

# Connecting Research and Practice

*Opportunities and Partnerships to Engage  
in the Study of Our Own Work*

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**FYMSiC 2025**



# Guiding Questions

- How are we linking research and practice in mathematics education?
- What are affordances and challenges in a bidirectional approach to research and practice?
- What are ways that we can examine our own practice, collaborate with others to learn and engage in work that not only impacts our own practices and informs research in the field, but guides us to learn more about the impact on student learning, effective instructional practices, deepen content knowledge, and more?
- What are opportunities and potential models for engaging in research to impact our work?
- How can we inform the broader mathematics research community?



# What does it mean to connect research and practice in mathematics education?

**S Maves-Tanq**  
May 8, 2025

### Inform your work

I often use the word "inform" - you need to consider it in light of your own context. Context, context, context is important.

4

**Attentive Orca**  
May 8, 2025

### Reflective teaching practice

1

**Benevolent Bear**  
May 8, 2025

### Testing whether teaching techniques work "in the wild"

1

**Adorable Bear**  
May 8, 2025

### to study the outcomes from my own different teaching techniques

1

**Responsible Otter**  
May 8, 2025

### The bidirectional relationship between research informing your teaching, and teaching leading to research questions that you can study

2

**S Maves-Tanq**  
May 8, 2025

### Study your own work

either formally or informally - using what social scientists know about studying people!

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**Beverly**  
May 8, 2025

### Starting point

Resources for ideas how to improve my teaching.

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**Ana**  
May 8, 2025

### Did what I learn from a particular approach in class have a potential for investigating further and sharing with the wider community?

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**Zack Wolske**  
May 8, 2025

### measuring effects of teaching practices that I believe are helping students learn

1

**Serious Oyster**  
May 8, 2025

### Agreed. What actually "works"

0

**Benevolent Newt**  
May 8, 2025

### having research answer relevant teaching-related questions

0

**S Maves-Tanq**  
May 8, 2025

### Ideas

so many ideas for work and ways to explain why you are doing what you are doing !

0

**Thoughtful Caterpillar**  
May 8, 2025

### Learning from what has worked and doesn't work and why. Expanding learning experiences that are accessible to more students/ways of learning.

0

**Emil Slimeonov**  
May 8, 2025

### Research should serve practice.

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**Peaceful Dolphin**  
May 8, 2025

### Providing Ideas

Giving ways and ideas on how to alter your practice in order to reach students you may have been missing and addressing your own biases and ways you teach because that's how you learned it.

1

**Responsible Dolphin**  
May 8, 2025

### Being able to build/test theories and conclude from the results

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**Charismatic Macaw**  
May 8, 2025

### Practicing what you preach.

0

**S Maves-Tanq**  
May 8, 2025

### Ideas

so many ideas for work and ways to explain why you are doing what you are doing !

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**Thoughtful Caterpillar**  
May 8, 2025

### Learning from what has worked and doesn't work and why. Expanding learning experiences that are accessible to more students/ways of learning.

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**Adorable Bear**  
May 8, 2025

### I'm also thinking about whether what I want them to learn is the same as what I am teaching. I mean, am I teaching the correct thing?

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# Are we linking research and practice?

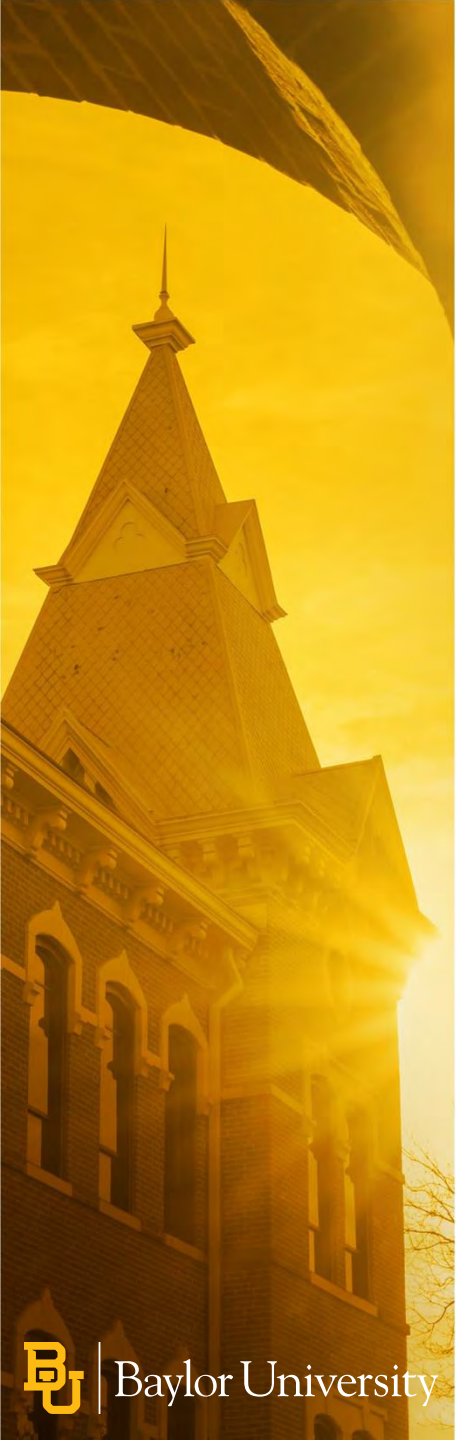
- Over time-shifted discussions from the notion of research informing practice to a stance that is more about connecting the two where each informs the other bidirectional relationship
- Goal of working together toward understanding the teaching and learning of mathematics across PK-12 and beyond
  - But is this a reality?
  - What is the evidence?
  - What partnerships are we developing to collaborate?
  - Who are our partners—stakeholders?
  - Whose voice is included?



# Linking Research and Practice: The 2010 NCTM Research Agenda Conference Report called for us to

- emphasize the need for communication and collaboration between practitioners and researchers around issues that are important to practitioners;
- make practitioners' research problems the primary initiators and consumers of research in the mathematics education research community;
- promote a set of guiding questions that focus researchers on critical problems of practice; and
- urge funding agencies, policymakers, and other mathematics education stakeholders to support research that is grounded in practitioners' problems of practice (p. 6). (Arbaugh et al., 2010)

**But have we?**



# Linking Research and Practice

## 2024 NCTM Position Paper

“Linking research and practice in mathematics education is essential to address critical issues in mathematics teaching and learning”

- Emphasizes the essential nature of collaboration and bidirectionality
- Inclusion of all educators, whether in PK-12 settings or higher education, as researchers and practitioners

# Linking Research and Practice

## 2024 NCTM Position Paper

### Declarations

- Mathematics education research must be ethical and comprehensively address critical problems.
- Research should identify high-leverage, effective, equitable mathematics practices shared in useful, actionable ways.
- All educators build knowledge of mathematics education research and practice.





# Lens of NCTM's Catalyzing Change Recommendations (2018, 2020a, 2020b)

Recommendation 1

**Broaden  
the Purposes of  
Learning Mathematics**

Recommendation 3

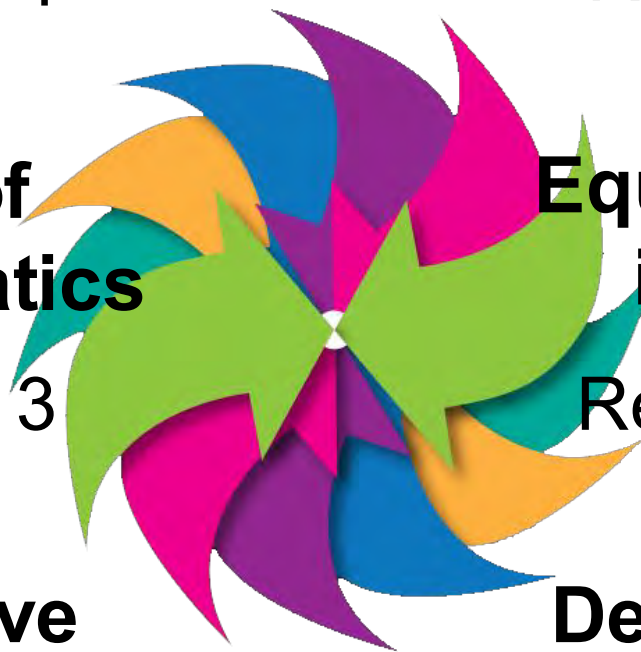
**Implement  
Equitable/Effective  
Mathematics Instruction**

Recommendation 2

**Create  
Equitable Structures  
in Mathematics**

Recommendation 4

**Develop  
Deep Mathematical  
Understanding**





# What are we publishing related to the 4 areas?

- *Investigations in Mathematics Learning (IML)* and *Journal for Research in Mathematics Education (JRME)*
- IML: primarily focused on Equitable Mathematics Instruction and Developing a Deep Mathematical Understanding, with only a few related to Broadening the Purposes of Mathematics and Creating Equitable Structures.
- JRME primarily focused on Developing a Deep Mathematical Understanding, Broadening the Purposes of Mathematics, and Equitable Mathematics Instruction with only a few related to Creating Equitable Structures.
- The 4 areas connect to practice—so it appears we are publishing findings that connect to practice but....

- Who is doing the research, with whom, to whom?
- Were these from perspectives of connecting research and practice, research to inform practice, or practice to inform research?
- Are we creating authentic partnerships between and among researchers and practitioners that truly link research and practice where they each inform and support each other?
- Are we addressing questions that are of interest and importance for both groups?
- Do the two groups value the same evidence?
- Do practitioners believe the evidence can inform their practice?
- Are the findings transferable to varied contexts and how is this considered as a practitioner examines research for application in their situation?
- Are there really two groups or are they both researchers and practitioners, in different contexts?
- Do we need to create authentic partnership? Is it always essential? What is gained or lost in such efforts? What conversations and between who, are needed to bring research and practice together?

# Connection or Disconnect? (JRME 2021-2023 Editorials)

- Research community and the teaching practice community do have connections having genuine, common interest.
- Successful Connection Examples: Australia, England, France, the Netherlands, Italy, Japan, and the US
- Varied types and approaches
- What are examples of connections in Canada?

Creators and Consumers!

“For research to have an impact on practice, teachers must be consciously and deliberately positioned as part of the greater community of those who generate as well as consume knowledge.”  
(Cai et al, 2017, p. 4).



# Action Research/Teacher Inquiry

Let's Share!

What is action research or teacher inquiry?

What has been your experience?

Why would we want to engage in action research or teacher inquiry?

Teacher inquiry is not something I do; it is more a part of the way I think. Inquiry involves exciting and meaningful discussions with colleagues about the passions we embrace in our profession. It has become the gratifying response to formalizing the questions that enter my mind as I teach. It is a learning process that keeps me passionate about teaching.

(Hubbell, 2007 as cited in Dana & Yendol-Hoppey, 2020, p. 10)

# Action Research/Teacher Inquiry

## What is action research?

- Inquiry conducted by and for those taking the action
- Includes continual spiral of action and reflection (Elliot 1988)

## Why action research?

- To improve practice
- To implement a new initiative
- To determine the impact on student learning
- To collaborate and discuss with peers



### Teacher Researcher (p. 13, 2<sup>nd</sup> edition)

- Intentionally asks questions about teaching and learning
- Organizes and collects information
- Focuses on a specific area of inquiry
- Engages in reflection
- Benefits from ongoing collaboration and support of critical friends
- Facilitates teaching and learning and maximizes student potential

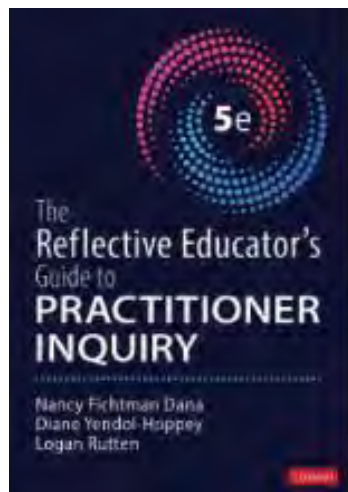


TABLE 1.2 University-Based Research and Teacher Inquiry Comparison

	UNIVERSITY RESEARCH	TEACHER RESEARCH (INQUIRY)
PURPOSE	Advance a field	Improve classroom practice
FOCUS	Control/Prediction/Impact/Explanation	Provide insight into teaching in an effort to make change
OWNERSHIP	Outsider	Insider
IMPACT	Broad	Local

(p. 8, 4<sup>th</sup> edition)

# The Action Research Cycle

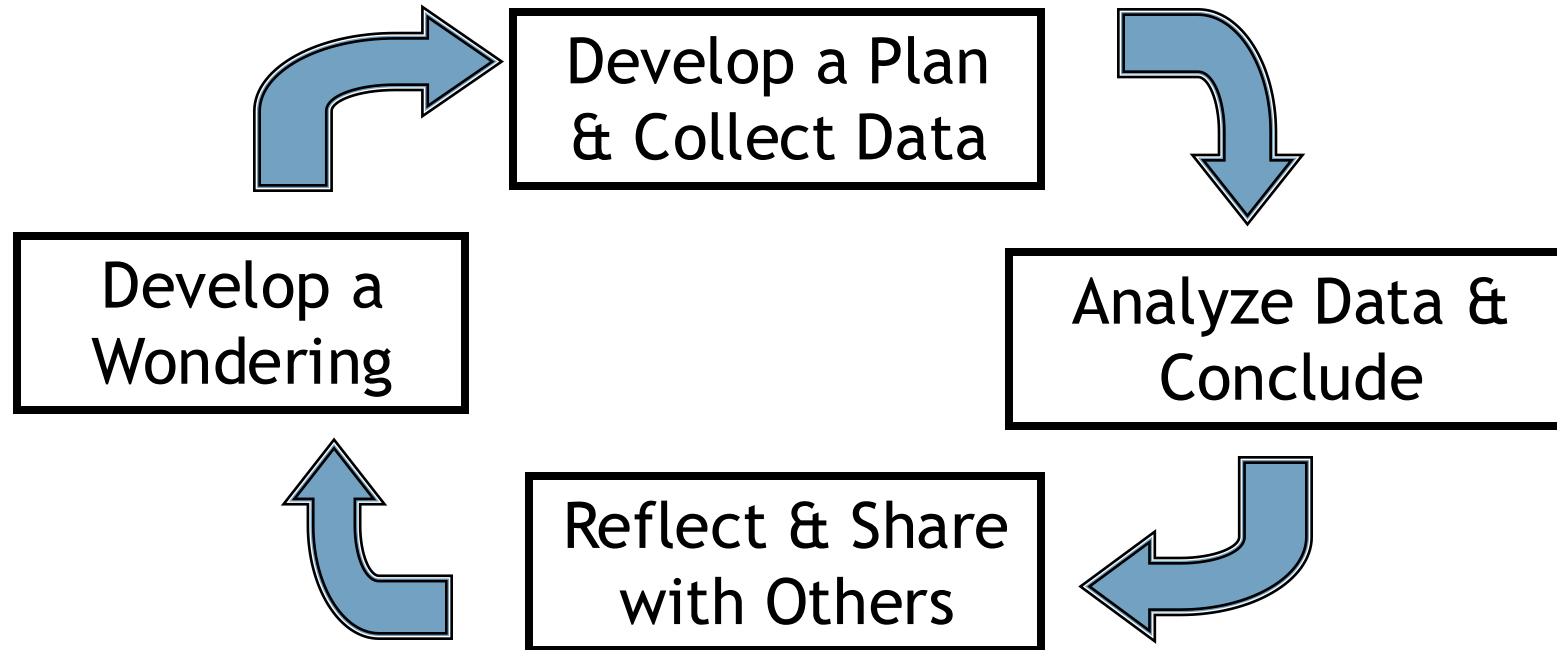
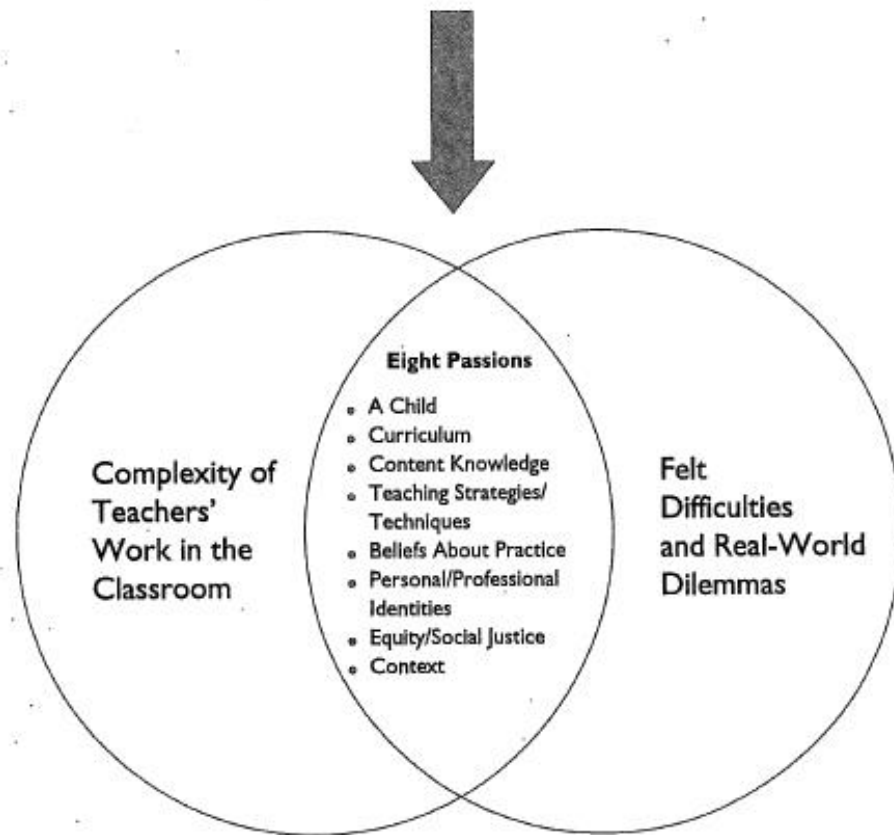


FIGURE 2.1 Developing Your Research Question

## FINDING YOUR WONDERING







# What is Your Wondering?

- Burning questions: student learning, curriculum, content knowledge, instructional strategies, beliefs about practice, professional identity, social justice, context
- First step in starting an action research project
- Based upon a topic, issue, strategy, or problem that you would like to investigate.

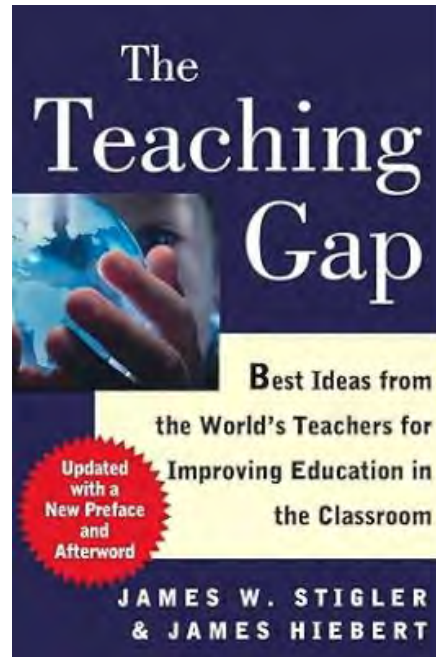


# Other Considerations

- Moving from wondering to researchable question
- Collaborate/Individual
- Research Design: Data Collection/Analysis
- Sharing
- Implications for Practice
- Trajectory of Study

# Learning through Lesson Study

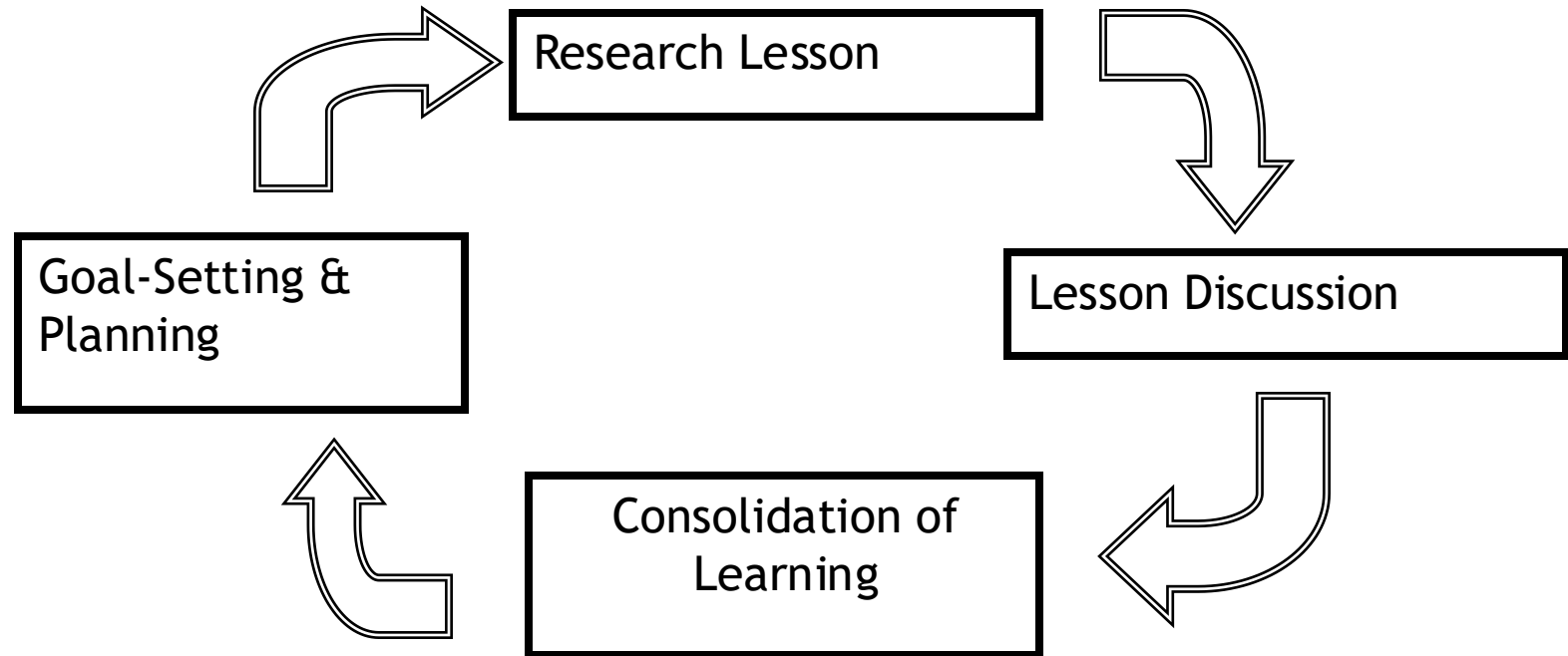
- TIMSS (1999)
- The Teaching Gap
- Japanese Approach
- Ongoing globally



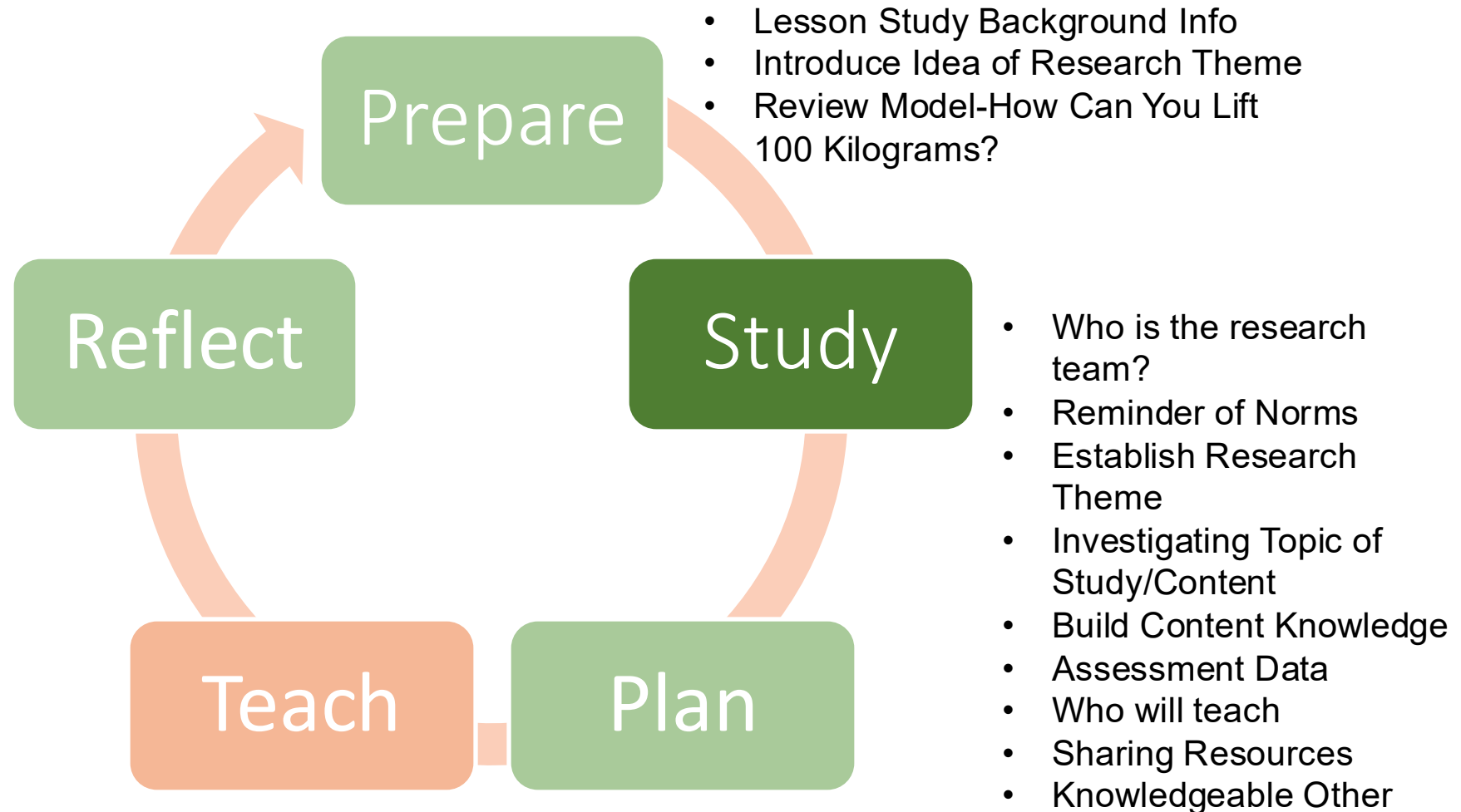
- Form of Professional Development
- Teacher-driven/Collaboration
- Student-focused
- Long-Term goals
- Reflection Process

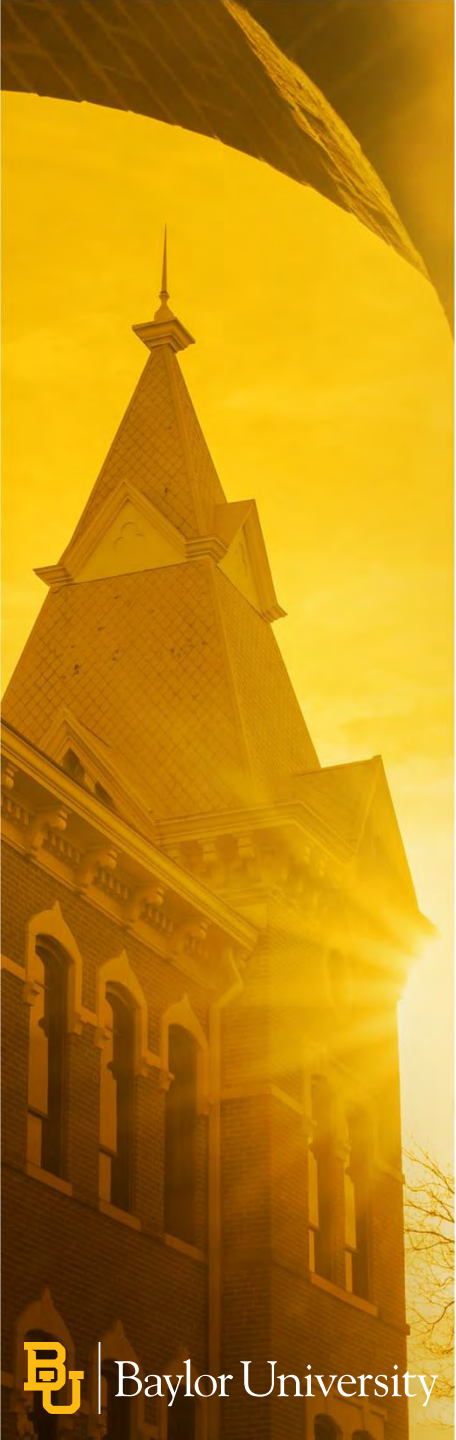


# Lesson Study Cycle



# Lesson Study Steps



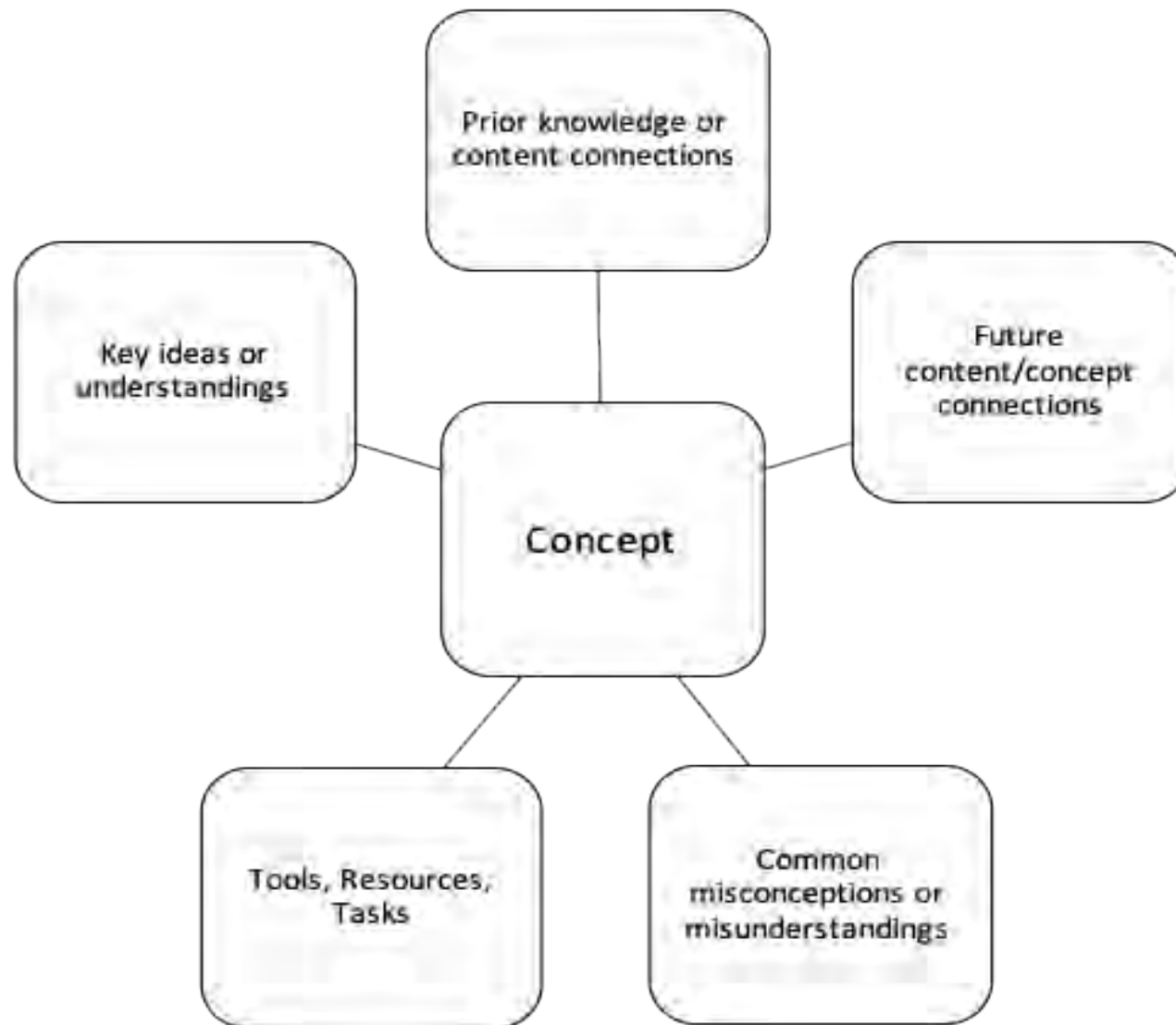
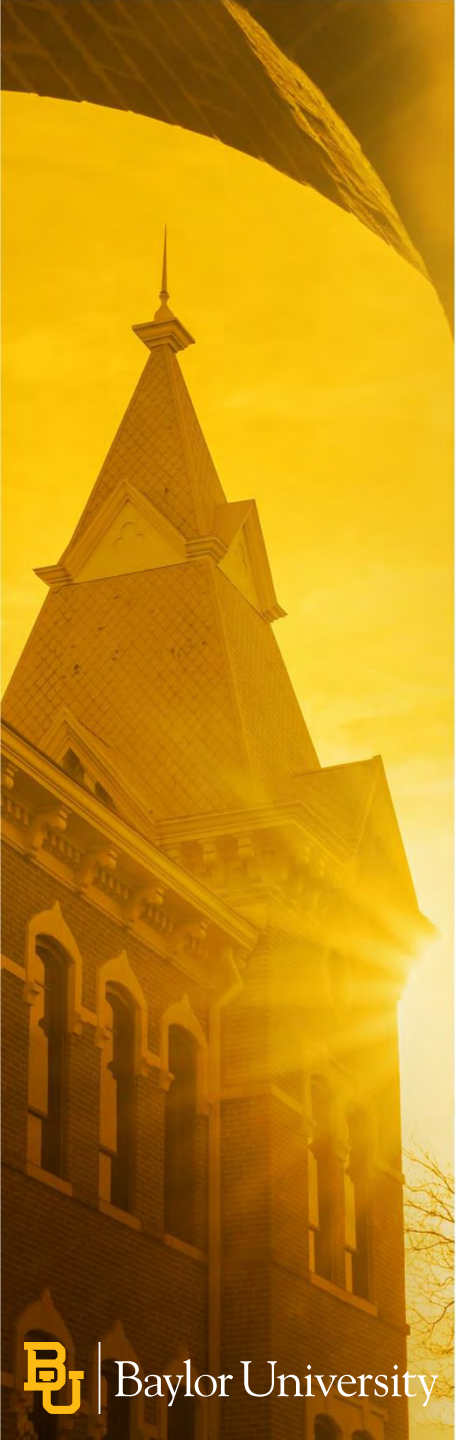


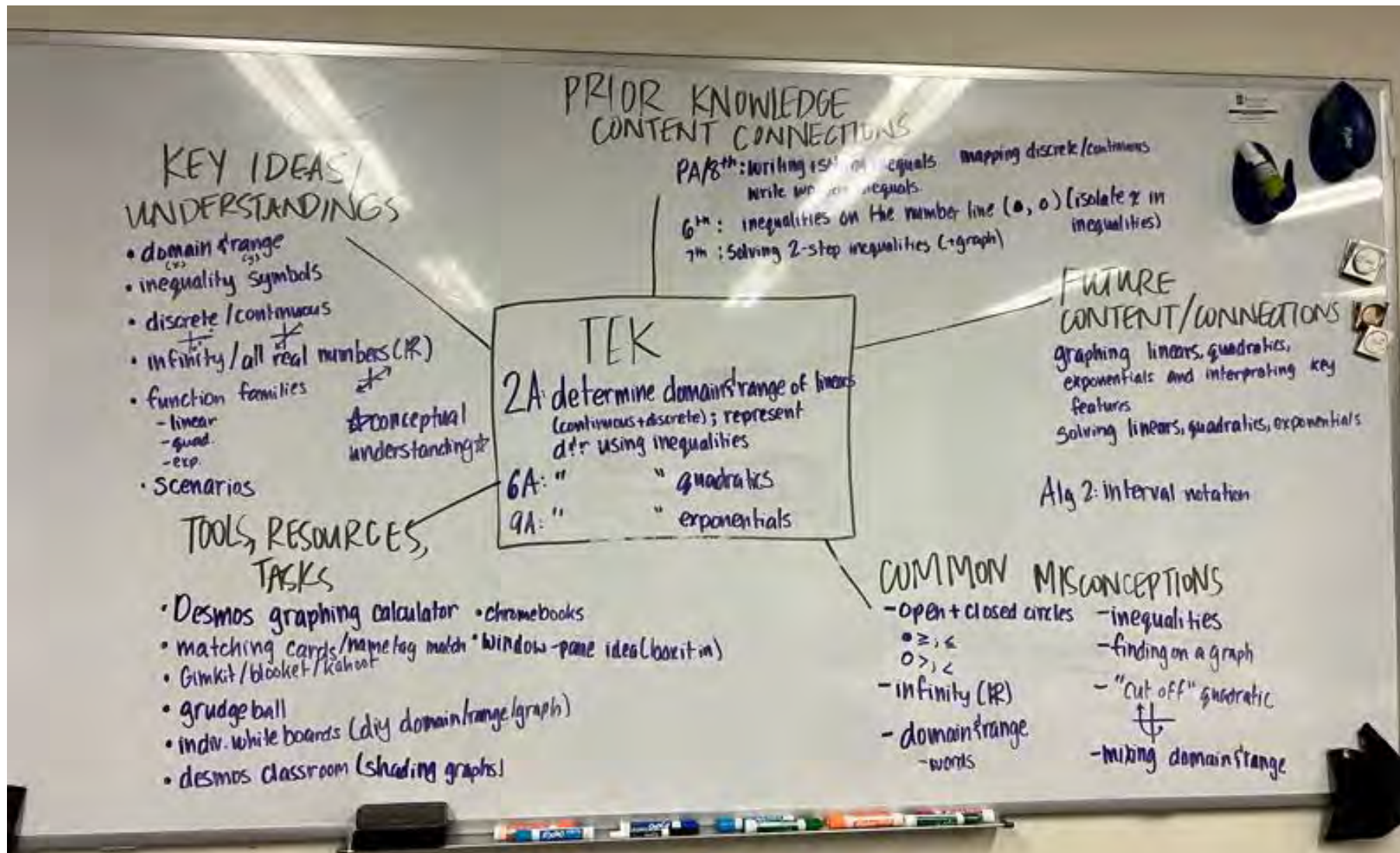
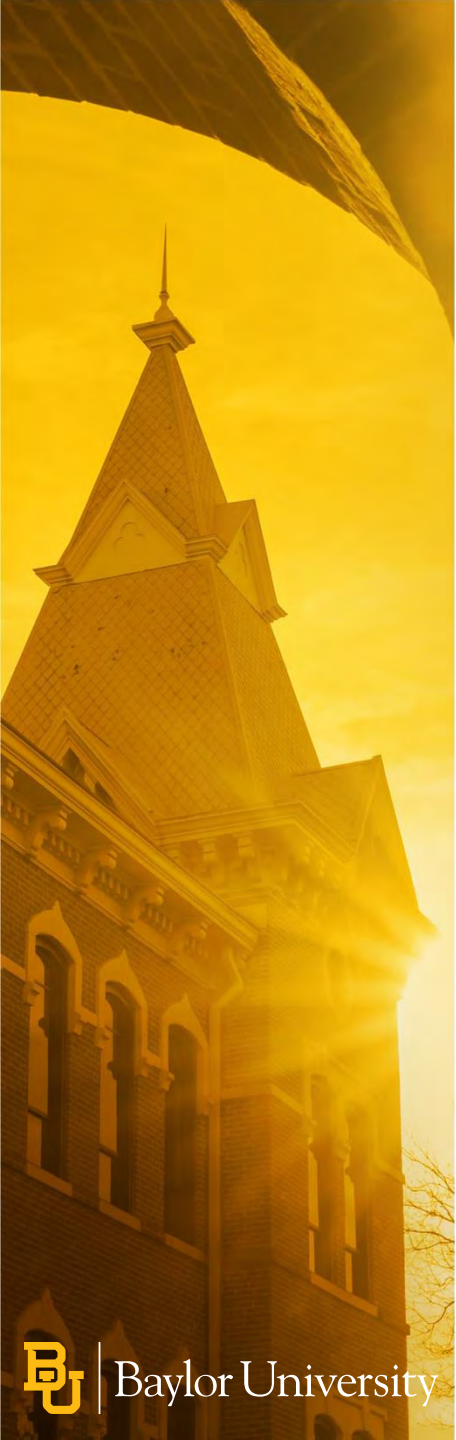
# Research Theme

## Approach concerning your students or you as a mathematics educator

- Student Example:
  - What qualities do your students currently have?
  - What qualities would you like your students to have five years from now or when they graduate from your institution?
  - Are there any gaps between the qualities you want your students to have and the qualities they currently possess? What are the gaps you would most like to address?







# Lesson Study Among Mathematics Educators

## Personal Example

Walking the Talk Experience  
Powerful Professional Development  
Professional Collaboration  
Virtual Options/Support-Building a Virtual Community  
Synchronous versus Asynchronous  
Opportunity for Varied Levels of Participation  
Studying Own Practice

Kamen, M., Junk, D., Marble, S., Cooper, S., Eddy, C., **Wilkerson, T.**, & Sawyer, C. (January 2011). Walking the talk: Lessons learned by university mathematics methods instructors implementing lesson study for their own professional development. In Hardt, L., Alston, A., Yoshido, M., & Murata, A (Eds). *Lesson-study research and practice: Learning Together*. Springer Publishing: New York.

Cooper, S., **Wilkerson, T.**, Eddy, C., Kamen, M., Marble, S., Junk, D., Sawyer, C. (2011) Lesson study among mathematics educators: Professional collaboration enabled through a virtual community. *Learning Communities Journal*, 3(1), Available at <http://celt.muohio.edu/lcj/>





# Potential Impact on MTEs

- Deepen Content Understanding
- Development of Professional Learning Community
  - Networking
  - Collaboration
- Develop engaging instructional practices
- Observe impact on students
- Empowerment



# The Call-Next Steps

## What is your Plan of Action?

- Study our own practice
- Develop partnerships and collaborations to further the work in mathematics education
- Local and Global partnerships
- Inclusive of all stakeholders
- What conversations can and should we begin?

# What do I want to explore related to research and practice?

Means of promoting student engagement

I need to set aside more time to read papers!

How to make and sustain effective collaborations

How to motivate students to do the homework needed to succeed?

inviting students as partners

I need to focus more on dissemination.

study effectiveness of different teaching techniques

How important/effective is "instant feedback" on assessments for learning?

lack of student engagement

I wonder if it's more important to teach techniques of integration and differentiation, or whether it's more important to teach theory and understanding of int. and diff in terms of future math usage.

?

What forms of assessment give students the ability to truly show what they've learned?

Create research collaborations between instructors and university teaching and learning center staff. Share more of what has been tried and what didn't work in our teaching.

how do I re-evaluate my assessment practices and teaching to embrace and integrate AI?

Honesty with students on how much work they actually have to do to get themselves to a level where they are confident.

Effective assessments to enhance students' learning

How to get students to attend class.

how much time my students actually spend studying math and what exactly they do when they "study"

Design-based research with me and colleagues who teach the same intro stats course.

Learning how to create research studies that will be interesting to students too

# Guiding Questions

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**Question?**

**Thank you!**

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