Table 9:

Making Teachers out of Students: Optimizing Action and Expression through Project-based Learning

Brandon Wallace (Education) and Ingrid (Van) Scott (Mathematics)

STEAMed Planet: Exploring the Intersections of Global Humanities and STEM through Climate Change

Friday, March 5, 2021 via Zoom

Presentation Title: Making Teachers out of Students: Optimizing Action and Expression through Project-based Learning

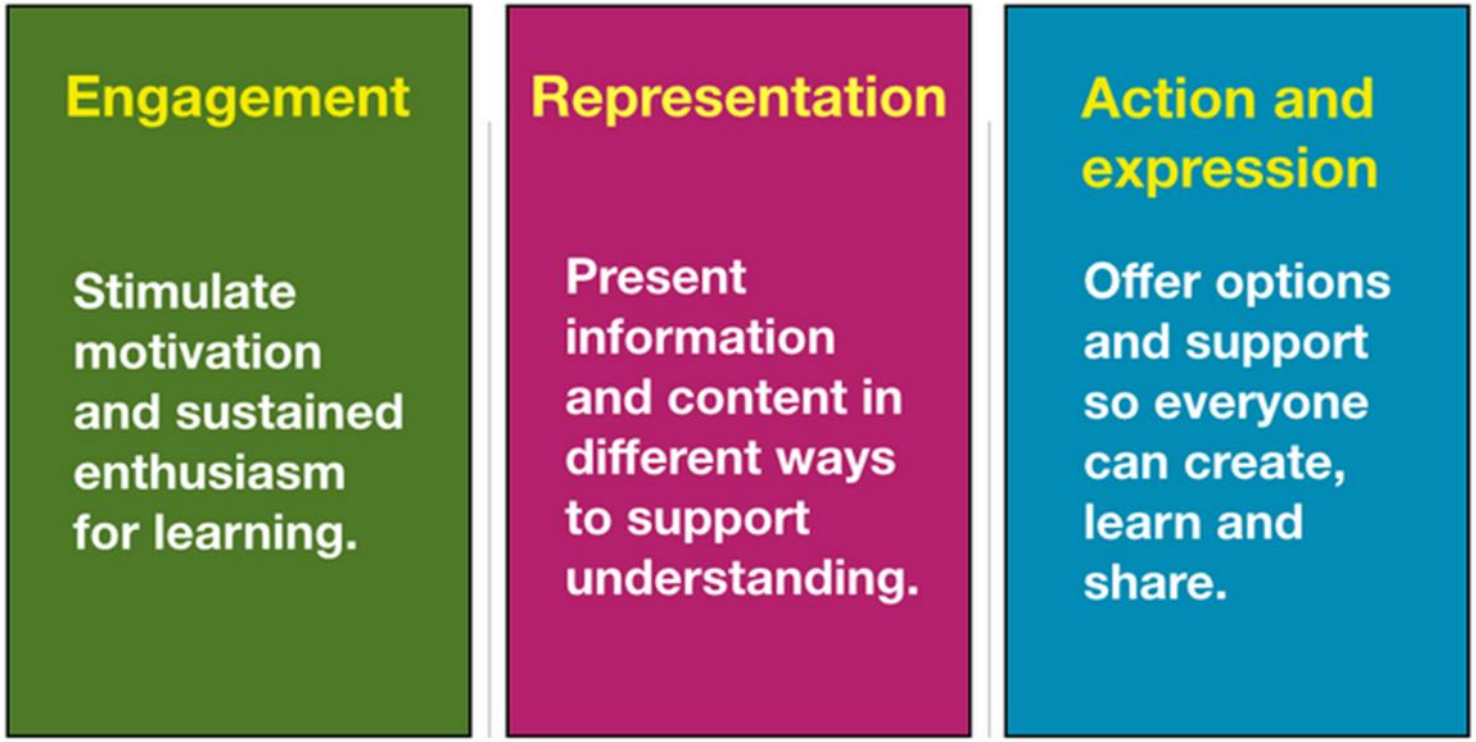
Presented by:

Ingrid Scott (Mathematics)

&

Brandon C.S. Wallace (Education & English)

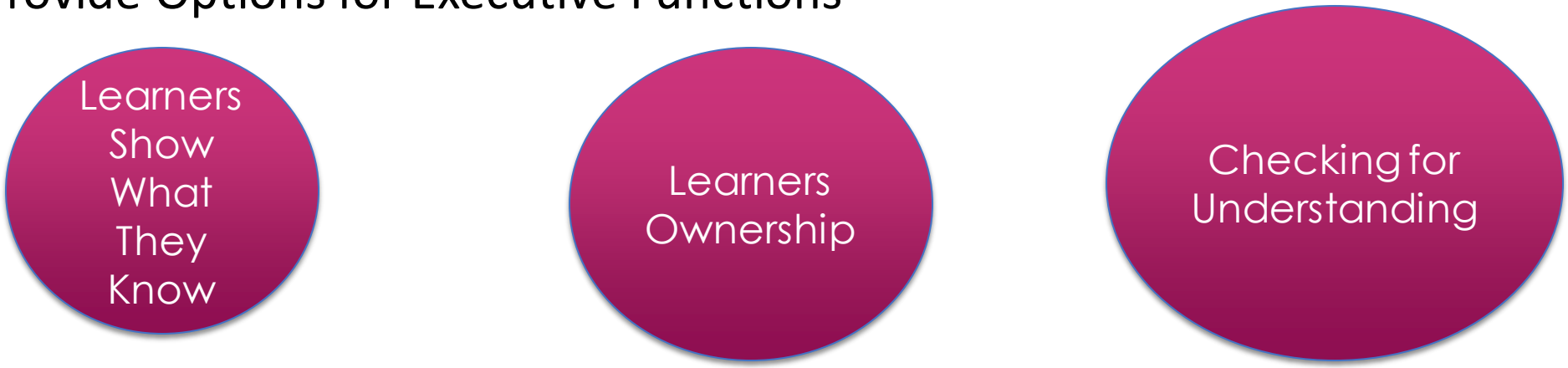
Universal Design for Learning



Universal Design for Learning: Know the learners. Identify and remove barriers to learning. Provide multiple learning pathways. Offer a range of universal tools and supports to everyone at the outset.

Action and Expression: Deeper Dive

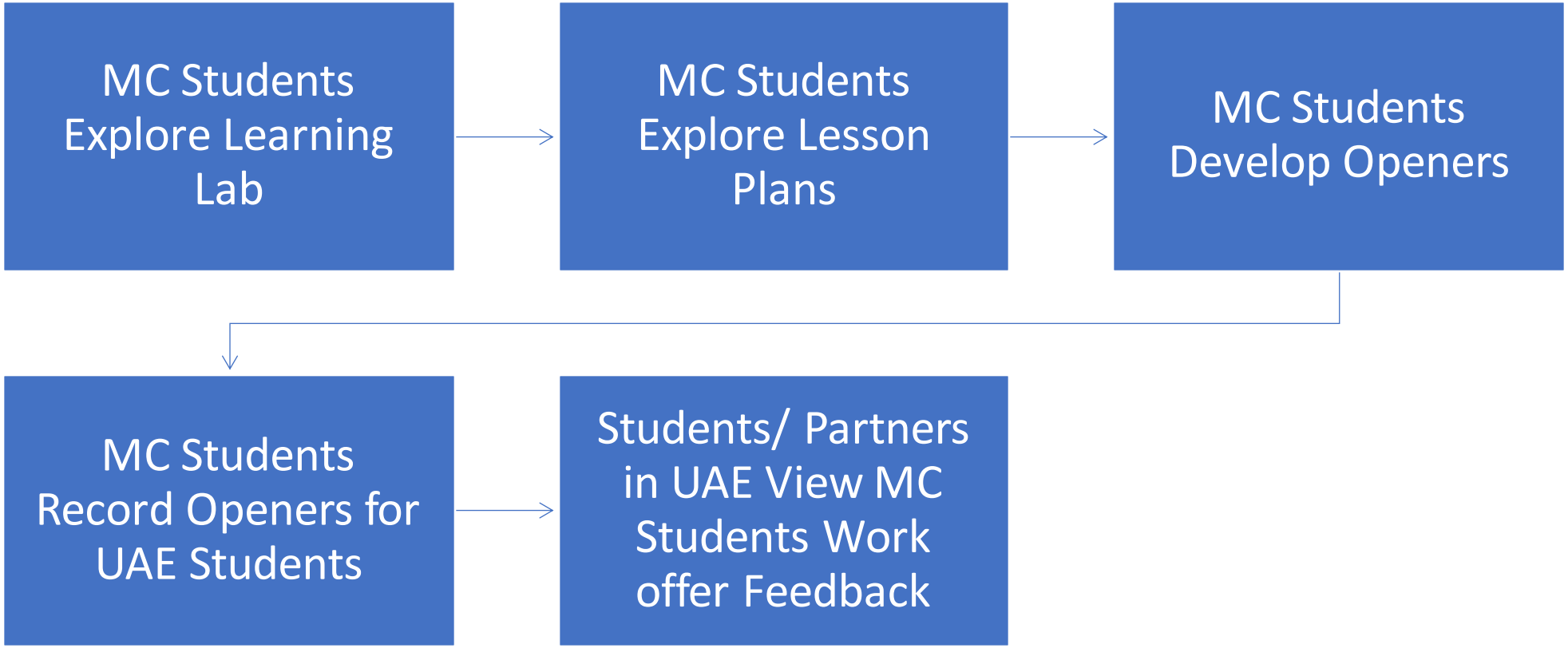
- Principle III. Provide Multitude Means of Action and Expression (the "how" of learning)
  - Provide Options for Physical Action
  - Provide Options for Expressive Skills and Fluency
  - Provide Options for Executive Functions



The Power of Peer-to-Peer Teaching

1. When learners shift from being students as recipients to being productive teachers, it is likely they need to understand the material at a deeper level to be effective teachers (Stigmar, M. (2016). Peer-to-peer teaching in higher education: A critical literature review. *Mentoring & Tutoring: partnership in learning*, *24*(2), 124-136.)
2. Students, who become teachers of their own learning, tend to engage in self-assessing, self-evaluating, self-monitoring, and self-learning. Cognitive activities to monitor and recall information include: (a) summarizing, (b) questioning, (c) clarifying, and (d) predicting and this is accomplished when students become their own teachers. (Hattie, J., & Clarke, S. (2018). *Visible Learning: Feedback*. Routledge: New York, NY.)
3. When learners shift from being students as recipients to being productive teachers, it is likely they need to understand the material at a deeper level to be effective teachers. Many students concentrate on learning recipes or problem solving strategies without understanding the underlying concepts; a focus on memorization does not always result in understanding. (Passeri, R., & Mazur, E. (2019). Peer Instruction-Based feedback sessions improve the retention of knowledge in medical students. *Revista Brasileira de Educação Médica*, *43*(3), 155-162.)

Simple Cycle



Then and Now . . .

Downtown Dubai In 2000 Vs Now

age 1 Source

Remixing the Global Idea . . .
Back in 2015 . . .

EDUC 101 Course Outcomes

Upon completion of this course a student will be able to:

- Examine current events and trends in education and describe how they affect students, families, schools and the community.
- Articulate key concepts regarding how children learn.
- Identify and describe best educational practices related to diverse populations in the classroom.
- ***Compare and contrast global education practices.***
- Identify key events, leaders, and movements in the history of education.
- Compare and contrast the essential philosophies of education and begin to develop a personal philosophy of education.
- Identify various funding sources for schools and ongoing controversies related to school funding.
- Describe the impact of federal laws and Supreme Court decisions related to education in K - 12 schools throughout the United States.

SMITHSONIAN INSTITUTION ASSIGNMENT: Lesson Plan Opening Project:

This class is different and special from any other class you will take, possibly over your entire college career. In short, this class is supported by the Smithsonian Institute, and you will be engaging in a global enterprise, essentially interfacing with global students in the United Arab Emirates. This project will take us remotely to the Smithsonian's myriad of resources throughout the entire semester. In short, and with the help of Smithsonian resources, specifically as you develop a small part of a lesson plan to engage students in the United Arab Emirates—the part of the lesson that grabs the attention of your learners and introduces them to a developed lesson. Our theme of this project is global warming and climate change in the United Arab Emirate (UAE). We will be working closely with officials from the Smithsonian, educational partners from UAE, and a host of other supports from Montgomery College. I will discuss the assignment and your obligations to the assignment in class as we progress through the semester.

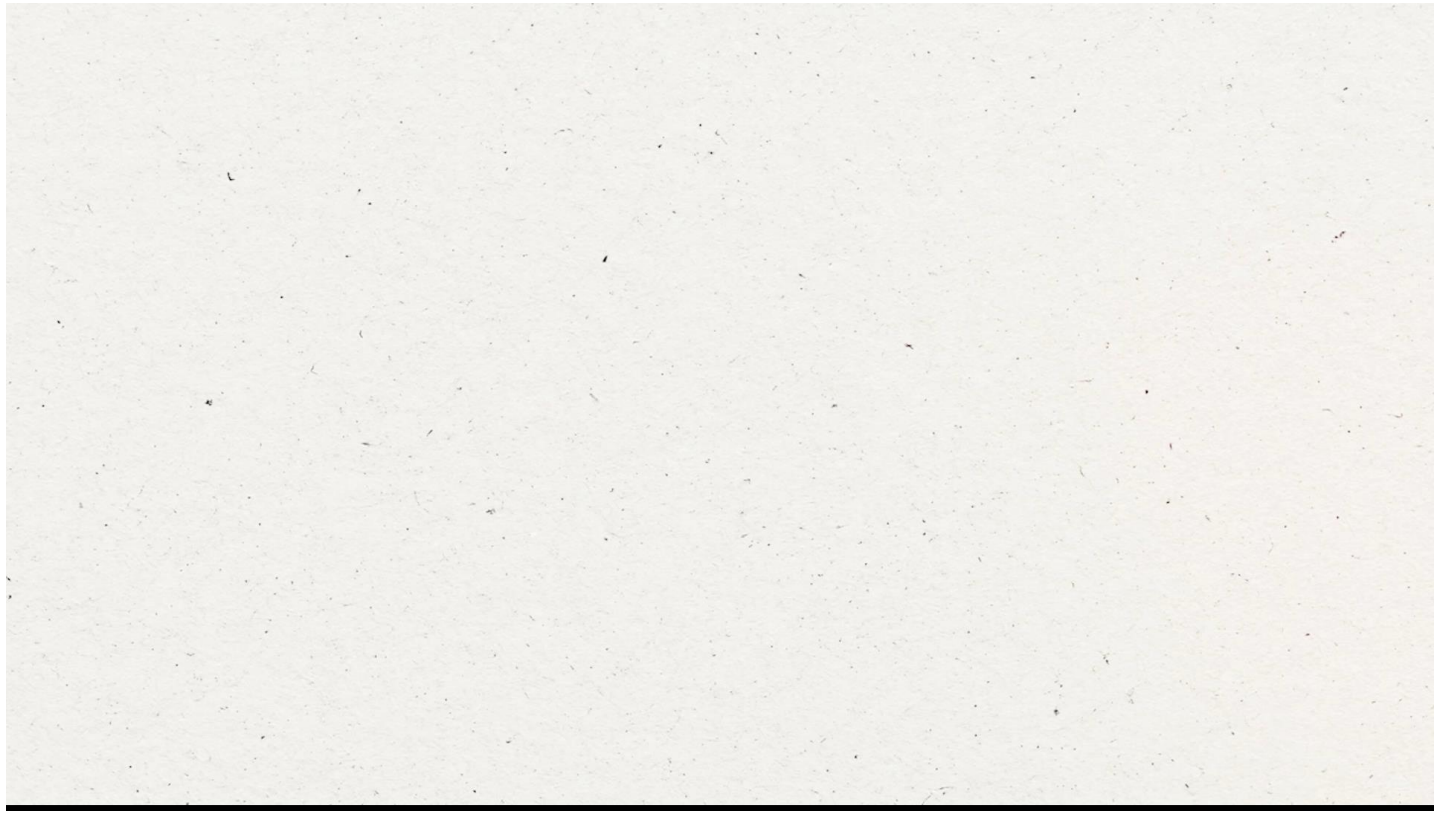
You will be required to develop a lesson plan opener and deliver it as a recording to the class and ultimately to the Smithsonian Institute, as well as students in the United Arab Emirates. The lesson plan opening project is a warm-up or a do-now that teachers employ to grab the interest and attention of their students. Your lesson plan opening project must be centered in global warming within the United Arab Emirates. The lesson plan opening should be exciting, entertaining, informing, and engaging. You may choose three grade levels that you would like to use for this project/ lesson plan opening. Throughout the semester, your instructor will ultimately approve your grade level. Approval is solely based on ensuring that there is enough diversity of grade levels for the course.

Please note that a lesson plan opening project required to be turned in by the assigned due date, and it is a mandatory project to complete this course. You will have to record a rough draft of your warm-up/ do-now and share it prior to final submission. When completing your draft, do the best you can and complete it as much as possible so you can receive feedback on suggestions and improvements before you present your final submission. Lesson plan samples will also be provided in class and a class planning day will be assigned for you to work with your partner on this project.

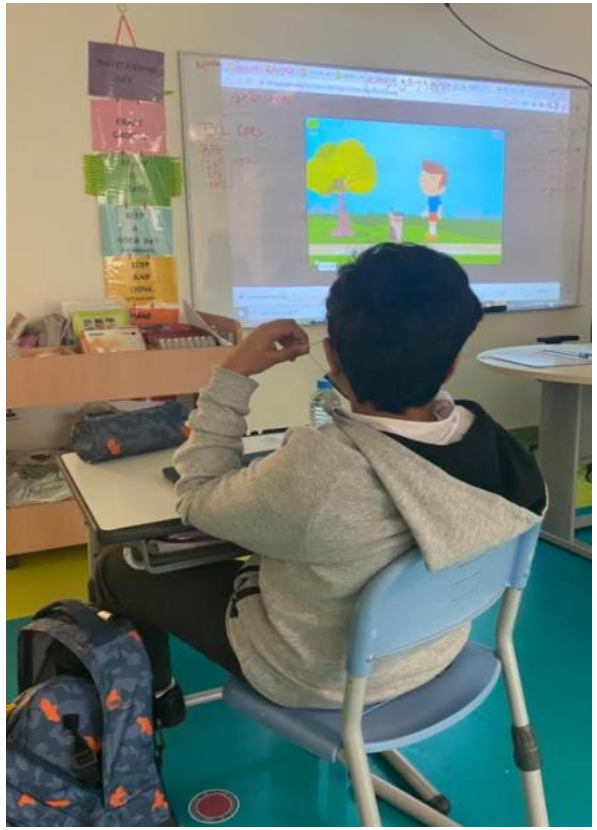
Support System

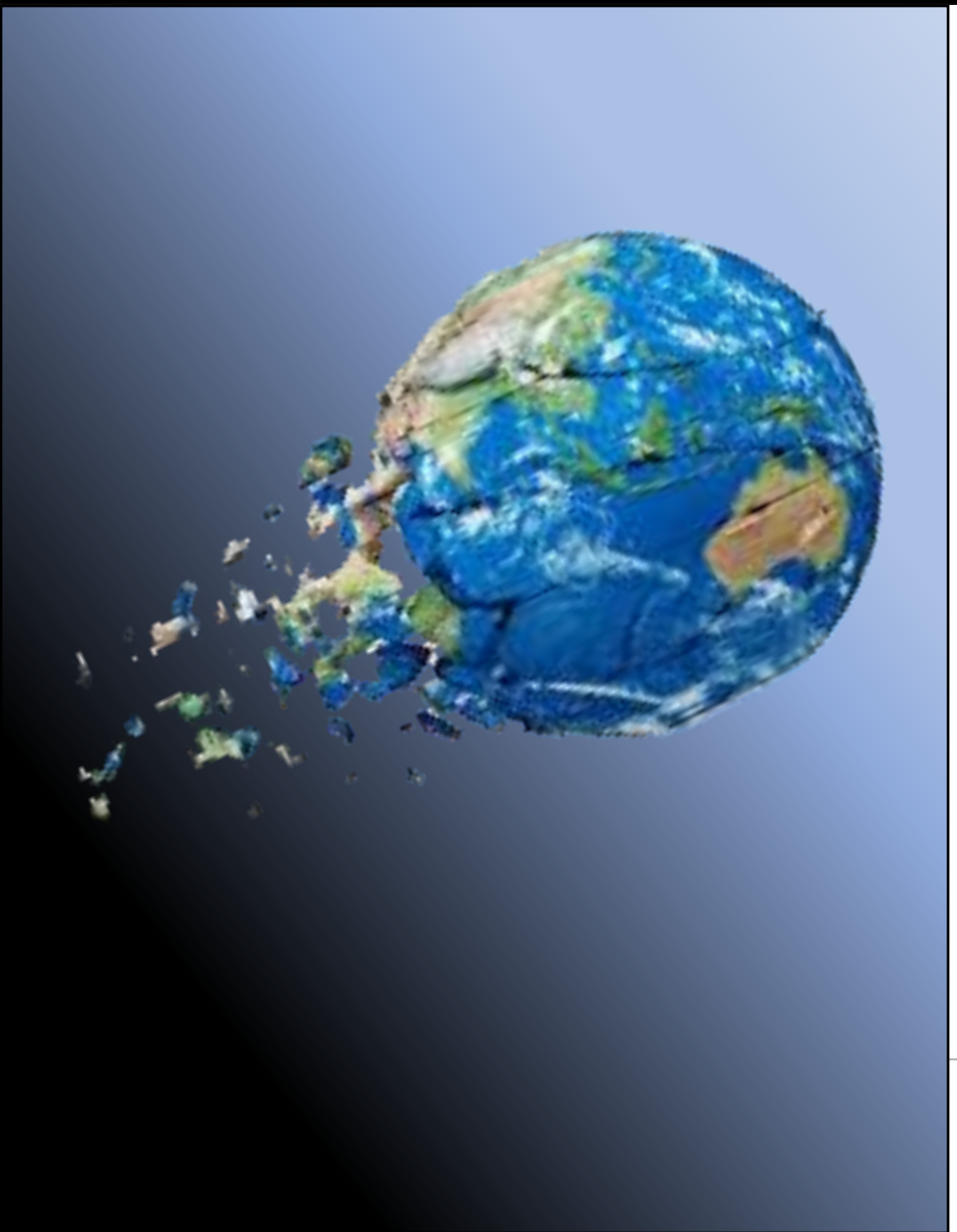
- Rebecca Fenton, Curator, Smithsonian Folklife Festival;
- Eric Benjamin, Dean of Education and Social Sciences & Tracey Smith-Bryant, Chairperson of education and social sciences;
- Jennifer Bowden, Director of Education World Affairs Council of Dallas/ Fort Worth;
- Phillipa Rappoport, Community Engagement Programs Manager, Smithsonian Center for Learning and Digital Access;
- Denise Dewhurst, Sara Ducey, Mimi Mann;
- and so many others within and throughout my Montgomery College and personal networks.

The Student Showcase



And . . . My New UAE Angels . . .





Piecing Together the Climate Change Challenge

- Incorporate research and information that gets students to think about their own connection to climate change.
- Explore the connection between climate change, pandemics, and environmental justice.
- Use statistical and analytical tools to examine the climate change phenomena.

Guidelines for Assessment & Instruction in Statistics Education (GAISE)

1. Teach statistical thinking.
2. Focus on conceptual understanding.
3. Integrate real data with a context and purpose.
4. Foster active learning.
5. Use technology to explore concepts and analyze data.
6. Use assessments to improve and evaluate student learning.

Why project-based learning in Statistics?

Project Based Learning is a teaching method in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question, problem, or challenge.

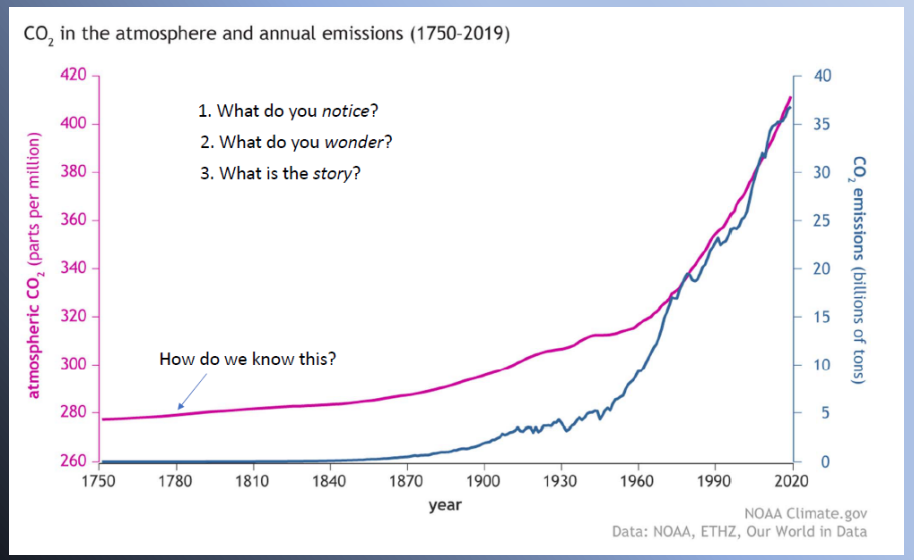
- Deepens content knowledge as well as critical thinking, collaboration, creativity, and communication skills.
- Improves students' opportunities to learn and perform.

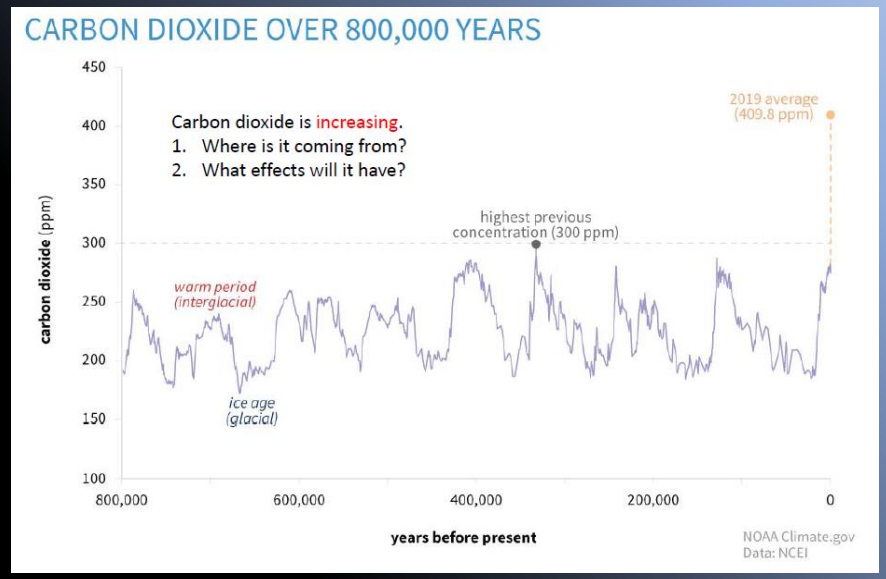
Implementing Project-Based Learning

- Know the goal
- Allow plenty of time
- Prepare ground work
- Plan frequent check ins

What Does Project-Based Learning Look Like in Statistics?

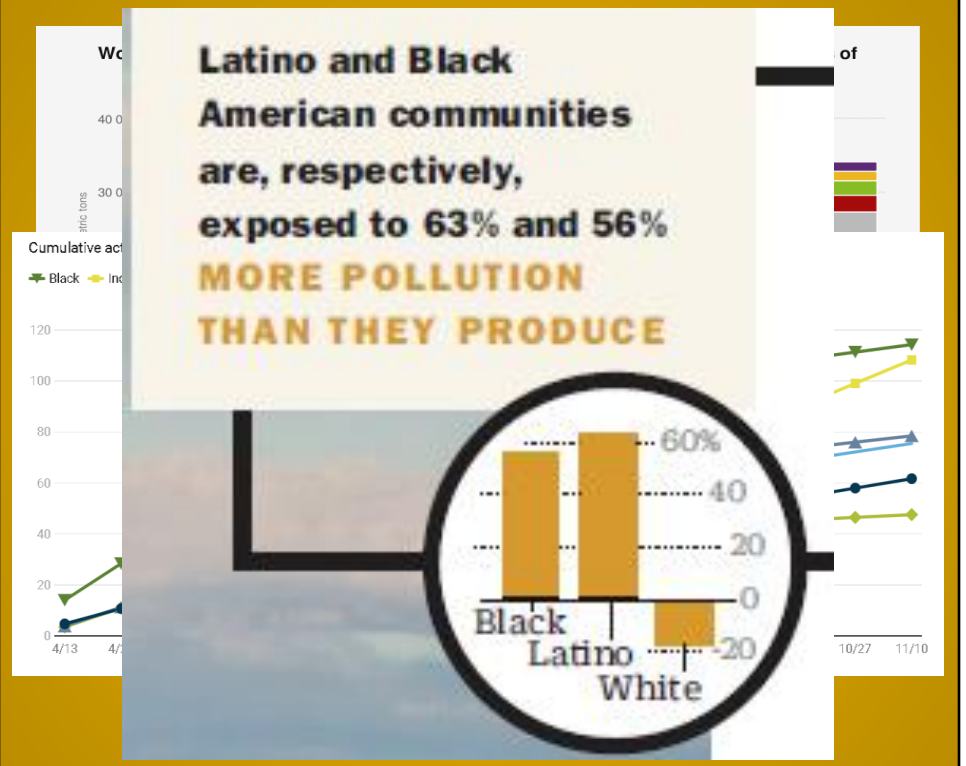
- Focus on an open-ended questions or tasks
- Use of activities and datasets to illustrate active learning of statistical thinking
- Emphasis on student independence and inquiry
- Longer and more multifaceted assignments





Using Climate Change Data in Introductory Statistics

- Global temperature anomalies
- Atmospheric concentration of carbon dioxide
- Decline of artic sea ice
- Floods, Droughts, & Wild Fires
- Sea level change



Using Climate Change Data in Introductory Statistics (continued)

- Carbon dioxide emissions
- Heat related illness & death
- Chronic respiratory disease
- Pestilence

Statistical Analysis of Climate Change Data

- Construct regression models
- Perform a hypothesis test on the difference in mean levels of CO_2 in the 1980's compared to the 2000's.
- Construct confidence intervals for CO_2 levels.
- Analyze the association between climate change and infectious diseases.
- Analyze the association between air pollution and the incidence of COVID-19 in Black, Latino, Indigenous, and low-income communities.

Final Project

Presentation on an article/study related to climate change, environmental racism, or COVID-19 to include a summary, detailed statistical analysis including a tool of statistical inference, a data visualization, and conclusion including opinions about the article/study and why it is important.

MATH 117-Elements of Statistics
Student Outcomes

- Explain the elements of climate change.
- Identify various sources of climate change evidence.
- Explain the impact of climate change on environmental, biological and social systems.
- Examine the impact of our daily routines and consumer habits on a micro and macro level.
- Use data and evidence to justify claims relating to climate and climate change.

Discussion Questions

- What, if any, assignment that you currently teach could be modified to utilize project-based learning or peer-to-peer teaching?
- Has anyone ever tried project-based learning or peer-to-peer teaching? If you have tried it, what have been some of your successes and challenges? If you have not tried it, what has been preventing you from attempting it?
- How do you see your practice changing by embedding more project-based learning or peer-to-peer teaching methods in your coursework?
- What concepts or ideas would you feel most comfortable allowing students to take control over in your coursework?
- What has been/ will be the most important aspect of project-based learning or peer-to-peer teaching, in terms of evaluating? What types of domains and progression languages will you use to measure your students' effectiveness?
- What other soft/ power skills do you see being developed by allowing this type of leadership opportunity in your course(s)?

AGENDA

- **3:20-3:40 — Group Report-Outs**
- **3:40-3:50** – **Dr. Sanjay Rai**, Senior Vice President for Academic Affairs
- **3:50-4:00 — Closing Remarks**

Sanjay Rai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