Promoting Equity With Course-Based Undergraduate Research Experiences

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Goals of this presentation

To share:

• What a Course based undergraduate research experience (CURE) is

• Benefits of CUREs to students

• Steps that were used to implement a CURE in my courses

• Best practices - Lessons learned to have a successful CURE experiences in a course - in different modalities.
What is a CURE?

• Short for Course-based Undergraduate Research Experiences
• Why CUREs
• MCCCD STEM-CURE
• Its Implementation in my Statistics Course
  • Sources of Inspiration
• Capstone Project
The Maricopa Community Colleges
Partners
Benefits of CUREs

- Student interest and engagement
- Mutual benefit
  - For students
  - For student success specialists
  - For industry/community partner
Some Previous CUREs

Spring 2020:

• Lead In The Water Of Arizona Schools
• Stay-At-Home Order Effects on Air Quality
• Causes of Death in Pediatric Leukemia Comparing COVID-19 in the Five Most Populated Countries
• Carbon Monoxide Levels in Phoenix
• Arsenic in Arizona Water
• Levels of Lead in the Drinking Water of Phoenix Union Schools
• MAP Water Systems vs. State’s Largest Water Systems
• Nitrates Vs. Water Quality
• Farms and the Effects of Air Quality
• Maricopa and Pima Counties Ozone and PM10 Levels in Relation to Hospitalizations Due to Asthma
• What Makes Water Hard?
• Wasteland
• Coral Reefs: The Heart of the Ocean
Some Previous CUREs

Fall 2020:

• How Covid-19 has Changed the Air Quality Around Us
• How does the COVID-19 pandemic affect the air quality near Six Flags parks in Arizona?
• How does Social Media Affect Teenagers?
• Opioid Mortality and Primary Care Score
• Carbon Monoxide Poisoning in Arizona Compared to Other States
• Water Hardness in Arizona
• Effect of PrEP Prevention Program and HIV/AIDS Contraction
• Correlation between Asthma and Ozone
• Alzheimer’s Disease - Does it matter where you live?
• The Relationship between the Air Quality in Phoenix and its Surrounding Areas
Some Previous CUREs

Spring 2021

• Mental Health
• Agricultural Methane and Increasing Global Temperature
• Suicide Rates in the United States
• Water Toxicity and Temperature
• Is it Safe to Float?
• To River Raft or Not?
• Homicide and Healthcare
• Breast Cancer in Arizona
• The Effects of S.A.D.
• Relationship Between the Human Population, Mule Deer and Game Hunters
• Depressive Disorder Rates Between White vs Other Racial/Ethnic College Students During the COVID-19 Pandemic
Sequencing

16 week course

Compressed 10 week course
• With OER textbook
• Online homework and videos
• Small group projects
• Course competencies covered

Fall 2019 Pilot
Sequencing

16 week course

Followed by 6 week capstone project

• Project chosen should be of interest to them
• Have easily acquirable data*
• Be of social relevance beyond a niche interest
• To be done as a team of 2 or 3 (at most)

Fall 2019 Pilot
Resources for Students

Resources

Student success specialist
- Former student of the CURE class
- Has the content knowledge/empathy
- Is a partner in the implemented lessons
Resources for Students

Resources provided to students

• Previous student presentations (video, slides)
  Spring and Fall 2020:
  https://youtube.com/playlist?list=PLnx0808B5TiuyYjWfMRGH-Cmk6OpwD9jx
  Spring 2021:
  https://youtube.com/playlist?list=PLnx0808B5TiupbUsRmauxux9psUgE-QiE

• Previous student posters (pdfs)
Resources for Students

Resources provided to students

• Poster template (two forms)

• A “poster demystified” document
• Created in collaboration with student success specialists over multiple semesters
Resources for Students

Resources provided to students

• Poster template (two forms)

  - Wide poster
    https://docs.google.com/presentation/d/1qHxkFqLUKO-TDS81_c6joE6zwUJUBF3Swn0Prv896hw/edit?usp=sharing

  - Tall poster
    https://docs.google.com/presentation/d/1o7l93IgbpxDTtL1RW7OzYZU9wIEl_3-7hbRdOQRGQwQ/edit?usp=sharing
Resources for Students

Resources provided to students

• A “poster demystified” document
  • Created in collaboration with student success specialists over multiple semesters
  • An iterative process

Current iteration of “poster demystified”
• https://docs.google.com/document/d/1ngIKuj4MoJnZLBZBZcCaj89x8t0ijPvllSaq_2uFck/edit?usp=sharing

Other Resources:
• The industry/community/government partners
• Buy in and aligned goals are important
Lessons Learned

Fall 2019 Pilot

- Introducing your CURE – pacing, timing, and milestones
Lessons Learned

Spring 2020 Implementation

- Adapting your CURE – when things do not go according to plan
Lessons Learned

Fall 2020

• A new normal – what worked in the previous semesters?
• What was still needed?
Lessons Learned

Fall 2020 - results

• Unusual/unexpected stubbornness of students regarding feedback
• Some teams not effectively practicing their pacing (too short/long)
• Invited guests leaving after the presentations portion of the capstone.
• Another lesson learned was that some students were resistant to the idea that the scope of a capstone project should go beyond personal interest to something members of the community might actually care about.

A plan was made!
May 25, 2021 (excerpt from direct message):

"Dr. Marfai, They were talking about doing a research internship with me. I am fine with that. They loved my teams poster, I shared my poster and slides with them. Thanks for making us do it. They were talking about the intern before me, and the interns didn't understand how to do a poster. So, I guess they gave the mentors slides instead.

You are right about NASA .... I met them, we had an off camera chat."

-Cybersecurity Intern at NASA Ames Research Center
Summer 2021
Lessons Learned – Spring 2021

Aug 27, 2021 (excerpt from email)

"PS Dr. Marfai, I've wanted to say this. The work we are doing in stats is so advanced, I'm so impressed with us. For real.

FOR. REAL.

I was able to go into the internship and hold my own in conversations with graduate students and my mentor professor with confidence about research, and volley back questions and have them pause to search for answers."

-NSF-REU Intern: Biological Data Science for Community College Students at James Madison University Summer 2021
Future Directions

• Taking what worked in Spring 2021 (presentation and poster)
• Using the developed resources
• Involving the partners (communication)
• Staying open to adapting
• Continuing to studying the effect on student retention, persistence,
• self-efficacy, and pro-STEM attitudes
References


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- Questions?

- Frank Marfai
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- More about the MCCCD STEM-CURE project
  - https://sites.google.com/phoenixcollege.edu/mcccdstemcure/home

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