Incorporating Education into Your Scholarly Portfolio

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Goals of Session

- Envision strategies to document and publish your education efforts in BME

  - How to get started, keep going

  - Ideas for publications

- Become aware of the publishing landscape in BME education

Please interrupt!

Changing Landscape of BME Education

- More teaching-focused faculty
- Increased interest in how (not just what) we teach
- Emphasis on activities outside classroom (advising, summer programs, outreach)

Changing Landscape of BME Education

- Science of Teaching and Learning (SOTL)
- Education Research
- Extracurricular
- Outreach
- Other…

Multiple Publication Outlets

- ASEE
  - Conference, papers
- BMES
  - Conference, abstract, committee, sponsors BIEE
- *Biomedical Eng Education* (BIEE) journal
- Engineering Education journals
  - *IJEE, AEE, JEE* etc.
- Repositories

BME/BIOE Education Connections

	Peer Review	Format/Costs	Timeline	Strengths
Biomedical Engineering Education BMES Springer	✓	Full Journal Paper	Continuous	Special Issues, rigorous review, teaching tips
ASEE BED Division ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION	✓	Full Conference Paper (copyrighted)	Annual ASEE Meeting (June)	Curriculum sharing Specific Networking, peer-reviewed and published online
BMES BMES BIOMEDICAL ENGINEERING SOCIETY	✓	Abstract	Annual BMES Meeting (October)	Networking, Information sharing of educational projects, ABET Information
Biomedical Engineering Educators Community BEEC A virtual community of practice for BME educators			Regular Online + (January) Meeting	Networking, feedback and idea sharing

Why Get Involved?

- Many opportunities to learn
  - Innovate in classroom, elsewhere
  - Improve teaching practice
- Many opportunities to share
  - Develop scholarship
  - Share innovation
- Community stronger, vibrant

Outline for Session

- Introduction
- Reflection around interests
  - Large notes
  - Share ideas during "gallery walk"
- Details on publishing
- Collaborate on reflections
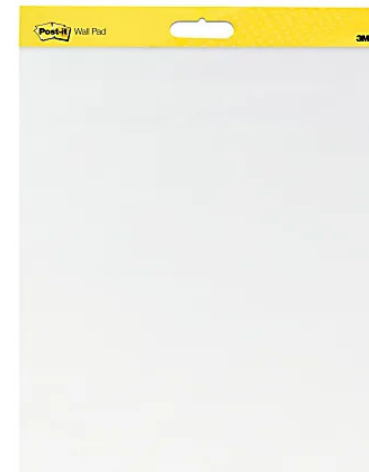
Working at Large Boards (5-10 min)

- Name
- Institution
- What courses have you taught in past 2 yrs?
- What other activities are you involved in?
  - DEI, recruiting, outreach, clubs, advising, etc
- What are you curious about in education and learning?
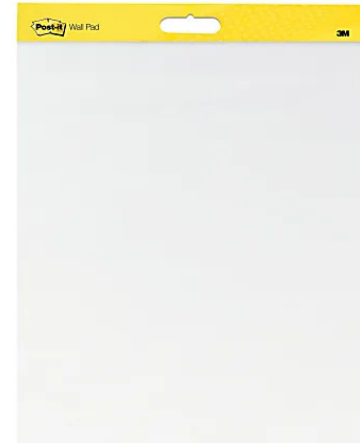
Working at Large Boards (15 min)

Reflect on last 5 yrs…

- List 3 interesting things from teaching & other education
- For each…
  - What did you do? What problem were you trying to solve?
  - Do you have data (grades, surveys, other)?
  - Was it "successful"? How do you know?
  - Have you shared with education community? If so, where?
  - Who else are you connected with about this?

Specifications Grading System (Brian)

- How can we help students focus on meeting learning objectives rather than on earning points towards a grade?

- How do we know if it worked?

  - Compared course grades to previous points-based grading system

  - Motivated Strategies for Learning Questionnaire (MSLQ): assessed students' motivation and their use of different learning strategies

- Shared results in an ASEE paper (2019)

- Connected with Casey Ankeny and David O'Neill to create an ASEE BED workshop (2022)

BME Instructional Incubator (Aileen)

- How can we bring more BME professional skills into the BME curriculum while increasing the use of evidence based practices in the classroom?
- Created the **BME Instructional Incubator**
- What did we learn? Asked research questions and collected data.
  - How does participant knowledge of and ability in teaching & learning change?
  - How do participant beliefs about teaching and learning change?
  - How do BME-in-Practice learners perceive their learning outcomes?
  - How do BME-in-Practice learners perceive the student-centeredness of instruction?
  - Has the Incubator fostered a Community of Practice?
- Shared results in ASEE, *Annals*, *International Journal of Engineering Education*, Research in Engineering Education Symposium (South Africa), BMES, *Biomedical Engineering Education*

Working at Large Boards (15 min)

Reflect on last 5 yrs…

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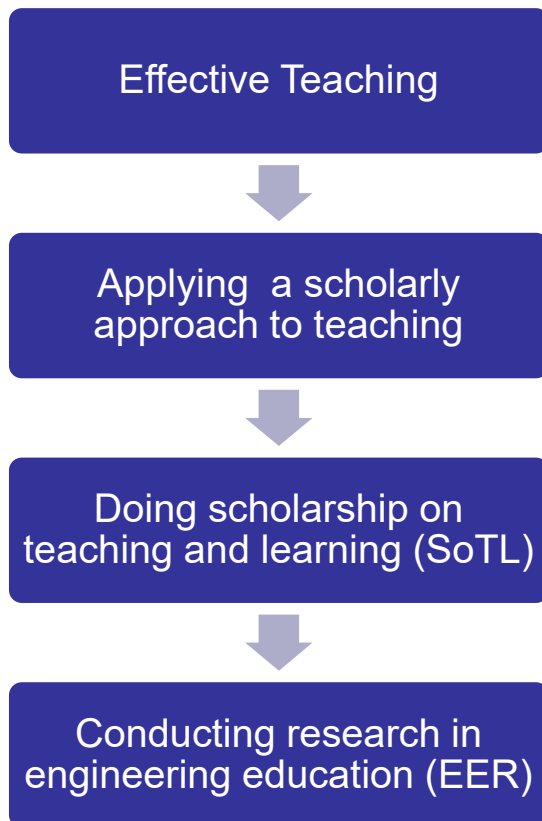
Gallery Walk (15 min)

- Add post-it to large boards
- Comment on:
  - Shared interest (leave your name!)
  - Literature in that space (leave a reference!)
  - Note an applicable theoretical or conceptual framework
  - Suggest some assessment or data
  - Actively looking for collaborators (leave your email)

Return to Large Board & Review (5 min)

Return to Seat

A Spectrum of Scholarship

Effective Teaching

↓

Applying a scholarly approach to teaching

↓

Doing scholarship on teaching and learning (SoTL)

↓

Conducting research in engineering education (EER)

SoTL is iterative, systematic inquiry into processes of student learning and experience in your course with the goal of improving those processes.

SoTL typically share what happens "in the classroom"

EER is a rigorous, interdisciplinary field in which scholars use research methods from education and social science to address a variety of issues relevant to engineering education.

https://eer.engin.umich.edu/about/why-eer/

EER often happens outside an individual classroom, addressing "why" and "how" questions, extends beyond student learning

An Aside: Assessment vs Research

Assessment

Develop program objectives and student outcomes

Establish performance criteria for objectives and outcomes and select assessment methods

Collect data

Interpret Results

Report results and make improvements

Research

- Form a research question
- Establish a hypothesis (and ground the work in an established theory)
- Collect data
- Analyze results and draw conclusion – is this hypotheses supported
- Report Results

(Smith & Streveler, 2005)

Adapted from Prof. Shanna Daly, University of Michigan

SoTL Articles

- Describe the application of evidence-based practices in a BME setting
- Usually features students and/or learning
- Example topics:
  - Novel instructional or assessment activity
  - Incorporating laboratory techniques
  - Integrating design in a novel way
  - Organizing courses thematically within a curriculum
  - Implementing research or clinical experiences for students

SoTL Typically has Assessment

- Clear learning outcome
- Assignment used for assessment that aligns with learning outcome
- Specific survey questions (support learning)
- Quantitative, or well-thought out qualitative

- Not just grades in class
- Not what students like/not (support satisfaction)

Research Articles

- Describe original, hypothesis-driven or research question-driven work in BME education
- Example topics:
  - How students learn and form knowledge in BME
  - Development of self-efficacy in BME
  - Impact of particular activities on student outcomes (e.g., research on admission to grad school)
  - What is BME identity and how students develop it
  - Formative experiences in career development

Scientific Research in Education

1. Pose significant questions that can be answered empirically
2. Link research to relevant theory
3. Use methods that permit direct investigation of the question
4. Provide a coherent and explicit chain of reasoning
5. Replicate and generalize across studies
6. Disclose research to encourage professional scrutiny and critique

Streveler RA, Smith KA. Conducting Rigorous Research in Engineering Education. J Eng Educ. 2006;(April):103–5.
Scientific Research in Education, Committee on Scientific Principles in Education, Shavelson, R.J., and Towne, L., (eds.), National Research Council, Center for Education, Division of Behavioral and Social Sciences and Education, Washington, D.C.: National Academy Press, 2002.

What is a Research Question?

"Good" Research Question

- Is the question answerable, reasonable, feasible?
- Is the question specific and focused?
- Is the question relevant?

Important Features

- Context, Intervention, Outcome,
- Research question aligns with methods
- Methods applies to appropriate population

Leveraging Literature

Theory	Theoretical Framework	Conceptual Framework
Explains/predicts a phenomena Emerges from research/data	Structure that summarizes concepts and theories to help you have a theoretical background	Logical conceptualization of your entire research project

Kivunja, C. (2018). Distinguishing between theory, theoretical framework, and conceptual framework: A systematic review of lessons from the field. *International Journal of Higher Education*, 7(6), 44-53.

Specifications Grading System (Brian)

Universal Design for Learning
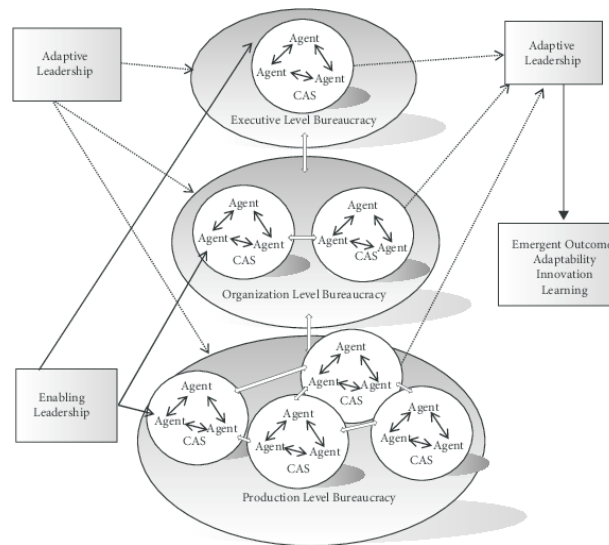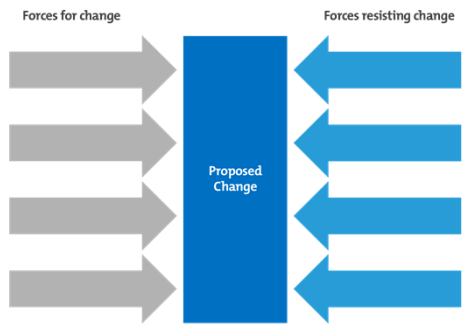

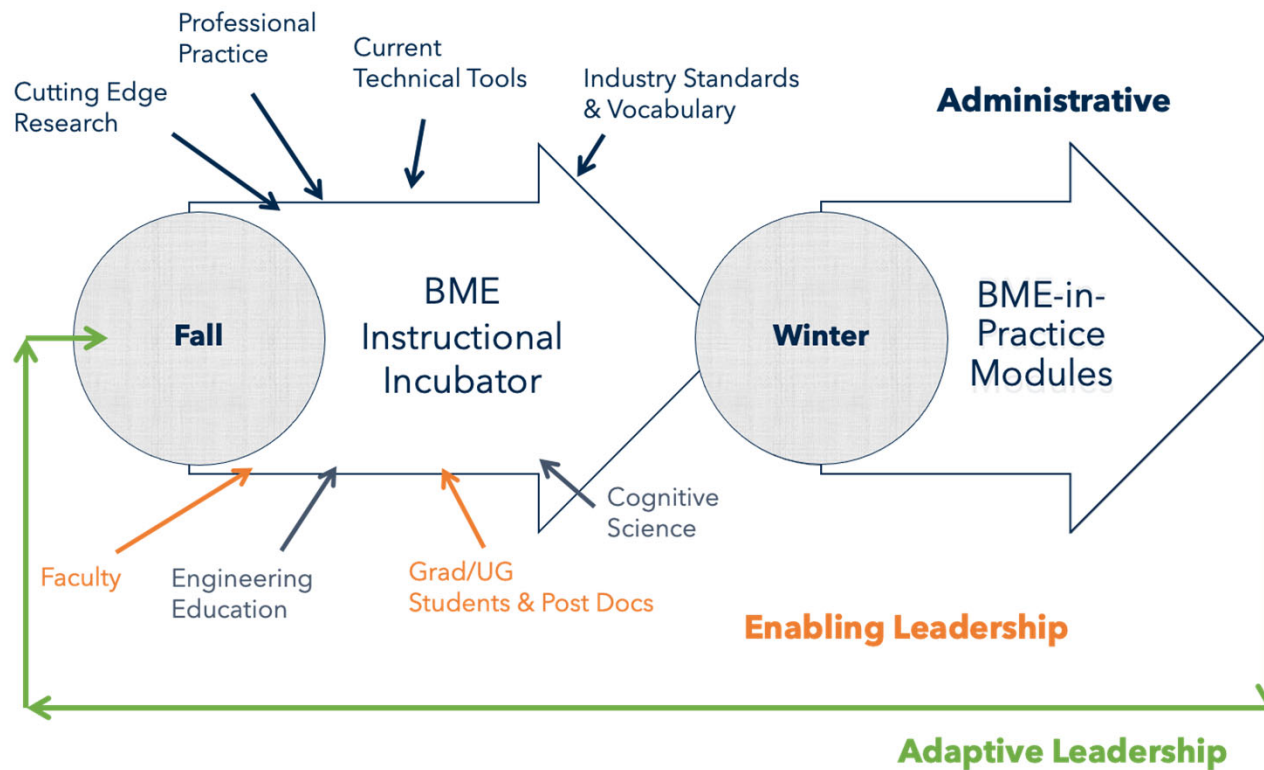udlguidelines.cast.org/

Self-Determination Theory
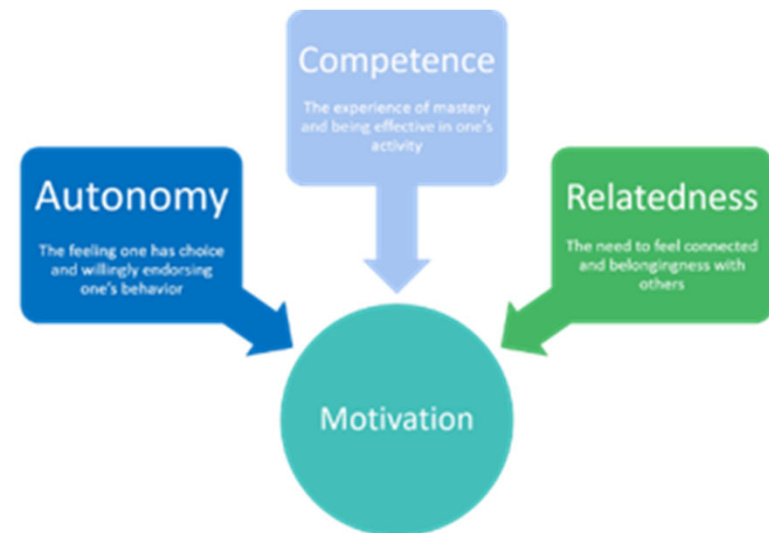
www.urmc.rochester.edu/

BME Instructional Incubator (Aileen)

How can we change the **way** we teach and
what we teach in biomedical engineering?

BME Instructional Incubator (Aileen)

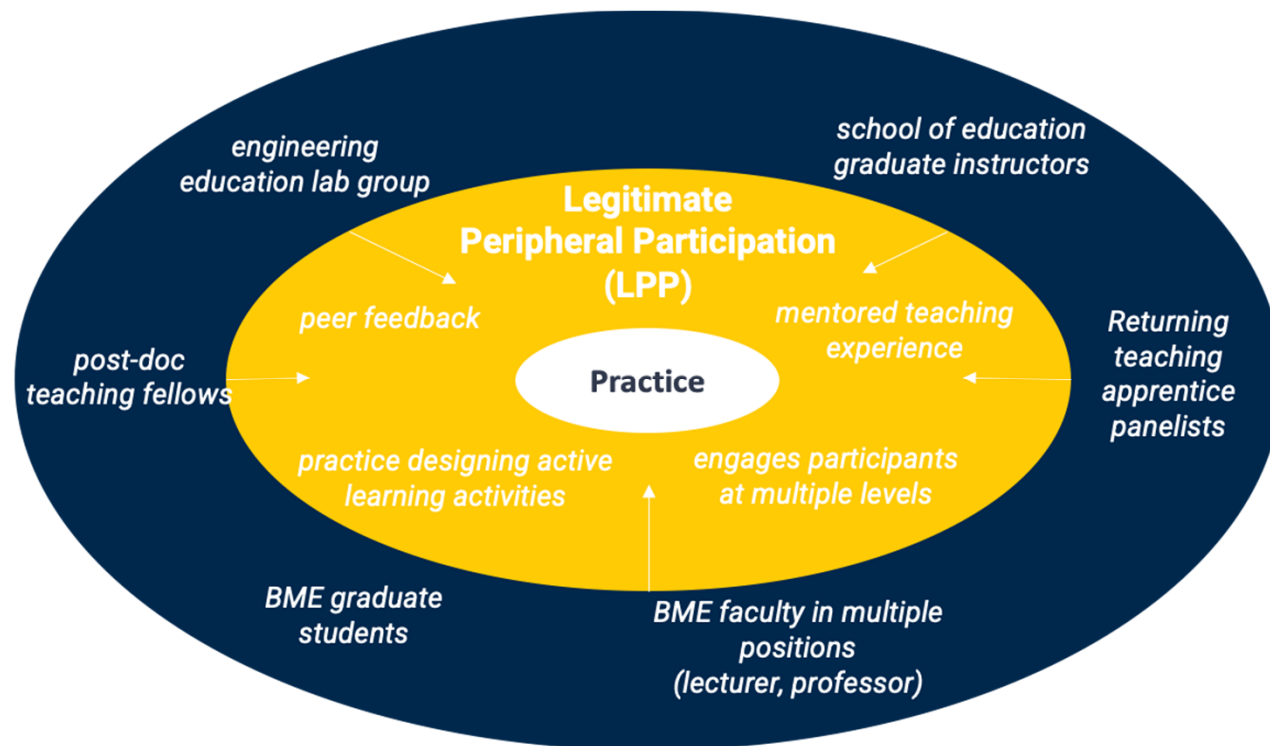# Incubator Informed by Learning Theory (Aileen)

Situated Learning Theory
Views learning as a social process where the cultural and historical context shapes learning activities.

Community of Practice
The _social groups_ within which situated learning occurs.

Legitimate Peripheral Participation
The _way community members engage_ in the shared work.

Opportunities for BME/BIOE Education Scholarly Advancement & Engagement

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Participation Poll

Biomedical Engineering Education Community (BEEC)

- What is it?
  - A virtual community of practice with the goal to share evidence-based practices and support community efforts throughout the year.

- How to get involved?
  - **Slack channel** – monthly discussion, questions and general communication.
  - **BEEC Teaching Tuesdays** – discussion in slack around simple evidence-based practices and how they are implemented in the classroom.
  - **BEEC Share and Learns** – monthly meetings led by a community member around a question (e.g. Best books in BME, How to teach capstone, etc).
  - **BEEC Annual Meeting –** formal annual meeting with keynote, author presentations and panels around teaching-based concepts.

Join our mailing list!

- Link to slack included!
- <u>Upcoming Event</u>:
- ***"The BME Grad Podcast: An Early-Career Podcast Built for those with a Biomedical Engineering Background"***
  - Led by: Allie Mitzak & Brian Kim, UNC Chapel Hill & North Carolina State University.
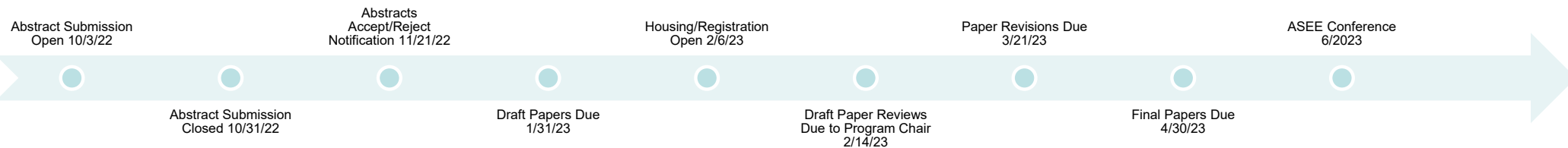 - October 20th, 2022, 1-2pm EST

BMES

- Share with large audience
- Connect with research community
- Poster or platform presentation based on limited peer review of submitted abstracts
- Abstracts archived for registered users

American Society for Eng Education (ASEE)

Abstract Submission
Open 10/3/22

Abstract Submission
Closed 10/31/22

Abstracts
Accept/Reject
Notification 11/21/22

Draft Papers Due
1/31/23

Housing/Registration
Open 2/6/23

Draft Paper Reviews
Due to Program Chair
2/14/23

Paper Revisions Due
3/21/23

Final Papers Due
4/30/23

ASEE Conference
6/2023

ASEE 2023 Annual Conference

Baltimore Convention Center, MD. | June 25th-28th, 2023

https://www.asee.org/events/Conferences-and-Meetings/2023-Annual-Conference

- How to submit to ASEE BED Webinar Video
- Speed Networking
- **BME Education Showcase**
- Visit local JHU BME Innovation Center
- Awards
  - Outstanding Educator Award
  - BME Teaching Award
  - Best Paper Award
  - Best WIP Award
  - BED Travel Awards (students/post docs)
  - Lifetime Faculty Mentor Award

Biomedical Engineering Education

- Digital and physical repository
- Voice for educational excellence in BME
- Stats: May 2020→ Oct 2022
  - \>200 papers submitted
  - \>80 papers published
- Main Paper Types:
  - Teaching Tips
  - Research
  - Innovation

Join with Like-Minded Peers

- Join a small discussion group
  - Senior/Capstone design
  - DEI activities
  - Lab classes
  - Others
- Introduce self, notes on boards
- Give feedback to each other & share ideas

Make an Action Plan for Yourself (15 min)

- What topics are important to you?
- Where could you share your work?
  - Any related deadlines?
- What is a forward plan for effort in this area?
  - Make a schedule!
- What data might you collect?
- Who can help you?

Wrap-Up

- Have strategies to document and publish your education efforts in BME
  - How to get started, keep going
  - Ideas for publications

Take your large papers + sticky notes home!

- Aware of the publishing landscape in BME education
- Growing and thriving community
- Scholarship and excellence in education matters!

END