

EDU 104: Transformative Science Pedagogy
Mount St. Mary's University
Fall 2020
Thursday 5:30 – 7:30 ONLINE

Instructor: Dr. Salina Gray

Phone: (213) 477-2620 to leave a message

Email: sgray@msmu.edu OR via CANVAS

Office hours: by appointment: to make an appointment, please email

Estimated response time to email and/or phone: within 24 hours

Required Texts and readings:

Jonathan 2018: National Research Council (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Available for free download at:

<http://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts>

Achieve, Inc. (2014). *Next Generation Science Standards (NGSS)*. Available for free download at: <http://www.nextgenscience.org/next-generation-science-standards>

**Inquiry and the National Science
Education Standards: A Guide for
Teaching and Learning. FREE PDF**

<http://www.nap.edu/books/0309064767/html/>

<http://ambitiousscienceteaching.org/wp-content/uploads/2014/09/Discourse-Primer.pdf>

(A discourse primer for science teachers)

Course Description: Education 104 is designed to expand your knowledge, competence and comfort teaching science to any age, grade or level. One of the primary goals of science instruction is to increase science and scientific literacy in society. As we become increasingly dependent on technology, access to quality science instruction is a civil rights issue. Those who have access will invariably at greater advantages than those who do not. In this course we will explore and use the (W)holistic Science Pedagogy as a framework for providing rigorous and robust science instruction grounded in transformative practices

Course Goals/Objectives:

Essential Questions

- How do we teach science in a way that doesn't cause harm?
- What does transformative science look like?
- What is science literacy?
- How do we apply the 5 Commitments of (W)holistic Science Pedagogy to teach transformative science?

Our classes will be held *synchronously* (on zoom) 13 of our 16 weeks. During this synchronous time together we will discuss ways to develop our own science content knowledge as the role of science as an enterprise. We will spend some time giving you an opportunity to develop your own knowledge of

science as well as effective practices and pedagogy. The approach to this will be to model many of the practices that you might use with your students and the emphasis will be on developing your ability to help students engage in transformative scientific practices. The *asynchronous* (not together or on zoom) time will consist of you working independently through modules on CANVAS.

Student Learning Outcomes

Students in this course will demonstrate the ability to enact the five commitments of the (W)holistic Science Pedagogy which are: *commitment (1) to an ever-developing self-awareness, (2) to science and its practices, (3) to science as a transformative agent, (4) to their students' social emotional wellness, and (5) to restorative practices.*

By the end of the course students will:

1. Explain the various historical and contemporary structures and systems that influence self and others. (Commitment #1)
2. Increase knowledge of science pedagogy including the content, process and nature of science as an enterprise. (Commitment #2)
3. Be able to implement pedagogical practices that are inherently more liberatory and just for all students. (Commitment #3)
4. Understand how students' needs, backgrounds and ideas about science inform science pedagogy. (Commitment #4)
5. Engage in regular conversation to identify and repair harm and restore justice caused by each other, science, and society (Commitment #5)

The syllabus has two major functions:

1. THE SYLLABUS IS A STATEMENT OF COURSE EXPECTATIONS

The syllabus sets out the course requirements, the grading scale, and the methods of assessment. It is intended to provide the students with sufficient information about the course expectations, along with due dates, and a class schedule. After the add/drop period, instructors should not redistribute points unless it is to the advantage of the student (e.g., reducing the homework/reading, removing a specific requirement, such as a quiz). The syllabus should be *consistent* with the catalog description.

2. THE SYLLABUS IS A PERMANENT RECORD

The syllabus is a permanent record for the student, instructor, the department, and the institution. As such, it is both a professional and personal document. The syllabus provides a record of course content, grading methods, and information vital for equivalency transfers, as well as for the evaluation of a course or instructor. Subsequently, both faculty and students should retain course syllabi for future reference.

Classroom Policies:

In-Class Participation/Attendance:

During our synchronous time we will discuss and model (when possible) many different teaching approaches, and class discussion will help us clarify our beliefs and practices. Every week we will be

involved in small group work and written reflection. Missing any session and/or being consistently tardy seriously jeopardizes your ability to earn a passing grade in the course. If you miss more than 1 session or the equivalent (4 hours), you will be required to complete an additional assignment. Any additional absences beyond 2, will result in being administratively dropped from the course.

Submitting Work: Course assignments will be complete and submitted on CANVAS. Many of the assignments may require using Google Slides, Google Docs and Google Forms.

Make-Up Work and Late Assignments: No late or make-up work accepted unless previously arranged with professor.

Online Participation

- It is your responsibility to check out all online components of this course ahead of time, and to verify that your personal computer is compatible with course requirements – or that you have access to a reliable, functioning computer somewhere else.
- Keep in mind that technology is variable and may not always work. Plan ahead, and make sure you have a backup plan to submit your work in a timely fashion. Do not wait until the last minute to submit your work.

Grading:

The course aims to model the importance of using multiple measures of assessment to gauge the progress of learners. Assignments must be completed on time according to detailed guidelines. Late work may be accepted but will not receive a grade higher than the lowest grade given for on-time assignments.

A	A-	B+	B	B-	C+	C	C-	D	F
94-100	90-93	87-89	84-86	80-83	77-79	74-76	70-73	65-69	<65

COURSE SCHEDULE

Date	Topic	Assignments and Readings for this class
Week 1 8/27	Foundation and Grounding for the course	Who is in this class? What are the requirements of this course? What are the major tasks and how are they related to the overall course organization? Science history (personal) Looking at the data
Week 2 9/3	Intro to WSP	Overview of WSP Why Commitments? <i>Reading due:</i> ‘Teaching to Transform: (W)holistic Science Pedagogy’, Gray, S. & Patterson, A. 2019 <i>Assignment #1 due: GOOGLE INTEREST SURVEY</i>
Week 3 9/10	Week 3 Commitment #1: Self-Awareness	Grounding and Mindfulness Self-Awareness and Resilience <i>Reading due:</i> ‘What is Self-Awareness and How to Cultivate It’ : https://hbr.org/2018/01/what-self-awareness-really-is-and-how-to-cultivate-it

Week 4 9/17	Commitment #1: Self-Awareness	Presentations: Identity Journey <i>Assignment #2 due: Identity Quadrant</i>
Week 5 9/24 (NO ZOOM)	Commitment #1: Self Awareness	Asynchronous Module: Inequity and Social Justice in Science instruction <i>Assignment #3 due: Personal Science Statement</i>
Week 6 10/1	Commitment #2: Science and its practices	Why teach Science: Science and Society <i>Reading:</i> Wysession, Michael. Why schools should teach science like sports. Scientific American. August 1, 2105. Why is Science Important? Website http://whyscience.co.uk/ Falk, J., & Dierking, L. (2010). The 95 Percent Solution: School is not where most of Americans learn most of their science. American Scientist, 98, 486-493. <i>Assignment #4 due: Reflection on Science and Society</i>
Week 7 10/8	Commitment #2	Phenomenon for NGSS: Asking questions <i>Reading:</i> Website: https://www.ngssphenomena.com/ Website: https://thewonderofscience.com/phenomenal 'Using Phenomena in NGSS Designed lessons and units'
Week 8 10/15	MID SEMESTER BREAK!	NO CLASS NO MODULE
Week 9 10/22	Commitment #2	Modeling and Interpreting Data: Defining Problems and Designing Solutions: What is Design Thinking in Science? <i>Reading:</i> Schwarz, C. V., Reiser, B. J., ... (2009). Developing a learning progression for scientific modeling: Making scientific modeling accessible and meaningful for learners. <i>Journal for Research in Science Teaching</i> . 46(6), 632-654. <i>Modeling: Allowing Students to Show What they Know. Tools for Ambitious Science Teaching.</i> <i>Assignment #5 due: Phenomenon and questions</i>

<p>Week 10 10/29 (NO ZOOM)</p>	<p>Commitment #3: Science as Transformative Agent</p>	<p>CANVAS MODULE: Defining Problems and Designing Solutions: What is Design Thinking in Science?</p> <p><i>Readings:</i> Lahey, Jessica. How Design Thinking became a buzzword at school. The Atlantic. January 4, 2017. https://www.theatlantic.com/education/archive/2017/01/how-design-thinking-became-a-buzzword-at-school/512150/</p> <p>Morrison, Debbie. Why ‘Design Thinking’ doesn’t work in education. Online Learning Insights. August 6, 2013. https://onlinelearninginsights.wordpress.com/2013/08/06/why-design-thinking-doesnt-work-in-education/</p>
<p>Week 11 11/5</p>	<p>Commitment #3:</p>	<p>Discourse and Argumentation in science</p> <p><i>Reading:</i> Osborne, J. (2010). Arguing to Learn in Science: The Role of Collaborative, Critical Discourse. Science, 328, 463-466.</p> <p>Additional Resources: TedED: Derek Muller, The founder of Veritasium. Video series. http://ed.ted.com/on/rTahZlkM#watch Hanford, Emily. American Radio Works. Don’t Lecture Me. Fall 2011. http://americanradioworks.publicradio.org/features/tomorrows-college/lectures/</p> <p>Chin, C. (2006). Classroom interaction in science: Teacher questioning and feedback to students’ responses. International journal of science education, 28(11), 1315-1346.</p> <p>Assignment #6 due: Reflection on Scientific Argumentation</p>
<p>Week 12 11/12</p>	<p>Commitment #4: Social and Emotional Wellness</p>	<p>Foundations of SEL</p> <p><i>Reading: explore CASEL Website:</i> https://casel.org/what-is-sel/ Sections: 5 core competencies, SEL in action, and the school guide https://schoolguide.casel.org/what-is-sel/what-is-sel/</p>
<p>Week 13 11/19</p>	<p>Commitment #4: Social and Emotional Wellness</p>	<p>Trauma Informed and Aware</p> <p><i>Reading:</i> https://www.chronicle.com/newsletter/teaching/2020-06-04 Within the article click the links to watch the webinar and go through the slides *This information will be used with your Assignment #7 due next week</p>

Week 14 11/26	NO CLASS	SCHOOL CLOSED
Week 15 12/3 (NO ZOOM)	Commitment #4: Social and Emotional Wellness Commitment #5: Restorative Practices	CANVAS MODULE Why Restorative Practices: Historical Perspective <i>Reading: 'Introduction to Restorative Practices', (pdf)</i> <i>'Restorative Justice is about more than just reducing suspensions',</i> https://hechingerreport.org/restorative-justice-is-about-more-than-just-reducing-suspensions/ <i>Assignment #7 due at end of Module Informed and Aware activity and reflection</i>
Week 16 12/10	Commitment #5: Restorative Practices	Restorative Practices in STEM <i>Reading: Radical STEM Teacher Activism (pdf)</i> <i>Assignment #8 due: Critical Research Study</i>

MSMU Office Information:

- Please call Catalina Hurtado, the Education Department Administrative Assistant, to make an advisement appointment: (213) 477-2620. Please contact her at churtado@msmu.edu or educationdepartment@msmu.edu .
- **MSMU Policy:**
***Potential COVID-19 Disruption:** Should the course modality change during the semester the instructor will provide a written comprehensive update of how the class will continue and any changes that may result.*
***University PPE Policy:** All students must comply with the University personal protective equipment (PPE) policy while on campus. Non-compliant students will not be allowed to stay in class.*