the classroom from inexpensive at home science projects.
I interpret the fourth outcome to refer to the connections that could be made between STEM disciplines and social justice in effort to build relevance, representation, and inspiration in the classroom while teaching historically exclusive disciplines. Ultimately, I think this outcome is measuring how STEM disciplines can be grounded in real people's stories and communities, and how it is our role as educators to use these narratives as foundations for science and math standards so students feel empowered to be	-exploring educational programs that support social justice STEM education (Teaching the Life Sciences) -"Zane and the hurricane" reading and science interdisciplinary lessons rooted in community stories (C&I Science)

scientists and engineers in their daily lives	
Achieving social justice for any social issue is an extremely challenging feat, and with the prevalent presence of STEM in societies around the world, STEM can be an effective tool to help bring awareness, and hopefully solutions to a wide range of social justice problems. Not only can physical STEM applications such as the internet, applications, and media help aid social justice, but the thought processes behind the scientific method such as inductive and deductive reasoning can be used to understand how people construct biases, and how to gather data that will be used to help back social justice issues in science.	One class I took for the STEM Ed minor was a Computer Science class; CS 107. In this class we learned basics on coding, and building basic applications. This STEM class intertwined with social justice in multiple ways: - Engaging in several activities that appreciated women, and people of color in science -Receiving local social problems, and using scientific methods to create potential solutions for these problems -Designing an app to help alleviate a social problem, my app being a place for people to locate food shelters nearby

STEM is everywhere in the world today, and such a powerful tool can make some of the most powerful changes.	