



# STRATEGIES FOR CULTURALLY RESPONSIVE ONLINE TEACHING IN STEM

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# Overview

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- Introductions
- Definition of Culturally Responsive Teaching
- The Culturally Responsive Teaching Online Model
- Earth Sciences Example
- Conclusion
- Questions

# STEM CHALLENGES

- Students of color barriers to achievement in STEM (Estrada et al. 2016)
- Eurocentric Instructional Model
  - This proposal will challenge the assumption of depleted cultural capital for students of color.
  - The classroom should not be treated as a culture-free zone.
  - Cultural diversity is acknowledged not ignored.

# CROTM RESEARCH PROPOSAL

- **CULTURALLY RESPONSIVE ONLINE TEACHING MODEL**

- Adult student learners succeed:
  - When their experiences are acknowledged
  - When new information builds on past experiences
  - When curriculum content is meaningful
    - Students gain the required knowledge to advance through the unit

# CROTM RESEARCH PROPOSAL

- **CULTURALLY RESPONSIVE ONLINE TEACHING MODEL**

- Explores new theoretical framework and its application to online teaching practices.
- Examine the integration of strategies for culturally responsive teaching
  - maximizing student learning in the online classroom for STEM courses

# CROTM GOALS

- Culturally Responsive Teaching pedagogy in the online environment is key to student's:
  - maintaining engagement in the classroom
  - acquiring knowledge about the course content
  - developing critical thinking skills
  - promoting a sense of belonging and community
  - succeeding in their academic and professional careers.

# Goal of Culturally Responsive Teaching

- Culturally Responsive Teaching requires instructors to focus on the relational component (Howard 2015)
  - engage students from diverse backgrounds
  - achieve learning at a higher level
  - learn course material at a deeper level
  - respect students for who they are

## MULTICULTURAL EDUCATION

## SOCIAL JUSTICE EDUCATION

## CULTURALLY RESPONSIVE TEACHING EDUCATION

**Focus on celebrating diversity**

Centers on exposing socio-political narratives

Emphasizes improving the learning capacity of diverse students

**Emphasizes positive social interactions and differences**

Focus on raising consciousness about social inequality

Centers around the cognitive aspects of teaching and learning

**Centers on exposing privileged students to diverse literature and inclusion in the curriculum**

Concerns with interrupting inequitable patterns

Concerned with building an academic mindset opposing dominant narratives about marginalized groups

# Definition of Culturally Responsive Teaching

- Gloria Ladson-Billings (1995) introduced theory of culturally relevant teaching, which is defined as the instructor:
  - Using the experiences of diverse students as a pedagogical tool
  - Building a framework on a three-leg stool
    - academic success
    - cultural competency
    - social awareness to challenge social inequality

# Definition of Culturally Responsive Teaching

- Geneva Gay (2010) constructed a culturally responsive teaching model.
  - contends instructors should acquire data on the cultural practices of diverse student groups to enhance learning
  - discusses how instructors should create a positive learning environment while maintaining high academic standards
  - Suggests instructors revise the course curriculum to promote equity in the classroom for all students

# Culturally Responsive Online Teaching Model (CROTM)

- The process to develop a CROTM model includes seven features
  - prejudice reduction
  - maintaining high academic standards
  - facilitating knowledge during course delivery
  - the integration of diverse experiences into the course curriculum
  - calling attention to social inequity in society
  - creating a sense of community in the online classroom
  - introducing technology to aid knowledge construction and interactional currency of diverse students in the online classroom.

# CROTM AND EARTH SCIENCE EXERCISE

- During this session, the presenters will describe CROTM and its theoretical application to a sample Earth Science lesson on Water Quality and Ground Water Contamination to make it culturally relevant.

# Water Quality and Groundwater Contamination

**Learning Outcome:** Explain the role of erosion, transportation and deposition in groundwater systems and karst landforms

## Unit Objectives

- 1-Research groundwater data and collaborate with peers to compare it to current environmental standards.
- 2-Explain the significance of the groundwater resources.

## Readings and materials

- 1-Textbook reading
- 2-Guided questions and knowledge checkpoints
- 3-Videos
- 4-Scientific Article
- 5-Website to access data

## Assessments Include points per item

- 1-Formative Assessment
- 2-Small Group Discussion (Rubric)
- 3- Journal: Self reflections

# Taking active steps to reduce prejudice

- Preconceived opinions
- Recognize your own biases
  - Unwillingly communicating negative messages
  - Low diversity in STEM areas
    - Geosciences are the least diverse (Bernard and Cooperdock, 2018)
- Representation in the classroom
- Test your own biases (E.g.) Project Implicit



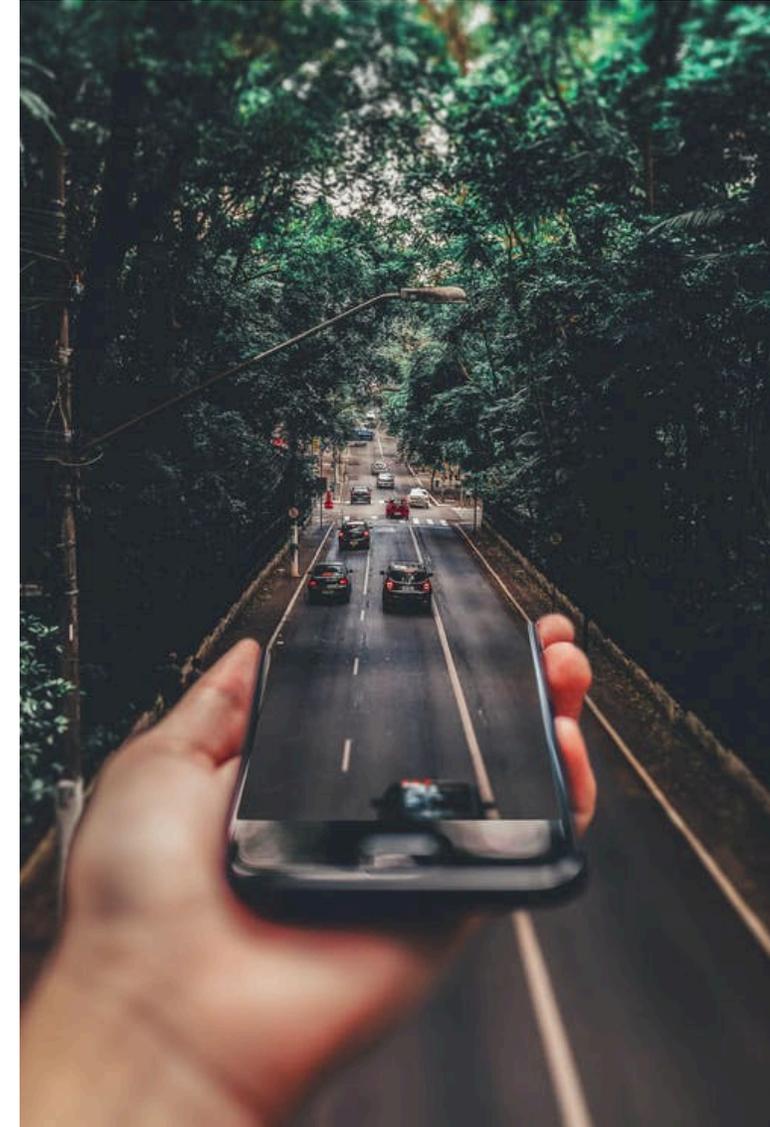
# Maintaining high academic standards

- Hold the same high academic standards for all students
- Articulate instructor expectations for the course
  - learning outcomes and objectives for each activity
  - Provide guidance on how all students can achieve these standards
- Promote the use of positive self-talk.
  - Provide positive student feedback
- Address students' misconceptions in STEM



# Facilitating knowledge during course delivery

- Provide roadmaps and objectives
- Create scaffolds
- Inspire students to participate in the online classroom
  - Individual reflections
  - Use case scenarios to trigger critical thinking and discussion
- Provide the resources for students to find the water quality data for their own neighborhoods



# Integrating diverse experiences into the course curriculum

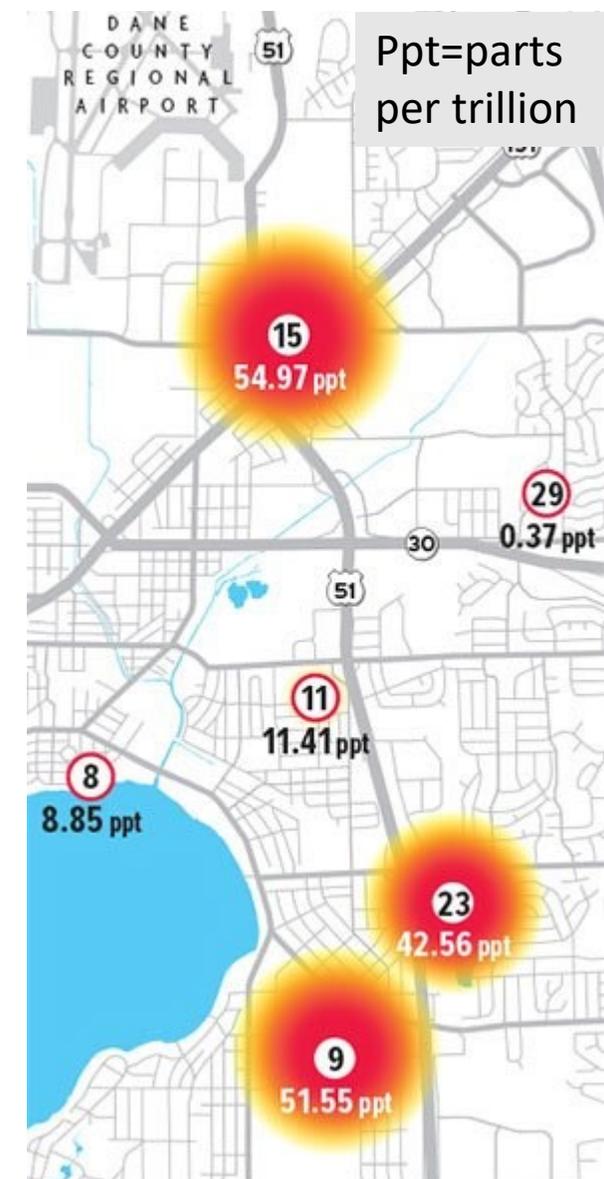
- Share personal experiences that relate to the course content
  - Provide local examples
  - Diverse researchers (Guest speakers or colleagues)
- Build connections between course content and students' experiences
  - Acknowledge students' experiences
  - Experience in other fields
  - Students learning from students



# Calling attention to social inequity in society

- Historically, poor quality of water in mid to low-income areas
- PFAs in low-income neighborhoods, including the community that our College serves
- Opportunities for case studies: how to address this issue with policy makers and legislation

\*PFAs: per- and polyfluoroalkyl



\*PFAs levels in Madison Water Utility wells on the East Side. 2019 Quality Report. (Isthmus, 2020)

# Creating a sense of community in the online classroom

- Humanize the online learning experience
  - Create a sense of presence
  - Often, students of color are not aware of their place in the community, and do not feel valued.
- STEM courses can be very individualistic
  - Collaborative learning activities
  - Students of color share their ideas and perspectives to make the content culturally relevant.
- Share current news or articles that are relevant to the topics discussed in the classroom



# Introducing technology to aide knowledge construction and interactional currency of diverse students

- Access to technology
- Using different means of representation
  - Video/Animations
  - Groundwater model
- Student Choice: allow students the opportunity to create and share content. Integrate technology
  - Students brings their own perspectives: cultural and social
  - podcasts, videos, presentations, games, songs, poems
  - allows the exchange of ideas using different means



# CONCLUSION

- The CROTM
  - Puts into practice the power of being seen by students
    - Zulu people of South Africa greeting: “I am here to be seen” and “I see you”
  - Considers culture a social currency
  - Encourages active learning and interactional transaction in the classroom
  - Promotes the student's social construction of knowledge
  - Facilitates discussions about social inequality in society
  - Demonstrates how technology can be a source of life-long learning

# RESOURCES

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