



# Coming up with ideas for educational research

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June 12, 2024



# Sources of educational research ideas

## Teaching perspective

- *Instructional activity*
- *Instructional media*
- Pedagogical approaches
- Measurement and evaluation
- Classroom management
- Professional development
- Curriculum

## Learning perspective

- *Learning problems*
- Misconceptions
- Cognitive skills
- Psychomotor skills
- Learning styles
- Attitude
- Awareness



# Examples of learning problems

Topic	Description	Problems	Examples	Causes
Molecular symmetry	How to identify symmetry elements and operations	Cannot visualize operations on molecules	Real-world combinatorial problems	Nonsystematic and insufficient mental practice
Exoplanet detection	How to detect exoplanets	How a detection method works	How a factor affects transit method	Never see a real detection at work
Algorithmic thinking	How to sequence commands together	Cannot solve even simple problems	Write a program to calculate factorial	Cognitive overload from syntax
Titration dynamics	How species change during titration	Cannot tell from a titration experiment	What interacts with added hydroxide ions	Focus only on calculation
Relations among supply-chain modules	Dependency among modules in a supply chain	Cannot explain how a module affects others	What factors affect loyalty to a chain	Never be in a supply chain

## Activity 1: Learning problems

- Create a table of topics that involve conceptual understanding (not mere memorizing) with which your students (or you) have trouble understanding

Topic	Description	Problems	Examples	Causes

# Generating educational research ideas from learning problems



- Which question would you ask?

What can be done about it?

- Your thought are free
- Solution is based on your way of understanding
- May not be innovative

What has been done about it?

- Influenced by what you read
- Gaps may be hard to spot
- Solution is based on the gap
- May not suit your style/preference



# Finding research idea by yourself

- How well do you understand the topic?
  - Find a way to enhance your understanding
- What steps lead you to understand the topic? Or
- What steps can lead students to understand the topic?
- Can they be implemented in class and how?
  - How does it help students construct concept(s)?
  - How complicate is the construction of concept(s)?
- Brainstorm (maybe with a generative AI)





# Research idea example

- Topic: Supply chain
- Problems: Relations among modules in a supply chain
- Cause: Never make decision in a supply chain
- Innovation: Simulated game that
  - Encompass whole supply-chain activities
  - Provide opportunities to make strategic business decision
  - Simple, transparent, and yet realistic
  - Modifiable to suit other objectives



## Research idea example (cont.)

- Simplistic, transparent, and modifiable
  - Spreadsheets, one for instructor (raw material and retail markets), supplier (raw material provider), manufacturer, and wholesaler
- Realistic: Incorporate demand and cost functions
- Gameplay
  - 6 groups (on-going companies) divided into 2 supply chains
  - Switch roles after each game (2 or 3 roles)
  - Slight advantage to do transactions within a chain





## Activity 2: Your research idea

- Select a topic from Activity 1
- Reflect on your aha moment (maybe with AI)
- Is the aha moment possible for your students?
- How do you teach? Does or can it lead to that moment?
- How can you help students have similar **experiences**?
- Can you simplify?
- Has it been done?



# Finding gap in the literature

- What is the topic?
- What can be the learning problems?
- What are potential ways to solve the problems?
- What keywords should be used in searching the literature?
- Once an article is found, does it cite others that solved the same or related problems?
- Are there other articles that cite this one?
- Are there still gaps?



## Activity 3: Gap in the literature

- Read the introduction part of Jittivadhana et al.'s (2009) article
- Answer the questions:
  1. What were the topic and the learning problem?
  2. What innovation was developed to solve the problem?
- Watch [Muscle Contraction - Cross Bridge Cycle, Animation. \(youtube.com\)](https://www.youtube.com/watch?v=...)
- Is the problem present in the animation?
- Were there gaps in Jittivadhana et al.'s innovation?
- Find an article trying to close a gap



## Activity 4: Gap in the literature

- Select a topic from Activity 1 or 2
- What has been done in terms of teaching and learning?
  - May need to be very specific (topic, learning problem)
- What innovation(s) came before/after?
- Are there still gaps?
- Can you close one of them and how?
- What are the trends?