SEPAL
The Science Education Partnership & Assessment Laboratory
San Francisco State University

SEPAL Scientific Teaching Summer Institute

Tuesday, July 9, 2019

Day 1: Intro to Scientific Teaching; Assessment

Today's Learning Outcomes…

- Get to know your SEPAL Scientific Teaching Summer Institute colleagues!
- Distinguish the components of Scientific Teaching through a shared classroom experience.
- Discuss the relationship between innovative teaching and the biological basis for learning.
- Apply principles of Backwards Design to individual class contexts.
- Construct a common understanding of "assessment" and its role in learning.
- Compare and contrast different forms of assessment tools for uncovering student ideas.
- Examine Bloom's Taxonomy as a tool for evaluating and modifying assessments and apply to individual courses.

9:00 - 9:40	**Introductions: Getting to Know You…**
9:40 - 9:50	**Reflection: A Time to Reflect on Your Own…**
9:50 - 10:00	**Big Idea: Summer Institute Overview and Scientific Teaching Framework**
**10 min - Break **	
10:10-11:10	**Activity: Scientific Teaching – A Common Experience**
**5 min - Break **	
11:15 - 11:20	**Big Idea: Focusing on a Single Course and Thinking about Fall…**
11:20 - 11:35	**Activity: Keeping Your Eye on the Big Picture**
11:35 - 11:55	**Activity: Learning Goals for Our Courses**
11:55 - 12:35	**LUNCH**
12:35 - 12:50	**Discussion: Content Coverage and Prioritizing Student Learning Outcomes**
12:50 - 1:00	**Big Idea: Using Backwards Design to Prioritize What to Teach**
1:00 - 1:20	**Big Idea: Problems with Undergraduate Science Education**
1:20 - 1:50	**Activity: The Purpose of Assessment and the Role of Questions**
**5 min - Break **	
1:55-3:15	**Activity: Assessment A-Go-Go**
**10 min - Snack Break **	
3:25 - 3:55	**Activity: Exploring Bloom's Taxonomy**
3:55 - 4:35	**Activity: Analyzing Our Exams/Quizzes Using Bloom's Taxonomy**
4:35 - 4:45	**Big Idea and Activity: Fall Action Plans and Wednesday Posters**
4:45 - 4:50	**Activity: Choose an area for the misconceptions hunt**
4:50 - 5:00	**Closing & Reflection**

Turn over for **Homework** and **Resource Readings** →

→ **Homework:** Read assigned Journal Club article

One of the following:

1) Unintentional gender bias in science – Moss-Racusin et al., PNAS 2012
2) Original Stereotype Threat article – Steele and Aronson, 1995
3) Reversal of Stereotype Threat in Physics for Women – Miyake et al., Science 2010
4) Reversal of Stereotype Threat in 8th grade African-American students – Cohen et al., Science 2006

→ **Resource Readings**:

1) Understanding by Design (Intro & Ch. 1) by Wiggins and McTighe
2) Scientific Teaching in Practice by Miller et. al.
3) Application of Bloom's Taxonomy Debunks "MCAT Myth" by Zheng et. al.
4) Scientific Teaching (Ch. 3 – Assessment) by Handelsman et. al.
5) Taming the Testing/Grading Cycle in Lecture Classes Centered Around Open-Ended Assessment by Schinske
6) Teaching More by Grading Less (or Differently) by Schinske &Tanner
7) Active Learning Increases Student Performance in STEM by Freeman, et al. (2014)
8) The Initial Knowledge State of College Physics Students by Halloun and Hestenes (1985)
9) A Familiar(ity) Problem: Assessing the Impact of Prerequisites and Content Familiarity on Student Learning by Shaffer et al, 2016
10) Teaching as Brain Changing by Owens and Tanner (2017)
11) Vision and Change booklet by NSF and AAAS
12) BioCore Guide

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Wednesday, July 10, 2019

Day 2: Assessment; Equity & Diversity

Today's Learning Outcomes…

- Compile a bank of student misconceptions that could serve as the basis for assessment prompts.
- Explore how issues of equity and diversity affect student learning.
- Experience how unstructured classroom environments can work against inclusiveness, fairness, and equity.
- Discuss recent research on stereotype threat and unconscious bias in science.
- Self assess current awareness of and use of common equitable teaching strategies.
- Investigate group behaviors that can influence inclusiveness, fairness, equity.

9:00 - 9:10	**Welcome and Reflections from Day 1**
9:10 - 9:30	**Big Idea and Movie: Uncovering Student Misconceptions**
9:30 - 10:10	**Activity: Misconceptions Research**
**10 min - Bathroom Break **	
10:20 - 11:50	**Activity: Building Mobiles**
11:50 - 12:35	**LUNCH**
12:35 - 12:55	**Activity: Exploring 21 Simple Classroom Equity Strategies**
12:55 - 1:10	**Self-Assessment: What Equity Strategies Are You Using?**
1:10 - 1:30	**Rock Stars of Science**
**10 min - Bathroom Break **	
1:40 - 3:05	**Stereotype Threat Jigsaw**
3:05 - 3:15	**Videos: Final Thoughts on Stereotype Threat and the Value of Diversity in Science**
**10 min - Bathroom and Snack Break **	
3:25 - 4:10	**Big Idea: Scientist Spotlights**
4:10 - 4:40	**Activity: Continuation of Fall Action Plans**
4:40 - 5:00	**Closing & Reflection**

Turn over for **Homework** and **Resource Readings** →

→ **Homework:** Read Order Matters by Tanner

→ **Resource Readings:**

1) Scientific Teaching (Ch. 4 - Diversity) by Handelsman et. al.
2) Cultural Competence in the College Biology Classroom by Tanner and Allen
3) Chamany et al. People & History of Biology article
4) Considering the Role of Affect in Learning by Trujillo and Tanner
5) Structure Matters by Tanner
6) Increased Structure and Active Learning Reduce the Achievement Gap in Introductory Biology by Haak, et. al.
7) Scientist Spotlight, Schinske 2016

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Thursday, July 11, 2019

Day 3: Active Learning; Looking Forward to Fall

Today's Learning Outcomes…

- Construct a common understanding of "active learning."
- Experience and evaluate different amounts of time required for integrating active learning into a lecture.
- Use the 5E model to analyze and modify a class session, identifying opportunities for active learning.
- Applying active learning strategies to individual class contexts.
- Reflect on how the Summer Institute is and is not likely to influence our classes this fall.
- Compose a plan for implementing small changes in our classes this fall based on Scientific Teaching.
- Set expectations for fall semester activities.

9:00 - 9:10	**Welcome and Reflections from Day 2**
9:10 - 9:25	**Brainstorm and Video: What Can Active Learning Look Like in a Lecture?**
9:25 - 10:25	**Activity: Active Learning in 1, 5, 10, and 20 Minutes During a Lecture**
**10 min - Bathroom Break **	
10:35 - 10:45	**Discussion: Integrating Active Learning in Your Own Context**
10:45 - 11:05	**Activity: How to Thoughtfully Integrate Active Learning**
11:05 - 11:20	**Mini-Lecture: The 5 E's**
11:20 - 11:30	**Activity: Assigning E's to an Individual Class Session**
11:30 - 11:40	**Discussion: Strategies for Using the 5E Model to Iteratively Change a Lesson**
11:40 - 12:00	**Activity: Tweak Your Lesson!**
12:00 - 12:30	**Activity: A Self-Assessment Tool for Active Learning**
12:30 - 1:25	**LUNCH and Group Photo**
1:25 – 2:05	**Carousel Graffiti: What Will You Use in Your Classroom?**
**10 min - Bathroom and Snack Break **	
2:15 - 2:50	**Poster Creation**
2:50 - 3:55	**Poster Session**
3:55 - 4:15	**Final Reflection**
4:15 - 4:40	**Celebration & Closing**
4:40 - 4:45	**Final Announcements**

Turn over for **Resource Readings** →

→ **Resource Readings**:

1) Chapter 2 from Scientific Teaching - Active Learning
2) Why Peer Discussion Improves Student Performance on In-class Concept Questions by Smith, et al.
3) How People Learn by Donovan
4) Infusing Active Learning into Large Classrooms by Allen and Tanner
5) Teaching and Learning in the Interactive Classroom by Silverthorn
6) What If Students Revolt by Seidel and Tanner
7) Innovations in Undergraduate Biology and Why We Need Them by Bill Wood
8) Classroom Sound Can be Used to Classify Teaching Practices in College Science Courses by Owens and Seidel