Mental FLOSS for Faculty:
Cultivating a Community of Practice and Modeling Evidence-based Instruction Techniques for Biology Faculty

→ As we wait to begin, please participate in our poll

Help us get to know you
There are three short questions to answer

Go to menti.com and enter 74 29 73 6 to participate
or use this QR:

(If you hit a tech road block, let us know and we can help!)
Mental FLOSS for Faculty:

Cultivating a Community of Practice and Modeling Evidence-based Instruction Techniques for Biology Faculty

Jules Winters, PhD

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Meet the team!

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now at Caltech!

Jenny Hazlehurst
CSU East Bay

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UC Berkeley
What is FLOSS?

**Faculty Learning Optimizes Student Success**

- Biology Faculty from:
  - Berkeley City College
  - CSU East Bay
  - UC Berkeley

- Community of Practice

- 8-workshop series

- 2 cohorts
  - 19 faculty participants so far

Thank you!
Motivations & Background
Intro Biology

• We asked ~2,200 UC Berkeley students how often they used various course resources.
  o Textbook, practice questions, office hours, readings, etc.

• What would you hypothesize the relationship to be between how frequently these resources were used and final grade in the class?
Intro Biology

Resource Use

Low

High

Final Grade

Low

High
ANOVA and Tukey HSD post-hoc. Race/ethnicity and Gender Identify are self-reported. First-generation data are from UCB enrollment data. ***p<.001
Difference in course GPA among Introductory Biology students:

- CSU East Bay: 0.47 – 0.7
- Berkeley City College: 0.5

Key:
- 1st Gen
- Continuing Gen
- Not AHN
- AHN
Fig. 1. Average achievement gaps are smaller in active-learning classes than traditional-lecturing classes. (A) Model-based estimates for the average achievement gaps in examination scores across STEM for students from MGS versus non-MGS under traditional lecturing (gold) and active learning (purple). The data are in units of SDs (SI Appendix, SI Materials and Methods). (B) Model-based estimates for the average achievement gaps in percentage of students passing a STEM course for students from MGS versus non-MGS. In both graphs, points show averages and the vertical bars show 95% Bayesian CIs; the dashed horizontal lines represent no gap in performance.
The need for Biology Faculty Professional Development

“My departmental norm for teaching is lecture”

Data from survey of faculty FLOSS participants before their participation in the program, N = 19
Where is the Deficit?

• Commonly = deficit on part of student
  o Ex) “first-gen are not well prepared”
  o Ex) “women aren’t supported”

• What about improving the climate and culture within which these students learn?
  o Educate faculty on inclusive teaching best practices
    ▪ Promote awareness of barriers and threats to student learning
    ▪ Inform best practices and approaches that can fight these threats
  o Foster intersegmental community of practice
Desired Priorities for FLOSS program

Needs Assessment

- Active learning methods for increasing student engagement
- Building more inclusive learning environments - Teaching to ALL of my students.
- Improving student equity in the classroom
- Best practices in assessment to gauge student learning
- Remote/Online teaching best practices
- Understanding how students learn
- Learning about education research and published best practices for teaching and learning
- Practice and feedback with active learning techniques and strategies
- Curriculum development strategies and resources
- Community of like-minded instructors for teaching support/ideas

Data from survey of biology faculty at UC Berkeley, Berkeley City College, and CSU East Bay, Fall 202
Intention: Intersegmental

• 3 diverse institutions:
  o Community college
  o Masters—granting university
  o R1 institution

• Modeling the strength of diversity
  o “Your classrooms also represent diverse membership”
    ▪ Where are perspectives being heard?
    ▪ When are limited views being prioritized?
  o “During FLOSS, notice where/when we harness our diversity to learn together”
Intention: Head & Heart

• Head:
  o Structure
  o Frequent feedback
  o Repetition

• Heart:
  o Sense of belonging
  o Inclusion
  o Supportive learning environment

(Not just active learning)

Theobald et al., 2020 PNA
Active learning increased self-efficacy and sense of belonging for students from minoritized racial groups, leading to academic performance gains.

Enhancing Diversity in Undergraduate Science: Self-Efficacy Drives Performance Gains with Active Learning

Cissy J. Ballen,1* Carl Wieman,2* Shima Salehi,1 Jeremy B. Searle,1 and Kelly R. Zamudio1

1Department of Ecology & Evolutionary Biology, Cornell University, Ithaca, NY 14853; 2Department of Biology Teaching and Learning, University of Minnesota, Minneapolis, MN 55455; 1Graduate School of Education and 2Department of Physics, Stanford University, Stanford, CA 94305

CBE—Life Sciences Education • 16:ar56, 1–6, Winter 2017
FLOSS Curriculum
<table>
<thead>
<tr>
<th>1 - Getting to Know Your Students</th>
<th>2 - Teaching to a Diverse Study Body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explore data resources to become familiar with student demographics and need</td>
<td>Exploration of diversity’s dimensionality</td>
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<table>
<thead>
<tr>
<th>3 - Building Inclusive Classrooms</th>
<th>4 - Metacognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying equal access barriers to classroom opportunities and resources</td>
<td>Examination of how students learn and methods to support this</td>
</tr>
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<thead>
<tr>
<th>5 - Introduction to Active Learning</th>
<th>6 - Assessment and Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active learning techniques and their contribution to student success</td>
<td>Investigation of the goals of assessment and how to meet them</td>
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<tr>
<th>7 - Backwards Design</th>
<th>8 - Peer Feedback and Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Techniques for effective curricula and assessment planning</td>
<td>Incorporation of previous discussions into existing or new lesson plans</td>
</tr>
</tbody>
</table>
Workshop 1
Getting to know your students

• Kicking things off
• Learning how to use institution-specific resources to learn more about your students
Help us get to know you
There are three short questions to answer

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(If you hit a tech road block, let us know and we can help!)
Workshops 2 & 3
Teaching to a Diverse Student Body & Inclusive Classrooms

- Dimensions of Diversity
- Positionality
- Jigsaw Activity:
  - Stereotype Threat
  - Growth + Deficit Mindsets
  - Unconscious/Implicit Bias
- Faculty Guest Speaker
- Carousel Walk Activity:
  - Microaffirmations
  - Asset thinking
  - Shared Values
Workshops 4 & 5
Metacognition & Active Learning

• Understanding how you learn
  ○ Self-assessment
• Developing expert learners
• Adding On Activity:
  ○ Metacognition
  ○ Explicit teaching strategies
  ○ Building Classroom Culture

• Overview of Active Learning Techniques
• Share Fair Activity:
  ○ Getting Started
  ○ Active Learning Experiences
  ○ Focus on Equity & Inclusion
Workshops 6 & 7
Assessments & Backwards Design

- Formative and Summative
- Typical pitfalls/problems
- Guest speaker Q&A:
  - Specifications Grading
  - Adaptive Learning Tools

- Start from your desired results
- Application Activity:
  - BYO course materials
  - Fit materials into 3-part framework

Tina Mendez, UC Berkeley
Workshop 8
Peer Feedback

- Bring in materials for feedback
- Ask for input

- Paired-review and feedback in shared Google doc
  - Recording requests (input needs)
  - Documenting feedback from partner

- Group discussion
  - More space for input
    - “We can’t decide between doing x or y”
Goals & Innovations

• Modeling
  o Pedagogical practices and activities

• ‘Meta Moments’

• Online & in-person teaching applications

• Canvas modules
  o Accessibility
  o Sustainability
Modeling

Getting to Know Your Students
Breakout Room 1

<table>
<thead>
<tr>
<th>Campus-wide Information</th>
<th>Notes &amp; Takeaways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log in to CalAnswers:</td>
<td>[-FG% relatively stable until Fa2020 it increases]</td>
</tr>
<tr>
<td><a href="https://calanswers.berkeley.edu/home">https://calanswers.berkeley.edu/home</a></td>
<td>[-A higher proportion of transfer students are URM compared to freshman entrants\ (~25 cf. 15%)]</td>
</tr>
<tr>
<td>Scroll all the way down to Student Data Dashboards</td>
<td></td>
</tr>
<tr>
<td>Open Academic Planning&gt;Campus Enrollment At a Glance</td>
<td></td>
</tr>
<tr>
<td>[for fac who come into PI portfolio, go to the dashboards pull-down]</td>
<td></td>
</tr>
<tr>
<td>What do you notice?</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Department-level Information</th>
<th>Notes &amp; Takeaways</th>
</tr>
</thead>
</table>

Part A
1. Examine a test or other major assignment from one of your recent courses, ideally one that you will teach next semester
2. Identify an area where students performed poorly on your major assignment

Part B
1. How did you approach teaching this material?                 
2. What materials/methods did you use?

Part C
1. Can you identify a gap between what you taught and how the students learned (or did not learn) what you intended?

If you are preparing only new courses for the fall, identify a concept or skill that you think will be particularly challenging for students on a test or other major assignment.

Jigsaw Breakout Room #3

Student scenarios:
For each scenario, discuss how unconscious bias, stereotype threat, and growth or deficit mindset might affect the experience of that student in a biology course.

1. Ellie is an Asian-American woman. Her parents were immigrants, and she was raised to believe that hard work was the key to success. She is the first person in her family to attend college.

   UB: In interactions with peers/others may perceive her as more expert solely based on perceived ethnicity.
   ST: Language facility may influence people's perception of her knowledge/understanding negatively.
   GDM: Student might not feel prepared or supported or able to succeed based on personal history and cultural background.
What does active learning mean to you?

- Teamwork: being able to work with others.
- Perseverance: experiments/etc can fail, being able to keep focused and carry on can be important for success.
- Creativity: being able to see a problem from various perspectives can bring insight and innovation.
- Collaboration: being able to work with others and share ideas and being able to cooperate will advance science and ideas.
- Open-mindedness: being able to think about alternatives and listen to other perspectives is important, especially when first approaches don’t work.
- Communication: Share your discovery and insights with the community.

Instructions:
1. What are the skills that are helpful for being a scientist? Write each skill as a separate post. Some duplication is okay.
2. Give specific examples of how that skill is useful/important for being a scientist, using your own experiences.
3. “Like” posts if you agree about that skill.
4. Responses: Add related skills or examples.

Example post:
1. Being able to speak more than one language

Example: While doing fieldwork in another country, it was incredibly helpful to be able to speak to my local field assistants in their language.

Example: A volcano erupted on one of my proposed field sites. I chose different field sites and carried on.

- Flexibility: being able to try new things and new approaches can be important, especially when first approaches don’t work.
- Integrity: honesty in conducting and reporting methods, findings, etc is critical.
- Being flexible:
- Perseverance:
- Open-mindedness:
- Communication:

[Example post] Perserverance
Things go wrong in the field. It’s inevitable! The important thing is being able to keep going and figure out how to get your fieldwork done even if a volcano erupts on your field site.

Example: A volcano erupted on one of my proposed field sites. I chose different field sites and carried on.
1. **Guest Speakers** - Bringing in guest speakers to share their expertise can help build the diversity of voices that are heard in a course. In this case, our guest speaker was invited to share stories about his experiences, and how those can translate into teaching practices that can be applied by others.

2. **Scaffolding** - Scaffolding in pedagogy refers to providing more instructional support for students when introducing a new topic/technique, then gradually reducing the role of the instructor as students gain mastery and are able to take over for themselves.

Learn more about scaffolding and applications at these resources from [The University at Buffalo](https://buffalo.edu) and [Northern Illinois University](https://www.niu.edu).

In workshop #2, we practiced using a simple Padlet for anonymous postings. In this workshop, we are expanding our use of Padlet through using "comments" and "likes" to respond to the postings of others. As participants know how to use a basic padlet from the previous workshop, the new scaffolding here is provided in the form of example postings/comments to model engagement and help spark ideas. FLDESS team members are also available to support as needed.

Note that in both workshops, instructions for using the Padlets are posted on the padlets themselves (in a contrasting color), so that participants do not need to remember instructions or refer to any other documents in order to add their contributions.

Padlet offers other options for engagement, include upvoting posts, grading posts, and requiring moderator approval. There is even a proficiency filter option, although it is likely not fully attuned to the full creativity of language that students are capable of unshackling.

3. **Carousel Walk/Carousel Brainstorm** - The carousel walk is a teaching strategy which allows for groups to work together to brainstorm ideas, with each group rotation building on the work of the groups that came before them. This supports the idea of the classroom as a community of learners, where everyone can contribute to a final product.

One potential application is for a review session before an exam -- each padlet/poster/large sheet of paper is headed by a topic (e.g., "Plant Reproduction" or "Evolution of Mammals"), and groups successively brainstorm and comment about what they remember about that topic. At the conclusion of the activity, they can screenshot or take a photo of the compiled results to use in their own studying.

In a virtual classroom, it is simpler to keep the participants in the same breakout rooms, and rotate them through each topic/padlet. For an in-person class, the topics/posterboards remains stationary and the participants move around. The short video below illustrates how this works:
Online & In-Person Applications

Zoom University

What does active learning mean to you?

On Campus

What does active learning mean to you?
Online & In-Person Applications

Zoom University

On Campus
Companion Modules

- Canvas
  - Workshop = Module
- Accessible
  - Real time and after
- Sustainable
  - Never expires
  - Primary lit, links to resources
- Discussion boards
  - Inter-workshop engagement
Assessment & Outcomes
Outcomes:
Diversity

# of years teaching college biology

- 1-5: 37%
- 6-10: 21%
- 11-15: 16%
- 16-20: 16%
- >25: 5%

N = 19
Outcomes: Participant Experience

Did the FLOSS program achieve its goals?

- Building a community of faculty: 8 participants (Strongly agree), 7 (Agree), 1 (Somewhat agree), 0 (Neither agree nor disagree), 0 (Somewhat disagree), 0 (Disagree), 0 (Strongly disagree)
- Introducing skills/techniques that you can apply to your classroom: 15 participants (Strongly agree), 0 (Agree), 0 (Somewhat agree), 0 (Neither agree nor disagree), 0 (Somewhat disagree), 0 (Disagree), 0 (Strongly disagree)
- Understanding of students’ academic and/or social barriers to learning: 9 participants (Strongly agree), 6 (Agree), 1 (Somewhat agree), 0 (Neither agree nor disagree), 0 (Somewhat disagree), 0 (Disagree), 0 (Strongly disagree)
- Engaging with critical pedagogical theory (how students learn): 13 participants (Strongly agree), 4 (Agree), 1 (Somewhat agree), 0 (Neither agree nor disagree), 0 (Somewhat disagree), 0 (Disagree), 0 (Strongly disagree)

N = 18
Assessment

1) Cultivate knowledge and confidence in faculty to build inclusive learning classrooms
   - Pre/post surveys for 2 FLOSS cohorts (N= 19)

2) Foster a community of practice among faculty participants
   - Pre/post surveys for 2 FLOSS cohorts (N = 19)

3) Impact participant’s classrooms such that faculty teaching and student learning is well-aligned
   - Survey students from 10 FLOSS faculty's classes
   - Match faculty and student responses to identical questions regarding classroom experience
Assessment

1) Cultivate knowledge and confidence in faculty to build inclusive learning classrooms
   - Pre/post surveys for 2 FLOSS cohorts (N= 19)

2) Foster a community of practice among faculty participants
   - Pre/post surveys for 2 FLOSS cohorts (N = 19)

3) Impact participant’s classrooms such that faculty teaching and student learning is well-aligned
   - Survey students from 10 FLOSS faculty's classes
   - Match faculty and student responses to identical questions regarding classroom experience
Please indicate your SKILL or KNOWLEDGE in the following areas:

A) Creating a classroom that is inclusive to all students
   Pre: 4.1  Post: 4.8

B) Addressing individual student needs
   Pre: 4.0  Post: 4.5

C) Measuring student learning
   Pre: 4.1  Post: 4.6

D) Teaching undergraduate biology
   Pre: 4.5  Post: 5.0

E) Using a variety of teaching methods to reach diverse students
   Pre: 4.7  Post: 4.9

F) Including active learning strategies in my courses
   Pre: 4.4  Post: 4.9

G) Including regular, formative assessments in my courses
   Pre: 4.1  Post: 4.7

H) Teaching students to gauge their own learning
   Pre: 3.6  Post: 3.9

1 - None  2 - Very Low  3 - Low  4 - Average  5 - High  6 - Very High

N = 19
“I have a strong knowledge of the diversity, equity, and inclusion issues facing students at my institution”
"I do not feel that I have enough knowledge to implement inclusive teaching"
Assessment

1) Cultivate knowledge and confidence in faculty to build inclusive learning classrooms
   • Pre/post surveys for 2 FLOSS cohorts (N= 19)

2) Foster a community of practice among faculty participants
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   • Survey students from 10 FLOSS faculty’s classes
   • Match faculty and student responses to identical questions regarding classroom experience
“I feel that I am a part of a community of teachers who are interested in active learning”
Community of Practice

- “This FLOSS workshop was great and it is soooo important - I would love to see it continue...This group (UC, Cal State, BCC) was a great mix.”
- [FLOSS is] “useful for spending time thinking about teaching in community with other excellent and committed teachers.”
- “It was great to get feedback on ideas, but also to listen to others discuss ideas that I had never even considered.”
- “I think that people may be hooked into TeachNet and think that is sufficient, but also having a community that is biology-centric I think really helps translate tools or concepts into practice.”
Community of Practice

• “…I would recommend this program. The main reason would be to connect with a community of like minded faculty across campuses. The content we learned about was great, but I think the long-term value is in keeping connected with a local teaching and learning community into the future.

• “I really valued the feedback and interactions with my colleagues at my home institute and my peers and neighboring campuses. I think having a mixture of faculty that teach at all levels was really helpful to engaging the material. It is also helpful to have faculty at different campuses …potential mentors for students who transfer…”

• “I really appreciated have a cross-section of faculty at multiple campuses. Even though the pandemic limits our interactions, I really learned a lot each Friday and felt like was a safe community to share strategies, triumphs, and pitfalls of remote versus in-person learning.”
Assessment

1) Cultivate knowledge and confidence in faculty to build inclusive learning classrooms
   - Pre/post surveys for 2 FLOSS cohorts (N= 19)

2) Foster a community of practice among faculty participants
   - Pre/post surveys for 2 FLOSS cohorts (N = 19)

3) Impact participant’s classrooms such that faculty teaching and student learning is well-aligned
   - Survey students from 10 FLOSS faculty's classes
   - Match faculty and student responses to identical questions regarding classroom experience
In reference to the course you just indicated in the previous question, read each of the statements below and indicate if you agree, disagree, or are not sure. When referring to the instructor, assume the question is referring to you.

Be sure to respond according to how you taught this past semester/term. If you taught the course online, respond accordingly. If you listed a course that you are not currently teaching, respond according to how you most recently taught that course.

Student Perceptions of Teaching

In reference to this course, read each of the statements below and indicate if you agree, disagree, or are not sure. When referring to the instructor, assume the question is referring to [Professor Name].

Student grades are based primarily on a set number of exams

<table>
<thead>
<tr>
<th>Agree</th>
<th>Disagree</th>
<th>Not Sure</th>
</tr>
</thead>
</table>

The instructor asks for student feedback about the class throughout the semester

<table>
<thead>
<tr>
<th>Agree</th>
<th>Disagree</th>
<th>Not Sure</th>
</tr>
</thead>
</table>
Alignment w/students

FLOSS Prowess

Alignment
Facuity & Student
Faculty & Student Alignment

Student grades are based primarily on a set number of exams

Agree  Disagree  Not Sure

The instructor asks for student feedback about the class throughout the semester

Agree  Disagree  Not Sure

Student grades are based primarily on a set number of exams

Agree  Disagree  Not Sure

The instructor asks for student feedback about the class throughout the semester

Agree  Disagree  Not Sure

FLOSS Prowess
Faculty & Student Alignment

Please indicate your SKILL or KNOWLEDGE in the following areas:

A) Creating a classroom that is inclusive to all students
   1 - None  2 - Very Low  3 - Low  4 - Average  5 - High  6 - Very High
   Pre: 4.1  Post: 4.9

B) Addressing individual student needs
   Pre: 4.2  Post: 4.5

C) Measuring student learning
   Pre: 4.3  Post: 4.6

D) Teaching undergraduate biology
   Pre: 4.9  Post: 5.0

E) Using a variety of teaching methods to reach diverse students
   Pre: 4.7  Post: 4.9

F) Including active learning strategies in my courses
   Pre: 4.4  Post: 4.9

G) Including regular, formative assessments in my courses
   Pre: 4.1  Post: 4.7

H) Teaching students to engage in their own learning
   Pre: 3.0  Post: 4.9
Is there a correlation between faculty 'prowess,' (confidence in the classroom as inclusive teachers) and that faculty's alignment with student in-class perceptions?
Lessons Learned
Lessons Learned

• Administrative aspects
  o Sustainable team structure
• Recruitment & Buy-in
• Assessment timing
• Building safety
Admin

• Dedicated 40hr/week person
• Team: Spread the wealth
  o Literal $
  o The more the merrier
• It’s hard to pay faculty
Recruitment

How did you learn about the FLOSS program?
10 responses

- Word-of-mouth: 40%
- Personal contact from previous participant: 30%
- FLOSS website: 20%
- Department listserv: 10%
- Informational Meeting on August 27th: 40%
- Through department: 20%
Recruitment

“Would you recommend this program to a colleague? Why or why not?”

- “(This was) outstanding! Should be required by all faculty and lecturers.”
- “Yes. critical for improving teaching and our DEI goals. All new faculty should be required to take it.”
- “Yes! I would love to see all my colleagues…participate! As a department, we would certainly benefit from a shift away from a deficit mindset, as well as a refresher on the various tools and techniques available for teaching.”
- “Yes. It has helped me frame better my ideas for a new course I'm developing. So I would highly recommend anyone who may need help in course development as well.”
- “Absolutely!!! The awareness of issues and options provides paths to what otherwise would never be implemented.”
- “Yes, most definitely. I got a lot of new ideas from FLOSS, and the discussions always made me think of new things to do in my class.”
Recruitment

We put them to their word when it came to recruiting the second cohort!

- Berkeley City College and CSU East Bay:
  - Word of mouth was 💪

- UC Berkeley:
  - New co-chair advocacy (read: buy-in)
  - Pitches at every dept. meeting

→ word-of-mouth + support from leadership = 🚀
Assessment Timing

• Robust pre/post course data:
  ○ Earlier the better for recruiting faculty
  ○ Consider course frequency

• Pre-emptive course/teaching assessments
“During some discussion sections, I felt excluded and had a hard time engaging and participating - not in a direct way, but as a result of the discussion being dominated by some of the participants, which incidentally were also white-male-UC Berkeley faculty. As an alum from UC Berkeley myself, I experienced at times the same patterns of exclusion that are typical from academia.

At other times, however, the discussions were productive and illuminating. I loved to engage with faculty from other Universities and it was fun to learn more about UC Berkeley from the faculty's perspectives. I am looking forward to future discussions with the FLOSS network!”
Future Directions
Next Steps

• Future cohorts

• Maintain current CoP
  o Peer mentorship

• Scaling curricula
  o Graduate student teacher training
  o Undergraduate teacher training

• Funding
Thank You For Your Support!

Funding, guidance and encouragement:
  • California Learning Lab

Additional in-kind Support from Departments:
  • Sciences Dept., Berkeley City College
  • Dept. of Biological Sciences, CSU East Bay
  • Integrative Biology, UC Berkeley

Questions, Ideas?

Jules Winters, PhD
jwinters@berkeley.edu

https://sites.google.com/berkeley.edu/floss