Exploring Innovative Teaching in STEM

Workshop #2

Center for Teaching Innovation

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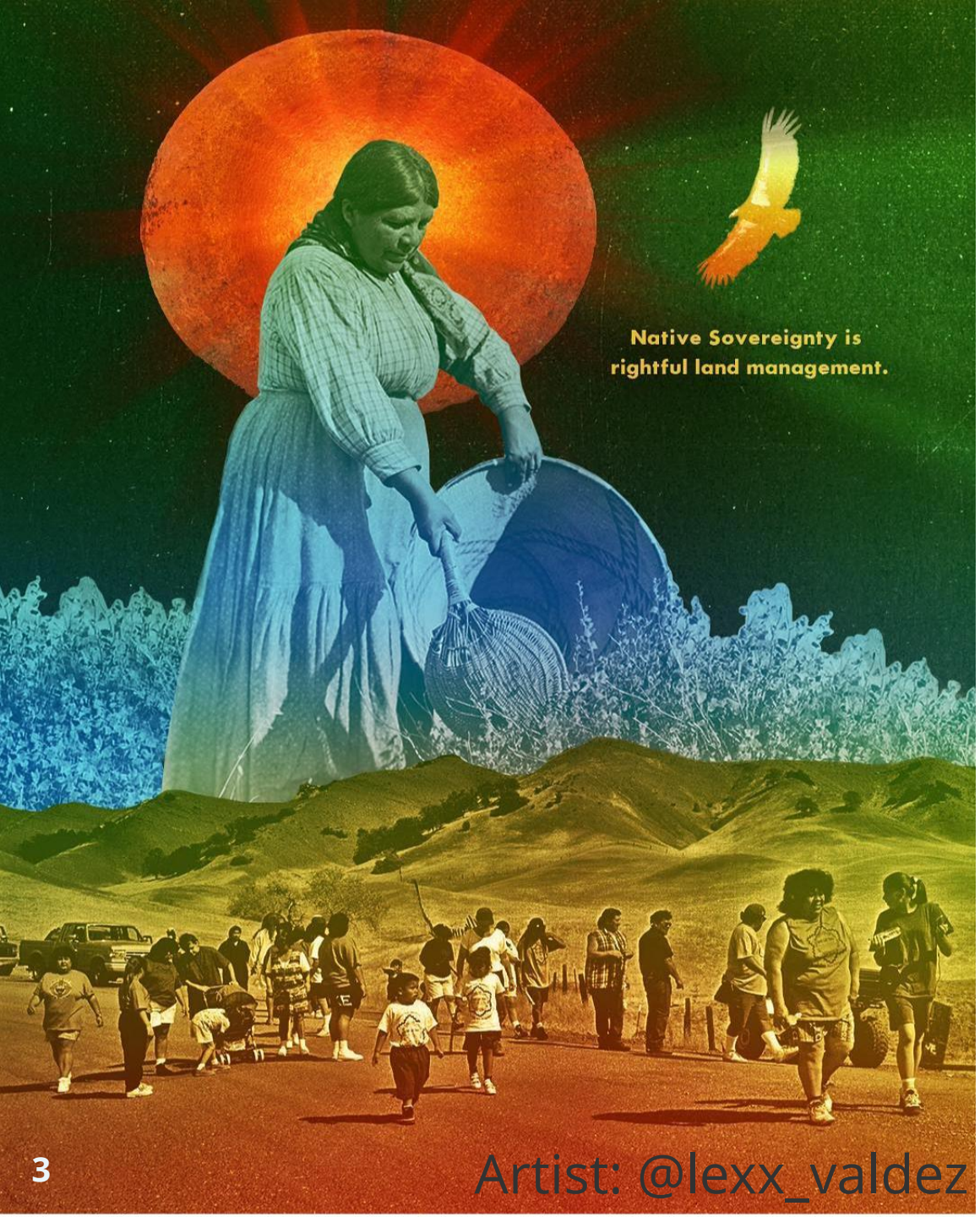

Artist: @lexx_valdez

Land Acknowledgement

Cornell University is located on the traditional homelands of the Gayogo̱hó:nǫ' (the Cayuga Nation). The Gayogo̱hó:nǫ' are members of the Haudenosaunee Confederacy, an alliance of six sovereign Nations with a historic presence on this land. The Confederacy precedes the establishment of Cornell University, New York State, and the United States of America. We acknowledge the painful history of Gayogo̱hó:nǫ' dispossession, and honor the ongoing connection of Gayogo̱hó:nǫ' people, past and present, to these lands and waters.

Text your zip code or your city and state to (907) 312-5085 and get the names of the Native lands that correspond to that region.

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Learning Outcomes

1. To identify what innovative teaching looks like and common innovative strategies used in the discipline

2. To connect innovative teaching strategies to student learning outcomes.

Activity #1

We will break you all up into breakout rooms. Share the following with others in your breakout room:

- Introduce yourself.
- Are you a TA this semester? If so, what course are you teaching? If not, what have you taught in the past?
- Think about a class where a teacher used a useful and unique teaching strategy that helped your learning
  - What did they do?
  - Why did it leave an impression on you?

DISCUSS

Tell us about your responses

DEFINING INNOVATION

Teaching innovation is the practice of employing **unique** strategies that...

- **Engage** students
- Increase classroom **participation**
- Lead to better student **learning outcomes**.
- Helps to create an **inclusive** classroom environment

Innovation is **adjusting the status quo teaching methods** to **meet the needs** of your students and learning outcomes of your course

Importance of Innovation

- To increase student **attention, build curiosity, interest** and **passion** to the material being taught
- Helps build a **supportive** learning classroom environment
- **Levelling** the classroom playing field
- Improve student achievement through engaging **active learning**
- Exposes students to **real-world experiences**

INNOVATIVE TEACHING STRATEGIES

- New strategies to try in your STEM classroom

Just-in-time teaching

Team-based learning

Interdisciplinary teaching

Case studies

Student portfolios

Just-in-Time Teaching

- Students complete pre-class material and **answer questions right before class**
- Instructors analyse student responses and tailor lesson plans **“just in time”**
    - Targeted instruction

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STEM Example: Use a class Slack channel to elicit questions about course material right before class.

Team-based learning

- **Strategically formed teams** work on an assignment or project spanning the whole semester
- **Accountability** for the team (as a whole and individually) and instructor
- Builds a **supportive** classroom environment

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STEM Example: Develop lab groups that work together on team assignments throughout the semester.

Interdisciplinary teaching

- Teaching from a perspective that draws insights from **multiple disciplines**
- Applies other disciplines to the instructor's own field
- Challenges traditional notions and enriches learning
- **Workshop #5**

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STEM Example: Bring in a **guest speaker** to discuss communication principles in a science course.

Case studies

- A **real-world problem** or event that motivates a course topic
- Guided problem-solving helps develop **critical thinking** skills
- Requires consideration for ethics and practicalities of the problem

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STEM Example: Lead the class through the decision-making process for a community designing a renewable energy system.

Student portfolios

- Online portfolios where students **share and collaborate** on classroom artifacts
- Includes materials that can **continue to be developed or used outside of the course**
- Represents and personalizes learning experiences

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STEM Example: Have students set up a GitHub repository and publish their code.

Combining Strategies

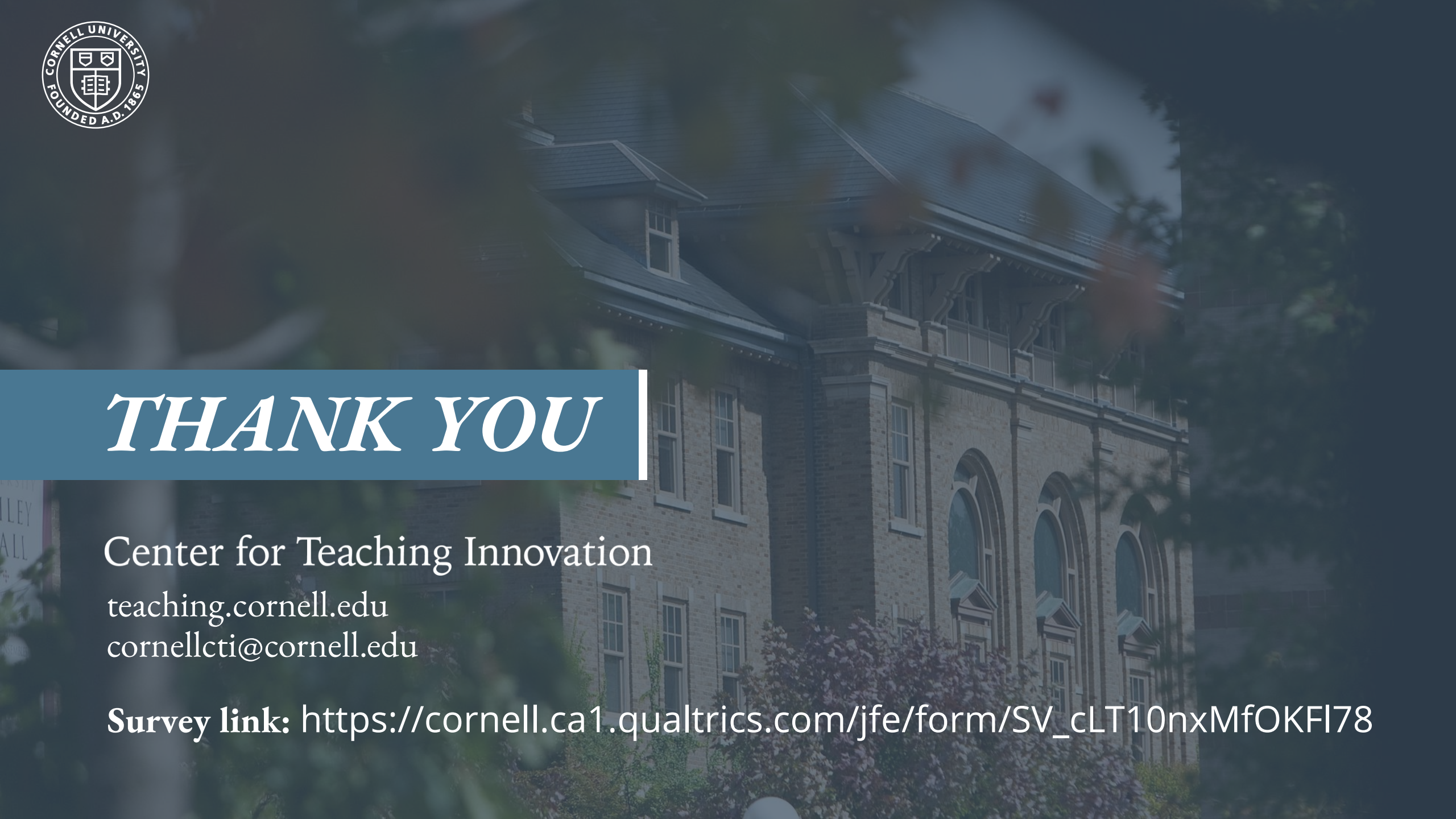
- Remember, you can **combine strategies**.
- Integrate multiple teaching strategies in ways that you feel **benefit** your students and your classroom.

Innovative Teaching

1. What innovative strategies are you interested in trying in your classroom?
2. How are you thinking of implementing the strategy?

Add your thoughts on our Jamboard (5 minutes)

https://jamboard.google.com/d/1Ap0V2KHC4eQbGxPQqtwOUfLm6OSpJ3U98XWiZ7QzxL4/viewer?f=1



THANK YOU

Center for Teaching Innovation

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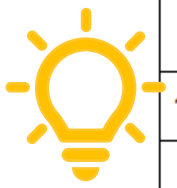
cornellcti@cornell.edu

Survey link: https://cornell.ca1.qualtrics.com/jfe/form/SV_cLT10nxMfOKFl78

U-WIDE *GET SET* TEACHING CONFERENCE

Saturday, March 5th, 2022

The Center for Teaching Innovation (CTI) is pleased to offer the Spring 2022 University-wide (U-wide) GET SET Teaching Conference, open to all graduate students, TAs, and postdocs at Cornell. This program provides an opportunity for interdisciplinary discussions on teaching with faculty and peers from a



9:00-9:10	**Check-in & Opening Remarks**			
9:10-10:00	**Concurrent Workshop - Session I**	**Exploring Innovative Teaching in *Humanities & Social Sciences*** Zoom link: https://cornell.zoom.us/j/91550959342?pwd=VFh6MWlSd0xra0tNQ0xzQ1ZRcWwxZz09 Passcode: **374561**	**Exploring Innovative Teaching in *STEM*** Zoom link: https://cornell.zoom.us/j/96656201038?pwd=bWVza1l5T0ZVRC9rL3Q5eFFLUmNoUT09 Passcode: **735105**	
10:00-10:10	**Break**			
10:10-11:10	**Plenary Session - *Innovations to Support Classroom Connections*** Dr. Andrea Stevenson Won, Dept of Communications, Cornell University			
11:10-11:20	**Break**			
11:20-12:10	**Concurrent Workshop - Session II**	**Innovative Strategies for Evaluating Student Learning** Zoom link: https://cornell.zoom.us/j/98175575099?pwd=V1RwV05ON2xmSCtLdThQVjQ2UDdydz09 Passcode: **984913**	**Integrating Innovative Technologies in the Classroom** Zoom link: https://cornell.zoom.us/j/92704878552?pwd=bWNma0lPNDBZWkc3RGRjbiQ5dEwwdz09 Passcode: **445752**	**Interdisciplinary Teaching** Zoom link: https://cornell.zoom.us/j/98086201457?pwd=Tjd3R2tvck9uSi9WU1lONC80QU1CZz09 Passcode: **062000**
12:10-12:20	**Reflection activity**	Interactive Session		
12:20-12:30	**Wrap-up**			

Extra Material

Mixed assessment media

- Student assessments are conducted in a **mix of formats**, rather than traditional problem sets:
  - **Examples:** podcasts, videos, slides, news articles, op-eds, etc.
- Assignments are **authentic and creative**

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STEM Example: Have students turn their lab reports into a set of short presentation slides.

Research strategies

- Perform research on your own teaching
- Evaluate yourself as a teacher and gain a better understanding of what works in your classroom
- **Deliberate, systematic, and reflexive** use of teaching methods and student assessments

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STEM Example: Compare student achievement in classes where you did vs. did not include a new strategy.

High-impact teaching

- A set of teaching strategies with an established positive impact on students
- **Includes:** capstone courses, collaborative projects, undergraduate research opportunities

Essentials:

- Time commitment
- Engagement
- Applications
- Feedback and reflection

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STEM Example: Connect your class to another university for a virtual “study abroad” experience.

Problem-based learning

- Students learn through facilitated problem-solving
- Problem is open-ended
- Focus is on the **path students take to solve the problem**, not necessarily the final solution
    - Contrast to case studies

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STEM Example: Guide students through an open question in your own research.

Flipped classroom

- Information transmission occurs outside of class time
- Use class time for **active learning activities**

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STEM Example: Have students perform wildlife observation outside of class, and discuss the results together.

Service learning

- Integrates **community service with instruction**
- Builds civic responsibility and strengthens communities
- Care should be taken to not create “an exercise in patronization”

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STEM Example: Have your students design and conduct science experiments with children in a local school.