Transfer of Knowledge

MSU STEM Outreach Project

Browning Middle School

Northwest Earth and Space Science Pipeline (NESSP)

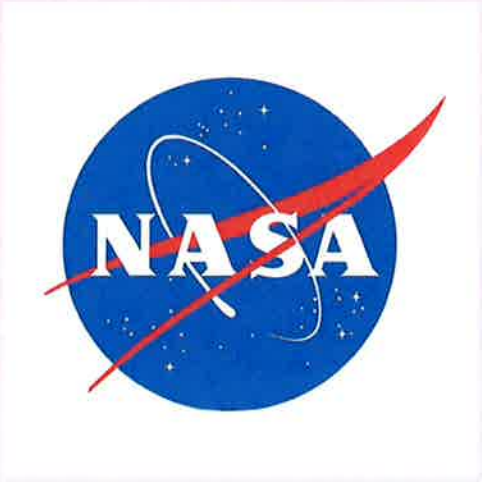
NASA SPACE & EARTH SCIENCE GRANT

STEM OUTREACH PROJECT

MONTANA STATE UNIVERSITY

Department of Academic Technology & Outreach

BOZEMAN, MT



Purpose

Utilize the traditional systematic structure of societies to acquire, foster, and transfer knowledge to improve attitudes towards STEM, and knowledge gain.

The common responsibilities of a society are to:

- **support the well being of each member of that society**
- **understand that they are a key part of the overall Tribe**
- **Take care of the knowledge of that society that has been passed down**
- **share that knowledge within the overall community to support the overall well being of everyone.**

It is important to understand the question of whether of not this type of outreach and traditional systems structure effectively increases the knowledge of key space and earth science concepts using current Montana State University students with similar backgrounds.

THE SCIENTIFIC METHOD

Ask a Question 

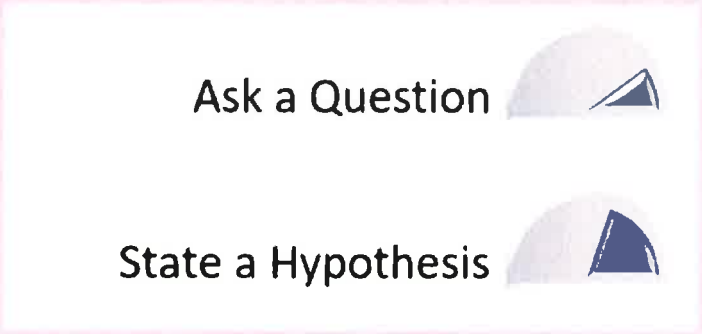
State a Hypothesis 

Conduct an Experiment 

Analyze Results 

Make a Conclusion 

RESEARCH QUESTION & HYPOTHESIS



1.) Research Question:

- **Does the societal systematic structure that is common among many Plains Indian Tribes influence attitudes towards and learning of STEM education?**

2.) Research Hypothesis

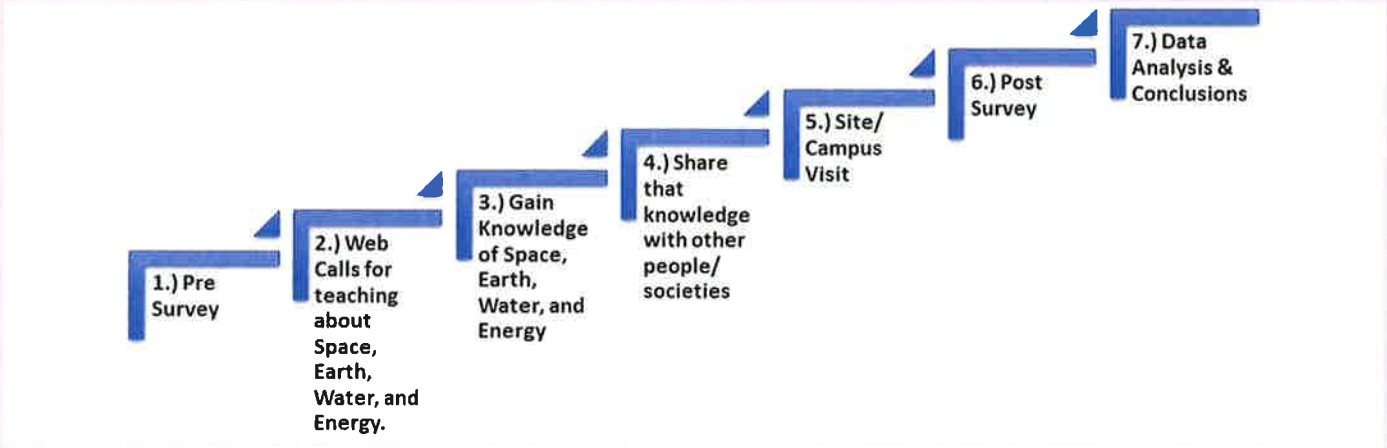
- **Because societies have been a way to transfer knowledge from generation to generation among the Pikanii People, both orally and visually, the societal systematic structure will increase positive attitudes and educate students on STEM related topics in energy, space, earth, and water.**

SYSTEMS APPROACH TO EXPERIMENT

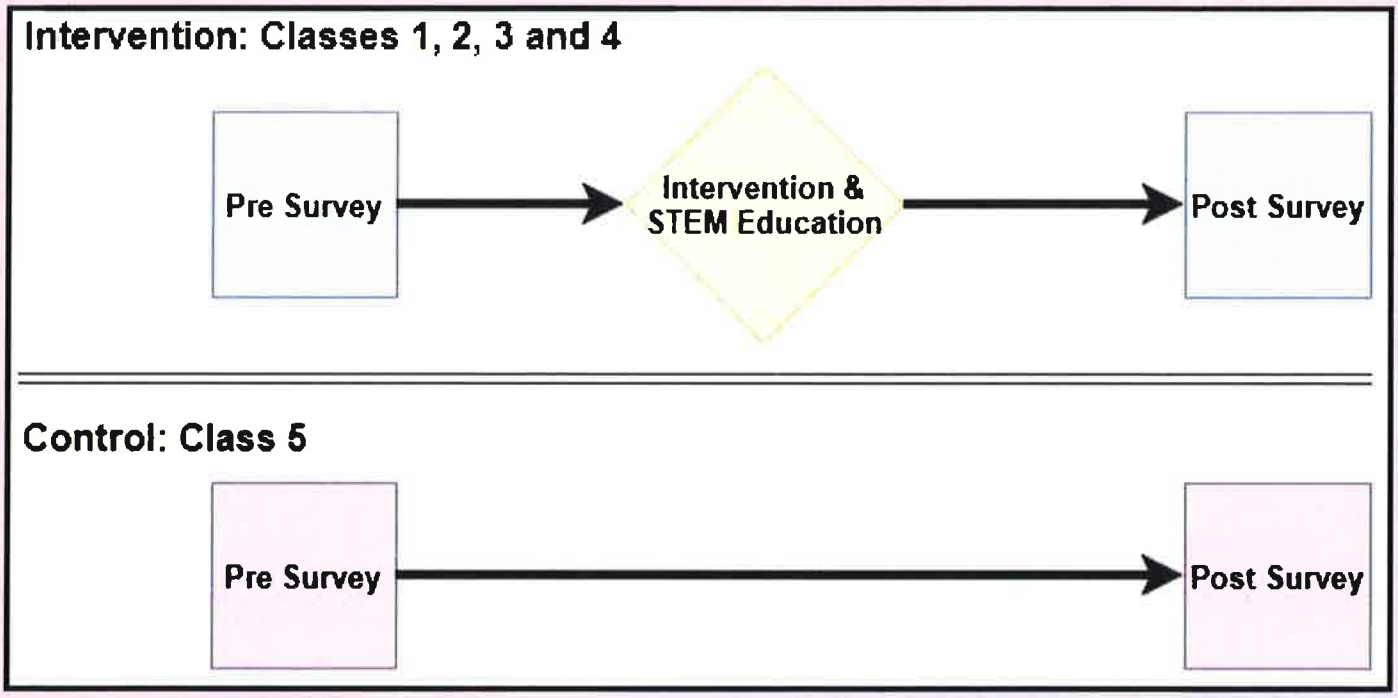
Conduct an Experiment

3.) Experimental Design:

- This systematic approach allows for a traditional pre and post survey evaluation to determine the statistical significance of the intervention, STEM educational webcasts and site/campus visits with students of MSU. The Data analysis of these surveys will allow for all stakeholders to make meaningful strides and conclusions about the education of underrepresented minority populations in regards to science, technology, engineering, and math.

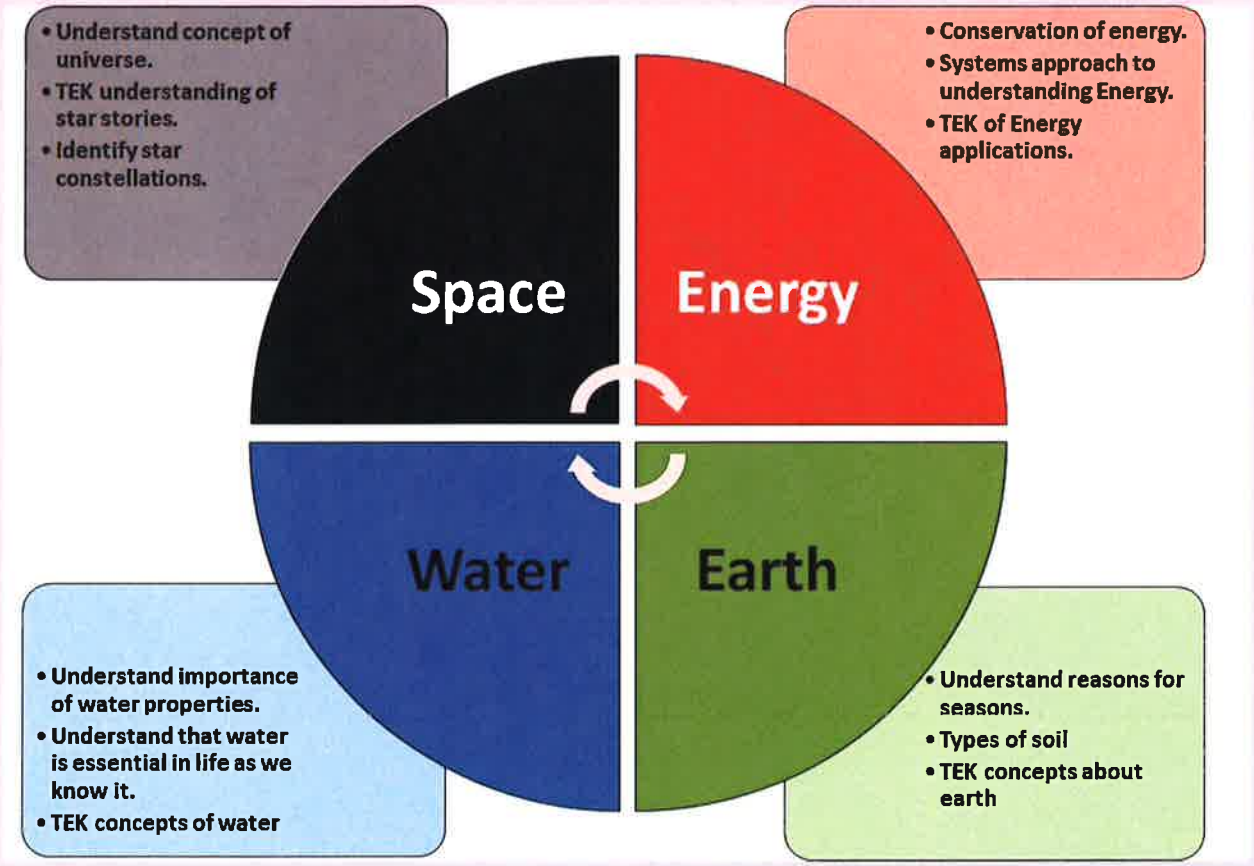


Statistical Design



The above figure depicts the method of intervention and control. Furthermore, this method will be used to analyze the effectiveness of the intervention, and there are five classes involved in the overall process. This means four classes will participate in one introduction webcast, 2 educational webcasts, and a final site/campus visit, while one class will not participate in any of the interventions, and will only take pre and post surveys around the same time the other four classes take their surveys.

SOCIETAL BREAKDOWN



- **All Classes will have all societies.**
- **All members of a society participate in all lessons and activities of that society.**
- **Each Society Completes a Society Information Sheet.**
- **Each Society will create four presentations to go back to original class and present as a group. (TRANSFER KNOWLEDGE)**

The first step is to divide the classes into four separate societies that are designated to learn a subject from instructors of MSU, and share that subject with the other three societies. There are key responsibilities and objectives associated with each society in order to improve the knowledge of the community/tribe (all societies together).

1. **The Energy Society**, is designated to learn about energy conservation, and the systems approach to understanding the different types of energy that take different forms, through transformation, throughout that system.
    a. LEARNING OBJECTIVE: Be able to identify a system where energy is conserved, decipher different forms of energy, give examples of common traditional and modern tribal uses for that energy, and be able to effectively communicate this knowledge to the other societies.

2. **The Earth Society**, is designated to learn about the changing seasons on Earth, different types of soils, and the Traditional Ecological Knowledge (TEK) of the Earth.
    a. LEARNING OBJECTIVE: Be able to identify conservation of mass through the carbon cycle, and be able to give an example of common traditional and modern tribal practices involving the carbon cycle, and be able to effectively communicate this knowledge to the other societies.

3. **The Space Society**, is designated to learn about the concept of the universe, identify star constellations, and understand the Traditional Ecological Knowledge (TEK) of star stories.
    a. LEARNING OBJECTIVE: Understand that the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. Decipher different constellations observed in different seasons, how tribal star stories influenced the behavior of people and technology, and be able to effectively communicate this knowledge to the other societies.

4. **The Water Society,** is designated to understand the importance of water properties, that water is essential for life as we know it, and Traditional Ecological Knowledge (TEK) of water.
    a. LEARNING OBJECTIVE: Be able to identify important uses of water today, traditionally, and locally, how water has been essential in the existence of life, traditional tribal understandings of water, and be able to effectively communicate this knowledge to the other societies.

Society Information Sheet

***All Societies in All Classes complete this form as a group within their original classes. ***

- **English Name of Society:** _____

  (example: Space, Earth, Energy, Water)

- **Piikani Name of Society:** _____

- **Piikani Name of Society:** _____

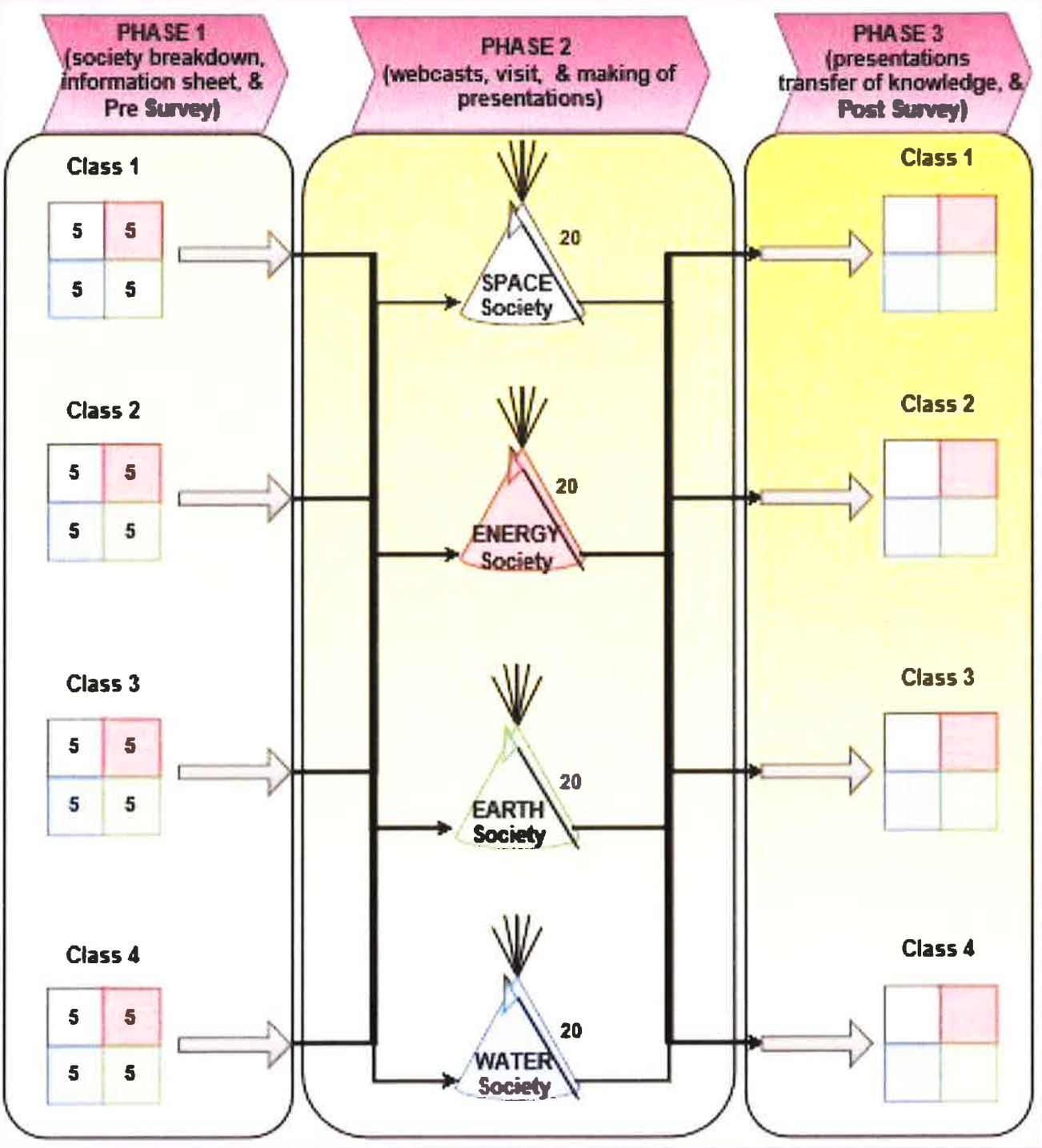
- **Society Values:** (What does your society value relating to subject).
  - *1.)*_____
  - *2.)*_____
  - *3.)*_____
  - *4.)*_____

- **Society Motto:** (How will your society use their values to learn about Space, Earth, Energy, or water).

  _____
  _____
  _____
  _____
  _____
  _____

- **Cultural Facts related to your society:** (try to relate what you know about the subject to your culture or a known project in your area).
  - *1.)*_____
    _____
    _____
  - *2.)*_____
    _____
    _____

PHASES OF PROJECT



Schedule of Events

Browning Middle School

Transfer of Knowledge Project

Resources Needed for Each Component of Project on Events Week

Educational Component

- MSU TEAM – 4 hours

Cultural Component

- Cultural Advisor for Space Society – 1 hour
- Cultural Advisor for Energy Society – 1 hour
- Cultural Advisor for Water Society – 1 hour
- Cultural Advisor for Earth Society – 1 hour

Career Component

- Career Advisor for Space Society – 1 hour
- Career Advisor for Energy Society – 1 hour
- Career Advisor for Water Society – 1 hour
- Career Advisor for Earth Society – 1 hour

Current Issue Component

- Societal Current Issue Research Day with Teacher

Total Project Class Time used = 16 Class Days

Summary Schedule of Events

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Week 1	**Indigenous Sciences Week**					
Week 2						
Week 3						
Week 4	**Western Sciences Week**					
Week 5						
Week 6						
Week 7	**Mixed Methods Sciences Week**					
Week 8	**Transfer of Knowledge Week** *(PowerPoint Presentations in original Classrooms)*					

Week of Events Daily Rotation Schedule for Each Society

Monday
- Space – MSU Presentation
- Energy – Cultural Advisor
- Water – Career Advisor
- Earth – Current Issue Day

Tuesday
- Space – Current Issue Day
- Energy – MSU Presentation
- Water – Cultural Advisor
- Earth – Career Advisor

Wednesday
- Space – Career Advisor
- Energy – Current Issue Day
- Water – MSU Presentation
- Earth – Cultural Advisor

Thursday
- Space – Cultural Advisor
- Energy – Career Advisor
- Water – Current Issue Day
- Earth – MSU Presentation

Indigenous Sciences Week

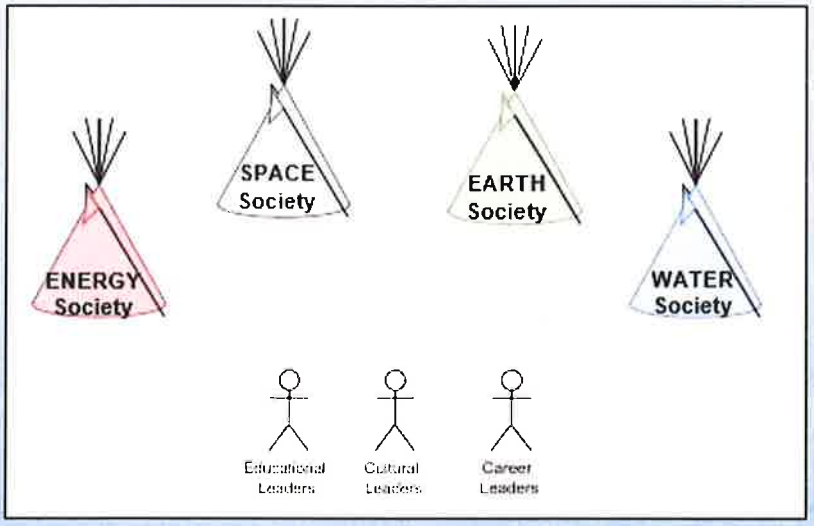
	Space Society	Energy Society	Water Society	Earth Society
Monday	MSU Presentation Lesson: *(Star Stories)*	Cultural Advisor for Energy Presentation via Society Classroom Lesson: *(Cultural Lesson)*	Career Advisor for Water Presentation via Classroom Lesson: *(Career Lesson)*	Current Issues Work Day for the Earth Society Lesson: *(Research Day)*
Tuesday	Current Issues Work Day for the Space Society Lesson: *(Research Day)*	MSU Presentation Lesson: *(Arrow Dynamics)*	Cultural Advisor for Water Presentation via Society Classroom Lesson: *(Cultural Lesson)*	Career Advisor for Earth Presentation via Classroom Lesson: *(Career Lesson)*
Wednesday	Career Advisor for Space Presentation via Classroom Lesson: *(Career Lesson)*	Current Issues Work Day for the Energy Society Lesson: *(Research Day)*	MSU Presentation Lesson: *(Indigenous Science Lesson)*	Cultural Advisor for Earth Presentation via Society Classroom Lesson: *(Cultural Lesson)*
Thursday	Cultural Advisor for Space Presentation via Society Classroom Lesson: *(Cultural Lesson)*	Career Advisor for Energy Presentation via Classroom Lesson: *(Career Lesson)*	Current Issues Work Day for the Water Society Lesson: *(Research Day)*	MSU Presentation Lesson: *(Indigenous Science Lesson)*

Western Sciences Week

	Space Society	Energy Society	Water Society	Earth Society
Monday	MSU Presentation Lesson: *(Science Lesson))*	Cultural Advisor for Energy Presentation via Society Classroom Lesson: *(Cultural Lesson)*	Career Advisor for Water Presentation via Classroom Lesson: *(Career Lesson)*	Current Issues Work Day for the Earth Society Lesson: *(Research Day)*
Tuesday	Current Issues Work Day for the Space Society Lesson: *(Research Day)*	MSU Presentation Lesson: *(Rockets)*	Cultural Advisor for Water Presentation via Society Classroom Lesson: *(Cultural Lesson)*	Career Advisor for Earth Presentation via Classroom Lesson: *(Career Lesson)*
Wednesday	Career Advisor for Space Presentation via Classroom Lesson: *(Career Lesson)*	Current Issues Work Day for the Energy Society Lesson: *(Research Day)*	MSU Presentation Lesson: *(Water Pipeline)*	Cultural Advisor for Earth Presentation via Society Classroom Lesson: *(Cultural Lesson)*
Thursday	Cultural Advisor for Space Presentation via Society Classroom Lesson: *(Cultural Lesson)*	Career Advisor for Energy Presentation via Classroom Lesson: *(Career Lesson)*	Current Issues Work Day for the Water Society Lesson: *(Research Day)*	MSU Presentation Lesson: *(Carbon Lightening)*

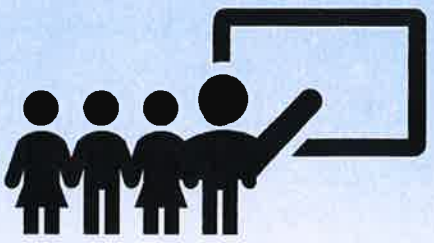
Mixed Methods Sciences Week

	Monday	Tuesday	Wednesday	Thursday
ALL SOCIETIES	MSU Instructors Site Visit to Browning Middle School. *(This consists of having all educational, cultural, and career leaders present to give a short talk)*	PowerPoint Presentation Work Day in societies. *Each Society will break down into groups divided by original classroom to compose a presentation to take back to original class to present to the other societies.*	PowerPoint Presentation Work Day in societies. *Each Society will break down into groups divided by original classroom to compose a presentation to take back to original class to present to the other societies.*	PowerPoint Presentation Work Day in societies. *Each Society will break down into groups divided by original classroom to compose a presentation to take back to original class to present to the other societies.*



This week kicks off with an eventful and motivational talk Monday, and then is followed by three consecutive work days to make PowerPoint Presentations in societies. The provided template will help students know what type of information to put on each slide.

Transfer of Knowledge Week



Teachers choose a day to have all societies in their original classroom to present their PowerPoint Presentations as a group to the rest of the class.