



Mobile Summer Institute @ The College of New Jersey

Dear Participant,

Welcome to TCNJ's Mobile Summer Institute on Scientific Teaching (MoSI). MoSI is a relatively recent iteration of the nationally renowned National Academies Summer Institute (NASI) founded at the University of Wisconsin – Madison by Jo Handelsman (Yale) and Bill Wood (UC-Boulder, Emeritus). This is an intensive workshop on undergraduate science technology, engineering and math (STEM) education. NASI was developed in response to the National Research Council report, *Bio2010*, which called for a transformation of science education by improving classroom teaching and attracting diverse students to science.

The goal of the MoSI is to better address institutional challenges to STEM education reform by traveling to post-secondary institutions and training a critical mass of educators in evidence-based teaching strategies. The original founders distilled the most effective teaching strategies from education research into a framework called Scientific Teaching. Scientific Teaching is defined as "active learning strategies to engage students in the process of science" (Handelsman et al., 2004). In addition to the proven summer institute training paradigm, participants of the MoSI will receive training in peer evaluation and mentoring. Local educators and administrators also will take part in facilitated planning sessions to improve STEM education.

The MoSI team is composed of national leaders in education reform, who will share teaching methods that engage students to learn – as scientists do – through problem solving and discussion. Through interactive workshops, group work, and presentations you will learn about innovations and research in undergraduate education. MoSI trainers will facilitate group work to help participants implement these strategies while creating novel teaching materials. By the end of the MoSI, you will have developed and peer-reviewed teaching materials, learned how to implement scientific teaching in your classrooms and to evaluate your peers in order to develop as reflective practitioners.

Sincerely,

Michelle Withers



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Support for TCNJ's Mobile Summer Institute on Scientific Teaching

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Overview

Goal

The goal of the Mobile Summer Institute is to improve undergraduate STEM education. This will be achieved by (a) training current and future faculty in effective, evidence-based, teaching strategies; (b) facilitating reflective practices through peer mentoring and evaluation and (c) facilitating brainstorming/planning conversations about reforming educational practices and course designs at TCNJ. This institute is modeled after the National Academies Summer Institute and is meant to extend the impact of that successful, nationally renowned professional development workshop and promote broader adoption of reformed pedagogies and promote institutional reform in STEM education.

Specific Outcomes

By the end of the institute, you will have:

- practiced a variety of evidence-based teaching strategies through workshops, presentations, and group work;
- worked as a team to create teaching materials that implement these strategies;
- begun to shift your focus from content and teaching to outcomes and learning; and
- practiced peer evaluation to promote reflective teaching practices.

The MoSI Approach

Scientific teaching provides a framework for making our classrooms more learner-focused and our curricula more richly representative of the nature and process of STEM. Scientific teaching encompasses three core themes: inclusivity, active learning, and assessment. Over the course of the week, you will implement strategies that address each of these themes into your teaching material.

Charles Henderson's four categories of strategies for change provide the model for the institutional change approach used by the mobile version of the Summer Institutes. In addition to the proven training paradigm provided by the pedagogy workshop, the MoSIs provide training in peer evaluation to drive long-term reflective teaching and facilitated planning to leverage newly gained expertise toward educational reform.

Week At-A-Glance

Time	Monday June 10, 2019	Tuesday June 11, 2019	Wednesday June 12, 2019	Thursday June 13, 2019	Friday June 14, 2019
8:30-9:00 am	Light Breakfast	Light Breakfast	Light Breakfast	Light Breakfast	Light Breakfast
9:00-9:30 am	Facilitator Planning	Workshop – Backward Design in Action	Workshop – Scholarly Teaching	Presentation Prep	Brainstorming/ Planning Session II
9:30-10:00 am			Workshop – Peer Mentoring/ Evaluation	Group Presentations	
10:00-10:30 am					
10:30-11:00 am					
11:00-11:30 am					
11:30-12:00 pm	Facilitator Lunch and Prep	Lunch	Lunch	Lunch	Lunch
12:00-12:30 pm					
12:30-1:00 pm	Introduction/ Welcome	Break	Break	Group Presentations (cont'd)	Lunch
1:00-1:30 pm	Workshop – Inclusivity/ Diversity	Group Work I	Group Work II		
1:30-2:00 pm					
2:00-2:30 pm					
2:30-3:00 pm	Workshop – Scientific Teaching in Action	Facilitator Meeting	Facilitator Meeting		
3:00-3:30 pm				Brainstorming/ Planning Session I	
3:30-4:00 pm					
4:00-4:30 pm	Reception	Dinner on own	Dinner on own	Dinner on own	
4:30-5:00 pm					
5:00-5:30 pm					
5:30-6:00 pm					

- Facilitator Activities
- Summer Institute Sessions
- Planning Sessions – *Open to all Attendees*
- Meals – *Breaks not listed here; see detailed agenda*

Summer Institute Events – Detailed Agenda

Monday | June 10, 2019

- 1:00 pm.....Introduction/Welcome (*STEM 102*)
- 2:00 pm.....Workshop Session – Inclusivity/Diversity (*STEM 102*)
- 3:30 pm.....Break (*Forum Café*)
- 3:45 pm.....Workshop Session – Scientific Teaching in Action (*STEM 102*)
- 5:00 pm.....Reception (*Forum Café*)

Tuesday | June 11, 2019

- 8:30 amCoffee and Light Breakfast (*Corridor outside of STEM 102*)
- 9:00 amWorkshop Session – Backward Design in Action (*STEM 102*)
- 10:30 am.....Break (*Forum Café*)
- 10:45 am.....Workshop Session – Backward Design in Action (cont'd) (*STEM 102*)
- 12:30 pm.....Lunch (*Forum Café*)
- 1:30 pm.....Group Work Session (*Breakout rooms; see page 11*)
Begin work on teachable tidbits using backward design
- 3:30 pm.....Break (*Forum Café*)
- 3:45 pm.....Group Work Session (cont'd) (*Breakout rooms; see page 11*)
- 4:30 pm.....Facilitator Meeting (*STEM 102*)

Wednesday | June 12, 2019

- 8:30 amCoffee and Light Breakfast (*Corridor outside of STEM 102*)
- 9:00 amWorkshop Session – Scholarly Teaching (*STEM 102*)
- 10:30 am.....Break (*Forum Café*)
- 10:45 am.....Workshop Session – Peer Mentoring and Evaluation (*STEM 102*)
- 12:30 pm.....Lunch (*Forum Café*)

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1:30 pm.....**Group Work Session** (*Breakout rooms; see page 11*)

3:15 pm.....**Break** (*Forum Café*)

3:30 pm.....**Group Share** (*Breakout rooms*)

Groups present tidbit to another group and get feedback

4:30 pm.....**Facilitator Meeting** (*STEM 102*)

Thursday | June 13, 2019

8:30 am.....**Coffee and Light Breakfast** (*Corridor outside of STEM 102*)

9:00 am.....**Presentation Preparation** (*Breakout rooms; see page 11*)

10:00 am.....**Group Presentations** (*STEM 102*)

12:30 pm.....**Lunch** (*Forum Café*)

1:00 pm.....**Group Presentations (cont'd)** (*STEM 102*)

2:30 pm.....**Wrap-up Session** (*STEM 102*)

3:00 pm.....**Ice Cream Social – Main Summer Institute events end** (*Forum Café*)

Brainstorming / Planning Sessions – Detailed Agenda

Thursday | June 13, 2019

3:30 pm.....**Easy-to-use/interpret instruments that integrate into CANVAS** (*STEM 102*)

Planning to experiment with your individual section or course next year? TCNJ's Center for Institutional Effectiveness (CIE) and Instructional Design Office are working together in order to create easy-to-use/easy-to-interpret instruments that will integrate with your CANVAS course. Please join us for a brainstorming session around:

- What questions do you have about your students and their response to your course (e.g., understanding content, feeling supported as a learner, professional aspirations, sense of belonging...)?
- What support would work best for you as an individual faculty member around asking pedagogical questions, gathering student data, and/or interpreting student data?

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Friday | June 14, 2019

8:30 am **Coffee and Light Breakfast** (*Corridor outside of STEM 102*)

9:00 am **Our course redesign efforts: Background and data needs** (*STEM 102*)

The School of Science's ongoing work to shift toward student-ready teaching and mentoring requires timely, pertinent, and accurate data. However, most faculty members aren't trained as educational researchers. As part of the overall plan, and for the first time at TCNJ, the Center for Institutional Effectiveness (CIE) aims to collaborate with faculty members as educational research partners rather than simply providing requested data. As a step in developing this partnership, please join us for this session as an informal kick-off for individuals, teams, and departments planning course revisions in the coming few years where we will consider the following questions:

- What background information on student performance would your course team like before the revision work starts?
- How could CIE effectively partner with you as individual faculty members and as teams to support your work?
- What information would you like to gather for formative assessment within the course revision process?

10:30 am **Break** (*Forum Café*)

10:45 am **Our course redesign efforts: Background and data needs (cont'd)** (*STEM 102*)

12:00 pm **Lunch** (*Forum Café*)

12:30 pm **Brainstorming/Planning Sessions end**

Format

Interactive Workshop Sessions

The interactive workshops are designed to introduce participants to innovations and research on undergraduate education, and to model principles about which they teach. These sessions will be interactive and model the strategies that are being introduced.

Group Work Sessions

Group work carefully designed to model scientific teaching has been found to be one of the most important processes at the Summer Institute. The group process also encourages cross-fertilization of ideas among colleagues and departments and strengthens the impact of the changes that you make in your classrooms. Therefore, much of the MoSI is devoted to group work time.

During afternoon group work sessions, your group will collaborate to develop teaching materials that incorporate the strategies from the interactive workshops. Each group has been assigned a trained facilitator – a Summer Institute veteran and/or a colleague with experience in facilitation/educational research – to model teaching practices that will help the group establish and meet common goals. On Wednesday, following the group work session, you will take part in a **group share** where groups pair off and present their teachable tidbit to one another. This will provide the opportunity to practice the presentation of the teachable tidbit and to gain feedback before final presentations on Thursday.

Group Presentations

The Thursday session will consist of group presentations of teachable tidbits that will be peer-reviewed by organizers and participants. This will allow groups to practice assessing the effectiveness and student-centeredness of learning activities and to incorporate peer feedback into their teaching modules before using them in their own classes.

Group Work Session I (Tuesday, June 11, 1:30-4:30 pm)

The goal of the first session is to meet your group mates, pick the topics for your teachable tidbits, and begin to backward design your tidbit. In particular, write learning goals and outcomes, identify summative assessments that will provide data about student learning, and finally develop the learning activities that will help students achieve the desired outcomes.

Teachable tidbits During the institute, each group will develop teachable tidbits that address topics/concepts within the group's topic area. Teachable tidbits are instructional materials designed to engage students in learning. Generally, they consist of a single activity that can be integrated into a larger context, such as a course, class meeting, or lecture.

1. **Group Dynamics.** Identify and discuss your own constructive and destructive group behaviors and the stages of group development.
2. **Identify topic area for teachable tidbit.** You want this to be narrow enough to address within the timeframe allotted. For example, if your topic is evolution, will you focus on some aspect of the concept natural selection, like the role of mutation in genetic variation, or another concept altogether?
3. **Identify learning goals/intended outcomes for the teachable tidbit.** Start by stating broad learning goals such as "Students will understand equilibrium" and then move on to more specific learning outcomes for each goal. If you stopped at this point, you might leave students wondering, "What do you mean by understand?" Think about how you will you assess student understanding. When stating learning outcomes, use active verbs that suggest suitable assessments. For example, "Students will be able to predict how relative changes in concentrations of reactants or products will affect forward or reverse reaction rates" is a specific and assessable learning outcome that would indicate whether or not a student actually understood the concept of equilibrium.

Group Work Session II (Wednesday, June 12, 1:30-3:30 pm)

The goal of this session is to continue to develop your teachable tidbit[s] incorporating active learning/formative assessment strategies to create an inclusive learning experience that will help students achieve the intended learning outcomes. Learning activities should engage students' previous knowledge and help them construct new knowledge and engage in deliberate practice of important skills. They should also align with the learning activities with your outcomes and assessments.

Group Share (Wednesday, June 12, 3:30-4:30 pm)

The goal of this session is to practice teaching your tidbit[s] and to give and receive feedback from your peers.

Exchange and review teachable tidbits with another group. Each group should "teach" their tidbit during this time, while the other group acts as the "students." Spend the remaining time asking questions, discussing the tidbits, and offering constructive feedback.

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Group Presentations *(Thursday, June 13)*

Session I: Final preparation for Presentations, 9:00-10:00 am

During this session you will put finishing touches on the 30-minute presentation of one of your teachable tidbits.

Session II: Group Presentations, 10:00 am - 2:30 pm, followed by Wrap-up

- 1. Teach one of your tidbits, including a brief overview of the context in which the tidbit will be taught.** You will have 30 minutes for your presentation.
- 2. Provide feedback on your peers' tidbits.** Use the rubric from the Peer Mentoring workshop to provide constructive feedback that will help the presenters become more active and student-centered.

Email teachable tidbit and related/supporting materials to Michelle Withers
(michelle.withers@mail.wvu.edu)

Group Assignments

<p>Group 1: Mathematics & Statistics Facilitator: Michelle Withers Breakout room: Biology 208</p>	<p>Group 2: Mathematics & Statistics Facilitator: Janet Morrison Breakout room: STEM 102</p>
<p>Timur Akhunov Nick Battista Karen Clark Cindy Curtis Tom Hagedorn Steffen Marcus Rachel Snider</p>	<p>Andrew Clifford Jana Gevertz Judit Kardos Matthew Mizuhara Michael Ochs Susan Schmoyer Qifu Zheng</p>
<p>Group 3: Computer Science Facilitator: Tracy Kress Breakout room: Chemistry 113</p>	<p>Group 4: Computer Science Facilitator/Participant: Andrea Salgian Breakout room: Chemistry 121A</p>
<p>Michael Bloodgood John DeGood Daniel Domen Monisha Pulimood</p>	<p>Deborah Knox Mark Russo Andrea Salgian Sharif Mohammad Shahnewaz Ferdous</p>
<p>Group 5: Chemistry Facilitator/Participant: Don Hirsh Breakout room: Physics & Math 228</p>	<p>Group 6: Chemistry/Physics Facilitator/Participant: AJ Richards Breakout room: Physics & Math 230</p>
<p>Marc Brescia Benny Chan Donald Hirsh Stephanie Sen Rebecca Triano</p>	<p>Joe Baker Mirela Krichten Thuy Le Angela Capece Romulo Ochoa AJ Richards</p>
<p>Group 7: Biology Facilitator: Jim Belanger Breakout room: Physics & Math 219</p>	<p>Group 8: Biology Facilitator: Cathy Liebars Breakout room: Physics & Math 222</p>
<p>Gary Dickinson Philip Felton Don Lovett Marcia O'Connell Keith Pecor Nina Peel</p>	<p>Curt Elderkin Sudhir Nayak Amanda Norvell Zaara Sarwar Melkamu Woldemariam</p>

Participants

Last Name	First Name	Department	Position
Akhunov	Timur	Mathematics and Statistics	Visiting Assistant Professor
Auryan	Mosen	Center for Institutional Effectiveness	Associate Provost and Director
Baker	Joe	Chemistry	Assistant Professor
Battista	Nick	Mathematics and Statistics	Assistant Professor
Bloodgood	Michael	Computer Science	Assistant Professor
Brescia	Marc	Chemistry	Adjunct Professor & Lab Technician
Capece	Angela	Physics	Assistant Professor
Chan	Benny	Chemistry	Professor
Clark	Karen	Mathematics and Statistics	Associate Professor
Clifford	Andrew	Mathematics and Statistics	Professor
Curtis	Cynthia	Mathematics and Statistics	Professor
DeGood	John	Computer Science	Visiting Assistant Professor
Dickinson	Gary	Biology	Associate Professor
Domen	Daniel	Computer Science	Adjunct Professor
Elderkin	Curt	Biology	Associate Professor
Felton	Philip	Biology	Adjunct Professor
Gazley	Lynn	Sociology	Associate Professor
Gevertz	Jana	Mathematics and Statistics	Professor
Gladysiewicz	Ryan	Office of Instructional Design	Associate Director
Hagedorn	Tom	Mathematics and Statistics	Professor and Dept. Chair
Hirsh	Donald	Chemistry	Professor and Dept. Chair
Kardos	Judit	Mathematics and Statistics	Assistant Professor
Knox	Deborah	Computer Science	Associate Professor
Krichten	Mirela	Chemistry	Visiting Assistant Professor
Le	Thuy	Chemistry	Adjunct Professor
Lovett	Don	Biology	Professor
Marcus	Steffen	Mathematics and Statistics	Assistant Professor
Mizuhara	Matthew	Mathematics and Statistics	Assistant Professor
Nayak	Sudhir	Biology	Professor

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Last Name	First Name	Department	Position
Norvell	Amanda	Biology	Professor
O'Connell	Marcia	Biology	Professor
Ochoa	Romulo	Physics	Professor
Ochs	Michael	Mathematics and Statistics	Professor
Pecor	Keith	Biology	Professor and Dept. Chair
Peel	Nina	Biology	Associate Professor
Pulimood	Monisha	Computer Science	Professor and Dept. Chair
Ramani	Swati	Office of Instructional Design	Instructional Designer
Richards	AJ	Physics	Assistant Professor
Rouse	LaMont	Center for Institutional Effectiveness	Assistant Director of Assessment
Russo	Mark	Computer Science	Adjunct Professor
Salgian	Andrea	Computer Science	Professor
Sarwar	Zaara	Biology	Assistant Professor
Schmoyer	Susan	Mathematics and Statistics	Visiting Assistant Professor
Sen	Stephanie	Chemistry	Professor
Shahnewaz Ferdous	Sharif Mohammad	Computer Science	Assistant Professor
Snider	Rachel	Mathematics and Statistics	Assistant Professor
Triano	Rebecca	Chemistry	Visiting Assistant Professor
Woldemariam	Melkamu	Biology	Assistant Professor
Zheng	Qifu	Mathematics and Statistics	Associate Professor

Facilitators

Last Name	First Name	Institution	Role
Auryan	Mosen	TCNJ	Observer
Belanger	Jim	Binghamton University	Coordinator/Facilitator
Gazley	Lynn	TCNJ	Observer
Hirsh	Don	TCNJ	Facilitator/Participant
Kress	Tracy	TCNJ	Facilitator
Liebars	Cathy	TCNJ	Facilitator
Miller	Elias	Binghamton University	Observer
Morrison	Janet	TCNJ	Facilitator
Richards	AJ	TCNJ	Facilitator/Participant
Rouse	LaMont	TCNJ	Observer
Salgian	Andrea	TCNJ	Facilitator/Participant
Withers	Michelle	Binghamton University	Institute Coordinator/Facilitator