

Flipped Teaching Methods in High School Biology

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River Valley High School

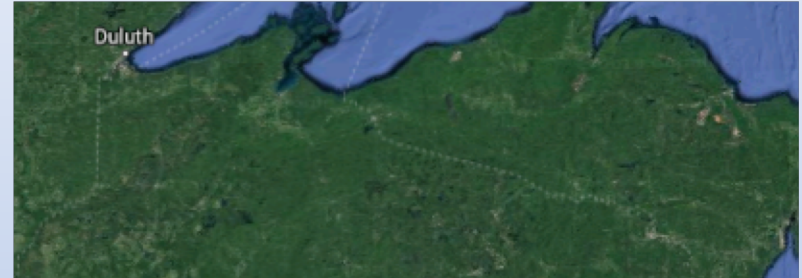
Montana State University MSSE

Outline

- School background
- How I came up with project
- Research Questions
- Methods
- Results
- Moving Forward

Classroom/school background

- Spring Green, WI
- 13 Townships, 4 Villages, 300 square miles
- Declining enrollment, 1,244 students K-12
- 1 High School, 1 Middle School, 2 Elementary Schools



Classroom/school background

- Biology, Conservation Science, AP Biology, AP Environmental Science
- Four science teachers
- Biology sections are split with a colleague



Coming up with the project

- MSSE Capstone Project
- Biology
- NGSS
- One-to-one
- Google
- YouTube



How to get them engaged?



G Suite for Education



Research Questions

- What are the effects of implementing flipped units on:
 - student performance?
 - assignment completion?
 - student attitude?
 - on me as a teacher?

Methods

Unit	Treatment Type	
Cells	Traditional	<ul style="list-style-type: none">• In-class lectures• A few labs• A few homework assignments
Microbiology	Mixed	<ul style="list-style-type: none">• Fewer in-class lectures• A few video lectures• A few homework assignments
Protists & Fungi	Flipped	
Plants	Flipped	<ul style="list-style-type: none">• Lectures assigned on video• More labs and other in-class activities

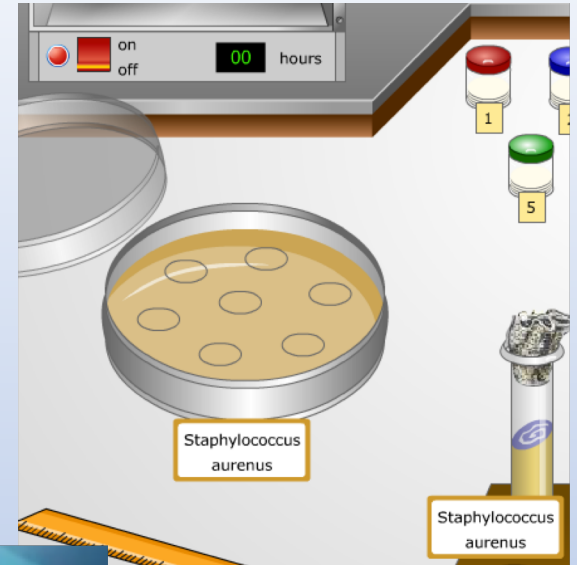
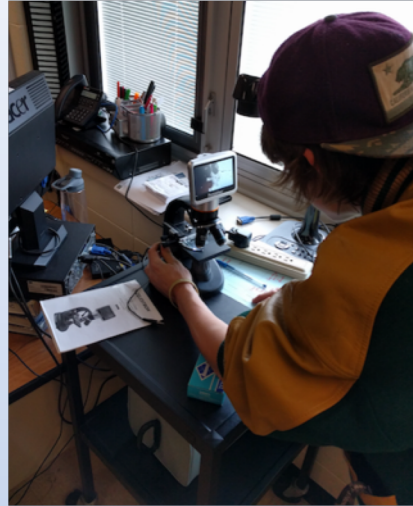
Flipping Method

- Screencastify Extension
 - Free
 - No editing
 - Time Limit: 10 min
- Recorded the presentation, assigned as homework
 - Hand notes
 - Google Doc notes
 - Questions in Google Classroom
 - EdPuzzle



In-Class Activities

- Microscopes
- Bacteria lab
- POGIL
- Podcast
- Germination
- Plant structures
- Wisconsin Fast Plants




POGIL
Process Oriented Guided Inquiry Learning




Methods - Data Collection

- Surveys and questionnaires
- One or two questions per unit
- Unit exams
- Student assessment of unit difficulty
- Missing/Late Assignments
- Student interviews

 Erik Johnson
Jan 31

Due Feb 1, 8:00 AM

How do you prefer to have 'video assignments'?



 Erik Johnson
Feb 1 (Edited Feb 1)

Should we take notes in class with the teacher lecturing instead of watching a video? Why or why not?

Research Questions

- What are the effects of implementing flipped units on:
 - student performance?
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 - on me as a teacher?

What are the effects of implementing flipped units on student attitudes?

  Erik Johnson
Feb 1 (Edited Feb 1)

Should we take notes in class with the teacher lecturing instead of watching a video? Why or why not?

- 25 out of 28 - preference for in-class lecture
- “yes, because i learn more from the teacher”
- “I think we should watch videos and take notes instead of a lecture. That way students can work at their own pace and there is more time for labs and hands-on activities in class.”
- “No. I get really distracted in class taking notes. I feel like I pay attention better with videos.”

Research Questions

- What are the effects of implementing flipped units on:
 - student performance?
 - assignment completion?
 - student attitude?
 - on me as a teacher?

Research Questions

- What are the effects of implementing flipped units on:
 - on me as a teacher?

What are the effects of implementing flipped units on me as a teacher?

- More enjoyment in class
- More interactions and conversations with students
- More feedback from students

“ During labs students might not all learn something with the group they are in, but in a lecture, every student is learning what you want them to learn.”

“ With labs and POGIL sheets etc., it's hard to focus or do the work, understand what we're supposed to do or learn, and pay attention to what's supposed to be happening in the experiment. Lectures are cut to the point and easier to understand.”

What are the effects of implementing flipped units on me as a teacher?

- Video lecture challenges – timing and editing - Screencastify
- Developing and implementing valuable activities was difficult

Moving Forward

- Determine which lessons should be flipped
- Determine which other teaching strategies from MSSE I should implement
- Determine which other MSSE classes I should take



MSSE Program

In-person and online

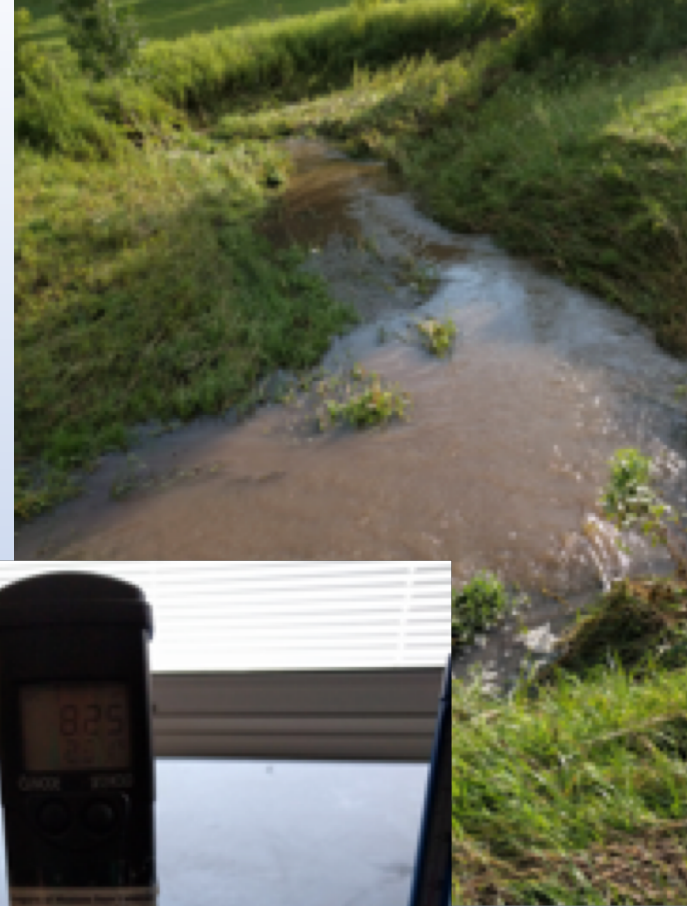




Fossilized stromatolites in
Geology of Glacier National Park



Fossil in Dinosaur Paleontology



Streamside Science –
Lab based class,
taught online



Online Courses

Tentative course list, subject to modification

Most online courses run June 10 - Aug 2. Schedules may vary, check individual course listings.

Biology

- [BIOE 513 Terrestrial Ecology of Plains and Prairies](#) (1 cr) CRN# 10907
- [BIOE 519 Biology of Riparian Zones and Wetlands](#) (2 cr) CRN# 10908
- [BIOH 595 Anatomy & Physiology](#) (3 cr) CRN# TBD

Chemistry

- [CHMY 595 Chemistry of the Environment - Water, Air, Earth](#) (3 cr) CRN# 11248
- [CHMY 587 Exploring Chemistry for Teachers](#) (3 cr) CRN# 11247
- [CHMY 597 Exploring Biochemistry I](#) (3 cr) CRN# 11381

Earth Sciences

- [ERTH 525 Landforms for Elementary Teachers](#) (1 cr) CRN# TBD **June 24 to Aug 2**
- [ERTH 528 Understanding Climate Change for Teachers](#) (3 cr) CRN# 11199 **June 10 to Aug 2**
- [ERTH 520 Fundamentals of Oceanography](#) (3 cr) CRN# 11271 **June 10 to Aug 2**

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Electrical Engineering

- [EELE 591 Introduction to Logic Circuits for Teachers](#) (3 cr) CRN# TBD

Land Resources and Environmental Science

- [LRES 582 Streamside Science for Teachers](#) (3 cr) CRN# 11167 *June 10 to Aug 2*

Microbiology

- [MB 540 Environmental Microbiology](#) (3 cr) CRN# 10858 *June 10 to Aug 2*
- [MB 541 Microbial Genetics](#) (3 cr) CRN# TBD

Physics

- [PHSX 491 Conceptual Physics](#) (3 cr) CRN# TBD *June 10 - Aug 2*
- [PHSX 511 Astronomy for Teachers](#) (3 cr) CRN# 10770 *May 28 - Aug 2*
- [PHSX 513 Quantum Mechanics](#) (3 cr) CRN# 10238 *May 13 - July 26*
- [PHSX 591 Electric Circuits and Magnetism](#) (2 cr) CRN# TBD *June 10 - July 26*
- [PHSX 591 Physics of Renewable Energy for Teachers](#) (3 cr) CRN# TBD *June 10 - Aug 2*
- [PHSX 591 The World of of Motion](#) (1 cr) CRN# TBD *May 13 - June 21*
- [PHSX 591 World of Force](#) (1 cr) CRN# TBD *June 24 - Aug 2*

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Education, Curriculum & Instruction

- [MSSE 501 Inquiry through Science & Engineering Practices](#) (2 cr) CRN# TBD
- [MSSE 502 Emerging Technology & the Science Classroom](#) (3 cr) CRN# TBD (*formerly MSSE 591 Web Tools for Teachers*)
- [MSSE 507 Capstone Data Analysis & Classroom Statistics](#) (2 cr) CRN# TBD
- [MSSE 536 Construction of Curriculum](#) (2 cr) CRN# TBD (*formerly EDCI 536*)

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Campus Courses

Tentative course list, subject to modification

June 17-21, 2019

- [BIOE 520 Understanding and Managing Animal Biodiversity in the Greater Yellowstone Ecosystem](#) (2 cr) CRN# 10896
- [PSPP 549 Plants, People, Health](#) (2 cr) CRN# 11163

June 24-28, 2019

- [BIOE 523 Wildlife Ecology of the Northern Rocky Mountains](#) (2 cr) CRN# 10897
- [PHSX 596 Teaching Electricity & Magnetism Using Research-based Curriculum](#) (2 cr) CRN# 11315
- [PSPP 548 Flowering Plants of the Northern Rocky Mtns](#) (2 cr) CRN# 10906

June 24-29, 2019

- [GEO 521 Dinosaur Paleontology I](#) (2 cr) CRN# 10902

June 29, 2019

- [MSSE 591 Statistics Bootcamp for Capstone Projects](#) (2 cr) CRN# TBD

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July 1-5, 2019

No classes on July 4th

- [BIOE 596 Land Use Issues in the Greater Yellowstone Ecosystem](#) (2 cr) CRN# 11193
- [CHMY 594 Chemistry Seminar: Science Lab Safety and Risk Management](#) (1 cr) CRN# 10898
- [MSSE 575 MSSE Professional Capstone Paper and Symposium in Science Education](#) (3 cr) (*SUMMER 2019 GRADUATE CANDIDATES ONLY!*) CRN # 11380

July 8-12, 2019

- [BIOE 522 Birds of Prey of the Greater Yellowstone Ecosystem](#) (2 cr) CRN# 11314
- [EELE 508 Solar Cell Basics for Science Teachers](#) (2 cr) CRN# 11259
- [LRES 557 Thermal Biology in Yellowstone National Park](#) (2 cr) CRN# 10903
- [LRES 569 Ecology of Invasive Plants](#) (2 cr) CRN# 10904
- [PHSX 401 Physics by Inquiry I](#) (*1st wk of 2 wks*) (3 cr) CRN# 10905
- [PHSX 402 Physics by Inquiry II](#) (*1st wk of 2 wks*) (3 cr) CRN# 11316

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July 15-19, 2019

- [BIOE 593 Alpine Ecology](#) (2 cr) CRN# 11164
- [ERTH 516 Northern Rocky Mountain Geology](#) (2 cr) CRN# 10901
- [GEO 522 Dinosaur Paleontology II](#) (2 cr) CRN# 11317 (*Prerequisite GEO 521 Dinosaur Paleontology I*)
- [MB 538 Cell and Molecular Biology](#) (2 cr) CRN# 11170
- [PHSX 401 Physics by Inquiry I](#) (2nd week) (3 cr) CRN# 10905
- [PHSX 402 Physics by Inquiry II](#) (2nd week) (3 cr) CRN# 11316

July 20, 2019

- [ERTH 594 Geology Seminar: Geology of Earthquakes](#) (1 cr) CRN# 10900

July 21, 2019

- [GEO 585 Mineralogy for Teachers](#) (1 cr) CRN# 11369

July 21-26, 2019

- [ERTH 596 Geology of Glacier National Park](#) (2 cr) CRN# 11166

July 22-26, 2019

- [CSCI 582 Computer Science: The Joy and Beauty of Data](#) (2 cr) CRN# TBD
- [LRES 586 Lake Ecology](#) (2 cr) CRN# 11195

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