View from the Ivory Tower

Closing the Education Research-Practice Gap

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Today we will....

(1) Provide background and context

(2) Share research findings
   (a) Elephant Training 101: Cognitive Strategies
   (b) Elephant Care 101: Affective Strategies

(3) Discussion: Closing the Research Practice Gap
   (a) Future research topics
   (b) Crowdsourcing tools
Background: How I got here
Background: How I got here

Student Outcomes

Student Actions

Teacher Actions

Teacher Mindsets, Beliefs, and Skills

How do you work?

No idea.

Educational Psychology

Human Development, Culture, and Learning Sciences
Educational Psychologists

Classroom Teachers

So what should I do?
What comes to mind when you think of “research based” teaching strategies?
Training your elephants

Caring for your elephants
Elephant Training 101 (Cognitive Domain)

1. Encourage active retrieval
2. Use dual coding (with care)
3. Develop metacognition
Encourage Active Retrieval

Dembo & Seli, Motivation and Learning Strategies for College Success: A Focus on Self-Regulated Learning (2012)
Encourage Active Retrieval

Misconceptions!
Teacher Tool: Refutation Texts

Incorrect Belief

Many people, including educators, believe learning styles are set at birth and predict both academic and career success....

Refutation
even though there is no scientific evidence to support this common myth, according to new research published by the American Psychological Association.

Correct Understanding

Though teachers and students have preferences regarding instructional style, studies have found no benefit in to “learning styles” for increasing student achievement.

Beker et. al. (2019) Refutation texts enhance spontaneous transfer of knowledge
Nancekivell et al. (2019) Maybe They’re Born With It, or Maybe It’s Experience:Toward a Deeper Understanding of the Learning Style Myth
Use Dual Coding

Use Dual Coding


*Educational Psychologist*
Teacher Tools: Doodling
Teacher Tools: Doodling

Table 2
Mean Conceptual and Seductive Recall as a Function of Text and Activity Condition for Experiment 1

<table>
<thead>
<tr>
<th>Recall</th>
<th>Base-only</th>
<th></th>
<th>Base-plus-seductive</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sketch</td>
<td>Summary</td>
<td>Think</td>
<td>Sketch</td>
</tr>
<tr>
<td>Conceptual recall</td>
<td>4.28 (2.97)</td>
<td>3.83 (1.86)</td>
<td>4.68 (2.38)</td>
<td>3.21 (1.96)</td>
</tr>
<tr>
<td>Seductive recall</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>.47 (.84)</td>
</tr>
</tbody>
</table>

*Note.* Standard deviations are presented in parentheses. There are no values for seductive recall in the base-text condition because these participants were not exposed to seductive text.

Jager et. al. (2018) Sketching and Summarizing to Reduce Memory for Seductive Details in Science Text. *Journal of Educational Psychology*
Teacher Tools: Doodling

Jager et. al. (2018) Sketching and Summarizing to Reduce Memory for Seductive Details in Science Text. *Journal of Educational Psychology*
Develop Metacognition

Strategy Use

“Thinking about Thinking”

Planning

Evaluation

Monitoring
Develop Metacognition

But is there an easier way? Looking at the diagram I took half and then half again to find my 75%.

I could do that same thing with the families. Dividing by two is easier than multiplying by big and unknown numbers. Well I would need to take all of the families and divide by two $(\frac{320}{2} = X)$ and then divide that answer by two again $(\frac{X}{2} = Y)$ and then add the second answer to the first $(X + Y = ?$ families that attended).

... hrm I could also subtract that $Y$ from the 320 and get the same answer $(320 - Y = ?$ families that attended) because it is 25%.

That can work, but I need to evaluate my plan.... Let’s see ... I have my total families, which I cut in half and have 50% (points to the first half of the diagram) and then cut in half again (points to the second half of the diagram) to get 25%, which I need to add to the 50% to find my 75%. Yep I have all of my facts and it matches the diagram and the problem, so I am good to go.

Teacher Modeling
Teacher Tool: Interleaving

Roher et. al. (2016) Interleaved Practice Improves Mathematics Learning. *Computer Science: Psychology*
Teacher Tool: Interleaving

Traditional Instruction

Interleaving
Teacher Tool: Interleaving


Elephants Training 101 Recap

How could I implement these ideas in Project Based Learning?
Elephants Care 101 (Affective Domain)

What comes to mind when you think of “social & emotional learning”?
Starkley-Perret et. al. (2018) Measuring the impact of teaching approaches on achievement-related emotions: The use of the Achievement Emotions Questionnaire. *British Journal of Educational Psychology*
Elephant Care 101 (Affective Domain)

1. “Trigger” and Nurture Interest
2. Acknowledge and Explore Identity
3. Build Caring Relationships
Hook and Nurture Interest

Acknowledge and Explore Identity

What five NOUNS would you use to fill in this box?
Acknowledge and Explore Identity

(McLean et. al, 2017)
Acknowledge and Explore Identity

- Context clues matter
- Refute stereotypes
- Promote growth mindset
- Provide role models
Acknowledge and Explore Identity

Build Caring Relationships

Autonomy

Self-Determination Theory

Competence

Social Relatedness

Build Caring Relationships

“...the teacher has a more important function than to say right or wrong.... there is more important work to be done – in which the teacher’s relations to the pupil cannot be duplicated by a mechanical device. Instrumental help would merely improve these relations”

- B.F. Skinner (1954, pg. 96)

Froiland, Worrell & Oh (2019) “Teacher–student relationships, psychological need satisfaction, and happiness among diverse students” Psychological Science
Elephant Care 101 Recap

How can I harness the power of interest, identity & relationships in my classroom?
Discussion: Research Practice Gap

No, no...we just study it.

Your job is to go out and do it.
Discussion: Research Practice Gap

Comparison Of Students’ Readily Accessible Knowledge Of Reaction Kinetics In Lecture- And Context-Based Courses
Kathleen A. Jeffery, Samantha M. Frawley-Cass, and Ryan D. Sweeder

Undergraduate Research Experience in Cybersecurity for Underrepresented Students and Students with Limited Research Opportunities
Dazhi Yang, Danxiang Xu, Jyh-hau Yeh and Yibo Fan

How Calculus Eligibility and At-Risk Status Relate to Graduation Rate in Engineering Degree Programs
Bradley D. Bowen, Jesse L. M. Wilkins, and Jeremy V. Ernst

Informed Design through the Integration of Entrepreneurial Thinking in Secondary Engineering Programs
Greg J. Strimel, Eunbiye Kim and Lisa Bosman

Jump Start: Lessons Learned from a Mathematics Bridge Program for STEM Undergraduates
Michael Lecocke, Jason Shaw, Ian Martinez, Necia Wolff, Paulina Cano and Vanessa Lobares
Discussion: Research Practice Gap

What questions do you have that research needs to be addressing? (i.e. what are the blind spots in academia)

What tools and resources do you currently use to find up to date research?
Take Away Messages

It's Complicated.

It Depends.
Your Questions?
References

In this session we will look at some recent research related to student engagement, social and emotional learning, and STEM education. We will discuss ways to balance work in the classroom with continual professional and personal growth including accessing resources, both scholarly and informal. Participants will leave the session with a bank of research based strategies to use immediately in the classroom as well as the tools needed to continue to build their professional practice.
Affective Domain

“Trigger” and Nurture Interest

Acknowledge and Explore Identity

Build Caring Relationships

Cognitive Domain

Recommended Resources for Accessing Relevant Research

(1) What Works Clearing House Practice Guides  
- Organized by topic with clear indicators of research-based effectiveness evaluation

(2) Harvard Educational Review  
- More of a “big picture” view on current issues in education, with a focus on social and cultural issues

(3) Education Endowment Foundation Teaching and Learning Toolkit  
- Specifically for ages 5–16; divided by topic and includes description, evaluation, and implementation points to consider (not updated frequently)

(4) Edutopia.org  
- An easy to read and informal guide to current trends in education; mostly blog posts and links out to sources

And someday in the future my website will be more up to date with research. www.sciencesmiles.com 😊

Encourage Active Retrieval

Use Dual Coding

Develop Metacognition

Peer recommended resources:

Further Questions? Contact Ella: emiesner@utexas.edu
Teacher tool: **Refutation Texts**

Teacher tool: **Doodling (and Summarizing)**

Teacher tool: **Interleaving**