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Evidence-Based Teaching and Learning: From Theory to Practice

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Evidence-Based Teaching and Learning: From Theory to Practice

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February, 2014

Goal is to explore using evidence-based practice in our work

1. What are our challenges in teaching & learning?
2. How can an evidence-based approach help?
3. How can we practice evidence-based teaching & learning?
4. What are the take-home messages?

1. What are our challenges in teaching & learning?

A “perfect storm” of challenges

- We teach a wider variety of classes and formats, but with less support
- Our students are less prepared & busier, but we must support them all
- We must show that students learn, but often without any training

Do these sound familiar to you?



1. What are our challenges in teaching & learning?

**TCCTA: The Power
of Harmony**

1. What are our challenges in teaching & learning?

Teaching

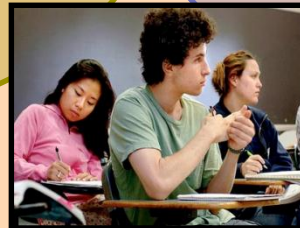


How can we support teachers?

Learning



How can we help students learn?



How can we assess students' progress?
Assessment

Goal is to explore using evidence-based practice in our work

1. What are our challenges in teaching & learning?
2. How can an evidence-based approach help?
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4. What are the take-home messages?

2. How can an evidence-based approach help?

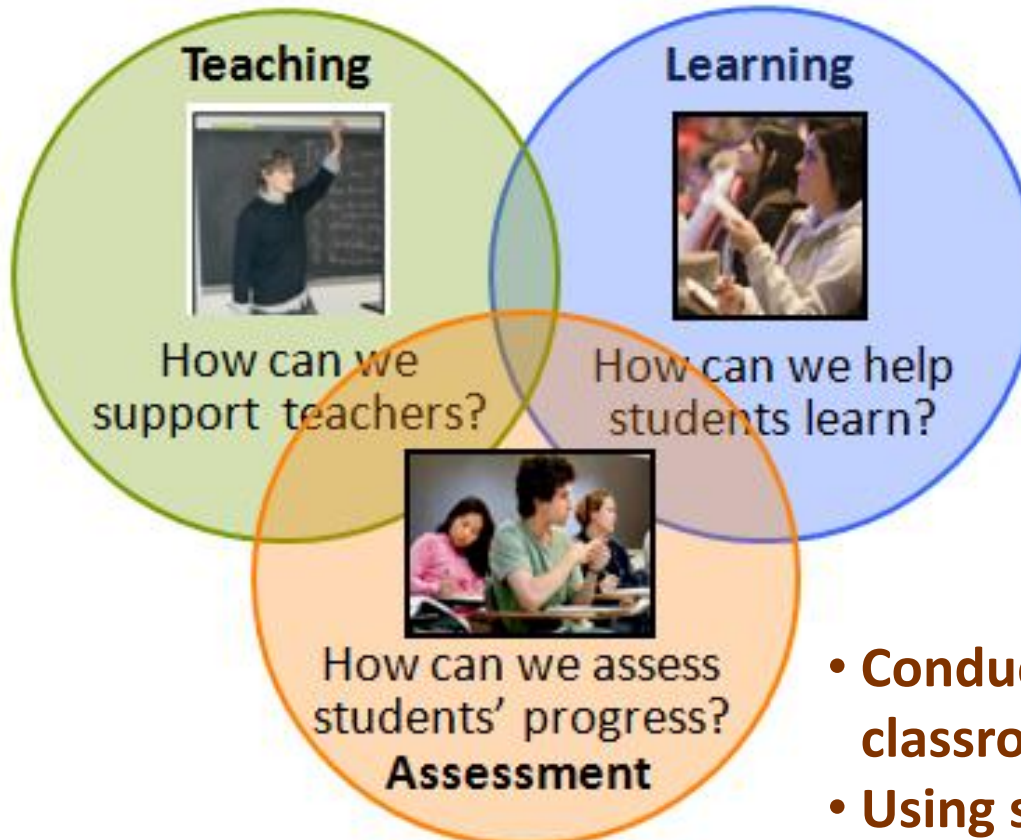
- Being evidence-based means using the methods and principles of science
- This is relevant to all aspects of our teaching and learning
- In the Introductory Psychology we called it “*Walking the walk*”



2. How can an evidence-based approach help?

Our approach to evidence-based teaching & learning

- Providing content resources for teachers
- Providing information about empirically supported pedagogies



- Using only empirically supported tools in course
- Teaching students effective study methods

- Conducting empirical classroom studies
- Using scientific methods in assessment

Goal is to explore using evidence-based practice in our work

1. What are our challenges in teaching & learning?
2. How can an evidence-based approach help?
3. How can we practice evidence-based teaching & learning?
 - ✓ While assessing outcomes
 - ✓ To enhance student learning
 - ✓ To support teachers' skills
4. What are the take-home messages?

3. How can we practice evidence-based teaching & learning?



Assessment

Challenge for our 10-year accreditation visit:

- To develop an assessment program based on scientific principles (Dunn, Mehrotra, & Halonen, 2004)

Step 1: Choose learning objectives (text, APA, & Bloom's levels (Pusateri, 2009))

Step 2: Develop indirect measures to assess attitudes (Breckler, 1984)

Step 3: Develop direct measures to assess learning on pre- and post-test

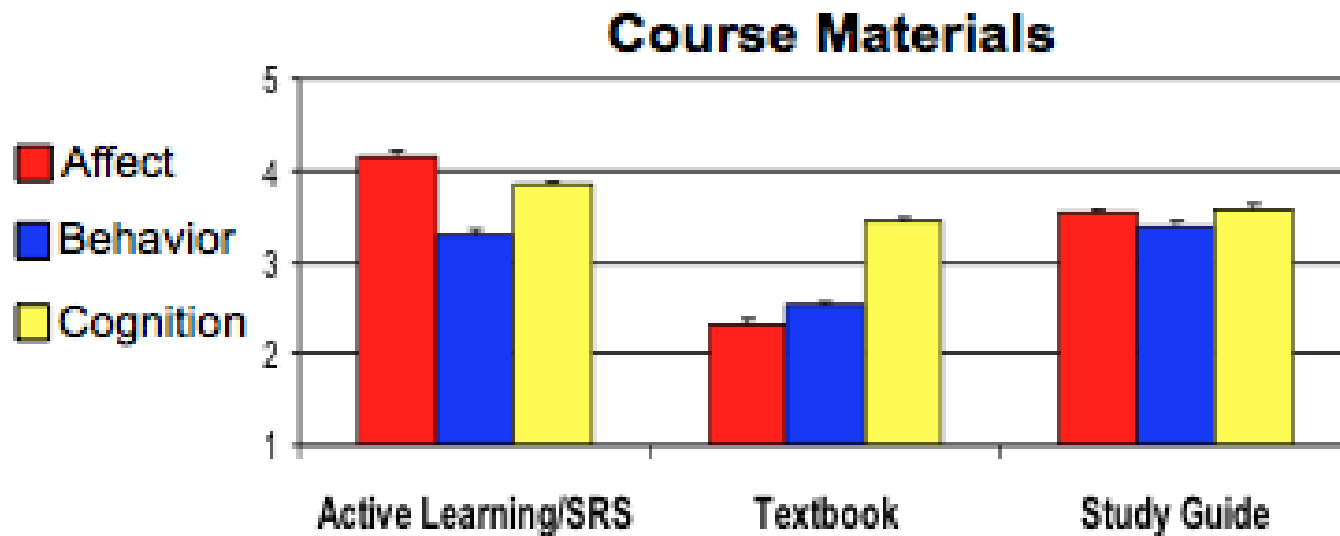
Step 4: Collect student data to investigate individual differences

Step 5: Apply results to improve student learning and support teachers' skills

3. How can we practice evidence-based teaching & learning?



Assessment

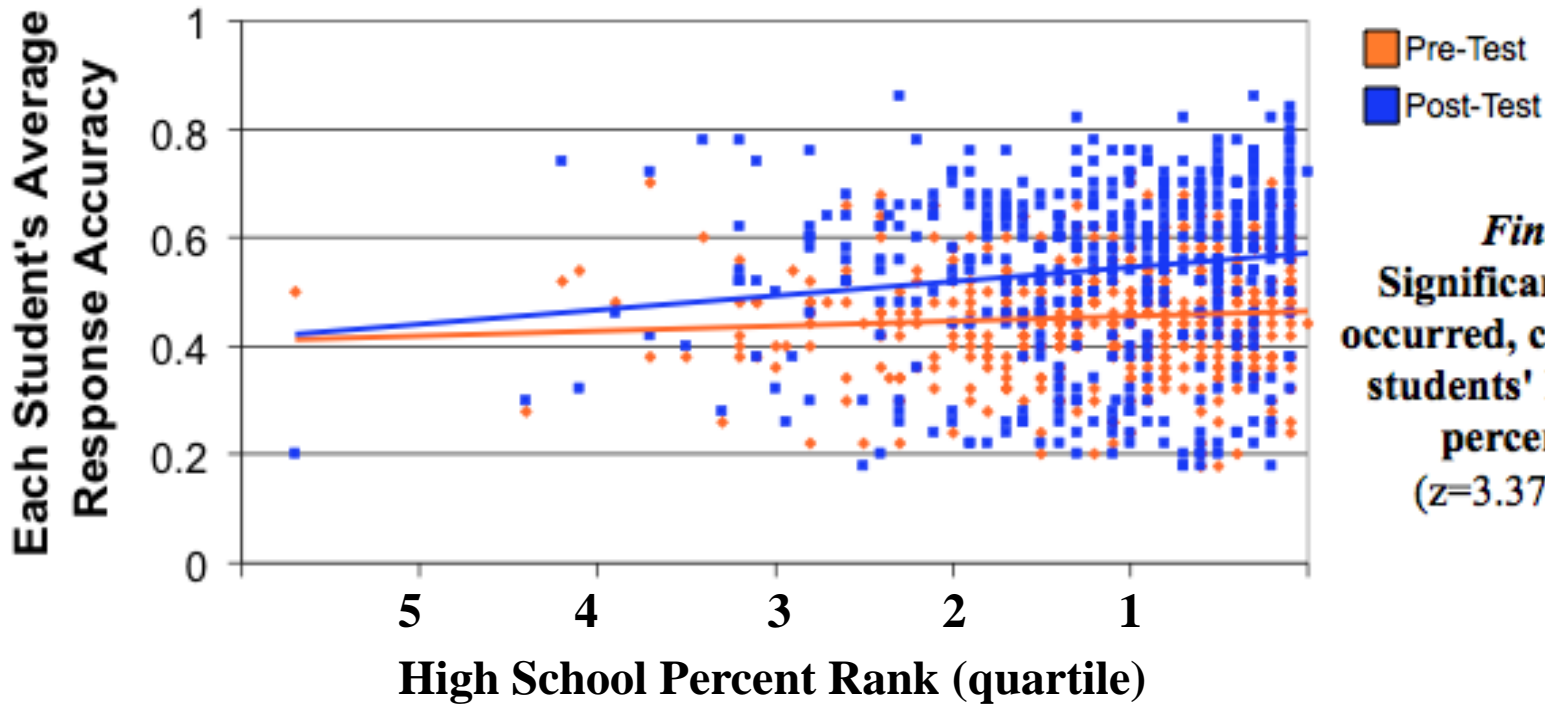


***Finding:* Most positive attitudes towards student response systems**

3. How can we practice evidence-based teaching & learning?



Assessment



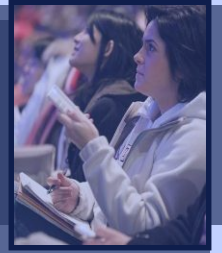
Finding:
Significant learning
occurred, contingent on
students' high school
percent rank
($z=3.37, p<.001$).

3. How can we practice evidence-based teaching & learning?

Tips from the trenches about assessment!

- Investigate getting IRB approval to access to students' files
- Motivate participation and performance
 - ✓ e.g., Give extra points on grade for correct answers
- Avoid practice effects
 - ✓ Two tests with **different** questions on **same** concepts/learning goals
- Examine difficulty across two tests
 - ✓ **Pre**-test: Half of students do Test A & half do Test B
 - ✓ **Post**-test: Students who had Test A now do Test B & vice versa
 - ✓ Analyze for difficulty of both tests & revise as needed

3. How can we practice evidence-based teaching & learning?



Learning

Challenge to improve student learning:

- Repeated testing improves memory (Roediger & Karpicke, 2006; Carpenter, et al., 2007)
- So we investigated using student response systems to achieve the effects of repeated testing

Step 1: Use data from assessment pre-test as baseline

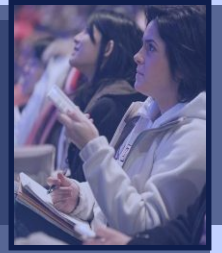
Step 2: For 1 week TAs' classes got 4 or 8 SRS questions (Preszler et al., 2007)

Step 3: For another week TAs' classes got 8 or 4 questions (counterbalanced)

Step 4: Collect data on text reading; Post-test 1 in 2 weeks; Post-test 2 in 12 weeks

Step 5: Close the loop to change policies on SRS use across sections & train teachers

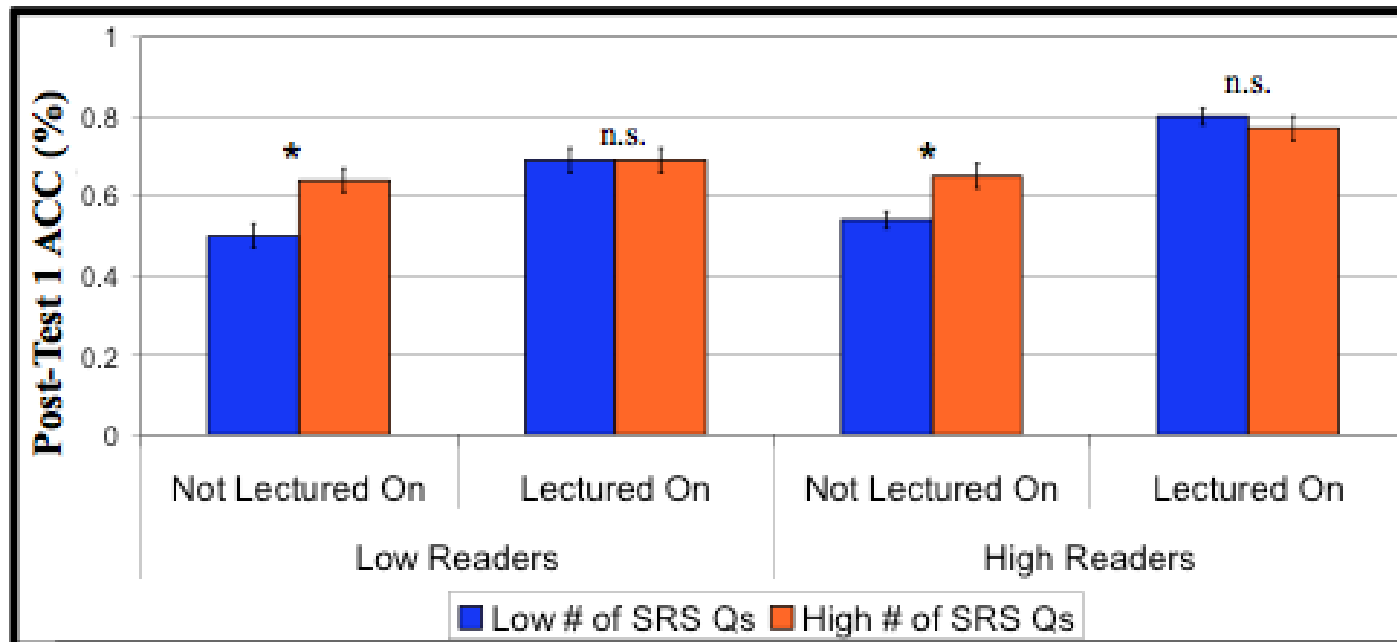
3. How can we practice evidence-based teaching & learning?



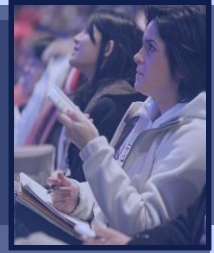
Learning

Learning After 2 Weeks Predicted By High Number of SRS Qs

Only for topics NOT covered in lecture ($z=4.7, p<0.001$)

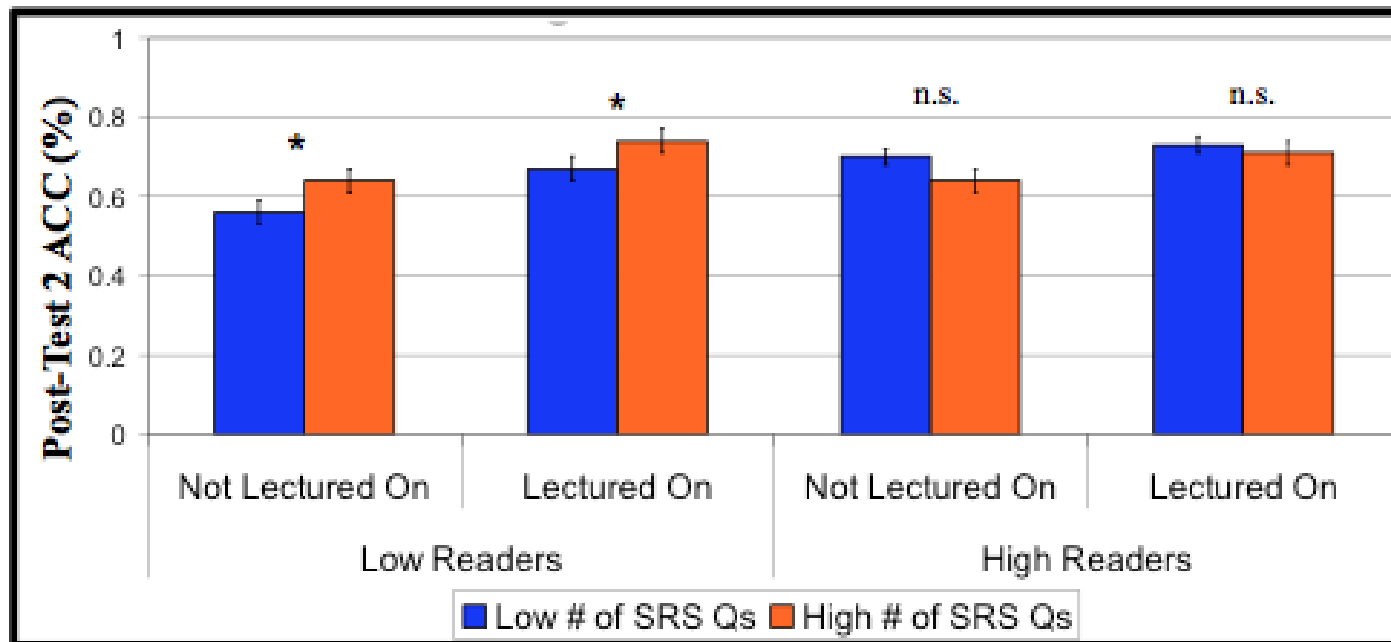


3. How can we practice evidence-based teaching & learning?



Learning

Learning After 12 Weeks Predicted By High Number of SRS Qs *Only for “Low” readers ($z=-2.3, p<0.05$)*



3. How can we practice evidence-based teaching & learning?

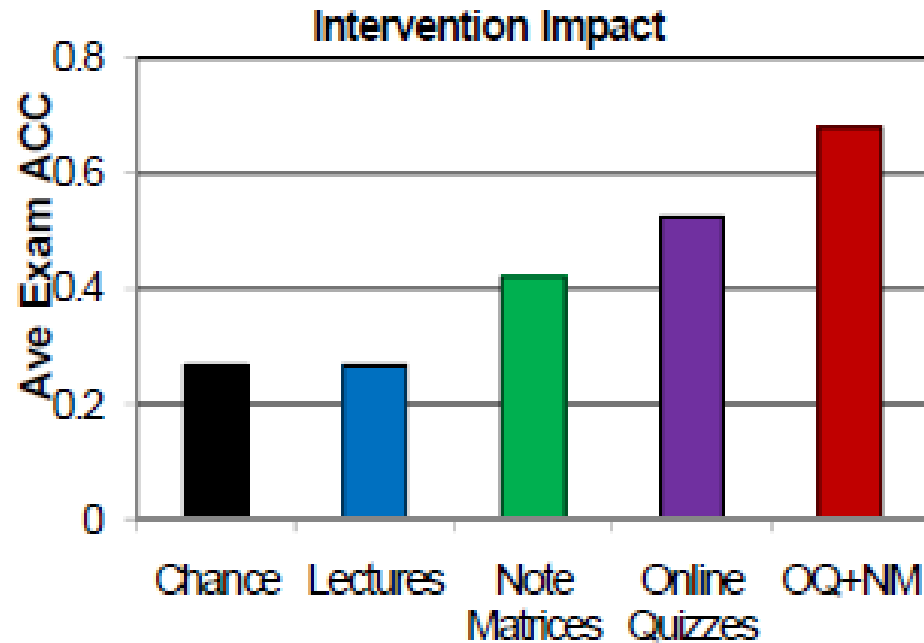
Tips from the trenches about student learning!

- IRB approval to find data that may predict learning/reading
 - ✓ e.g., High school rank, Mini Big 5, Achievement Motivation etc.
- Be careful about ethics in classroom studies
- Teach students the skills that will help them learn!

Strong Support	Moderate Support	Weak Support
Repeated Testing	Self-explanation	Highlighting
Distributed practice	Elaborative interrogation	Re-reading

Dunlowsky et al, 2013

3. How can we practice evidence-based teaching & learning?



Finding: In equal opportunity sections, repeated testing via online quizzing and self-explanation via written homework (note matrices) predicted better test performance.

3. How can we practice evidence-based teaching & learning?



Teaching

Challenge to support teachers:

- Few receive teaching training (Buskist, Beins, & Hevern, 2004)
- We provided content & pedagogy support to TAs



Step 1: Develop classes & seminars to support content, pedagogy & technology

Step 2: Develop wiki of resources on these topics for teachers to access

Step 3: Develop non-evaluative methods for class visits & videotaping

Step 4: Provide professional development support for teaching certificates

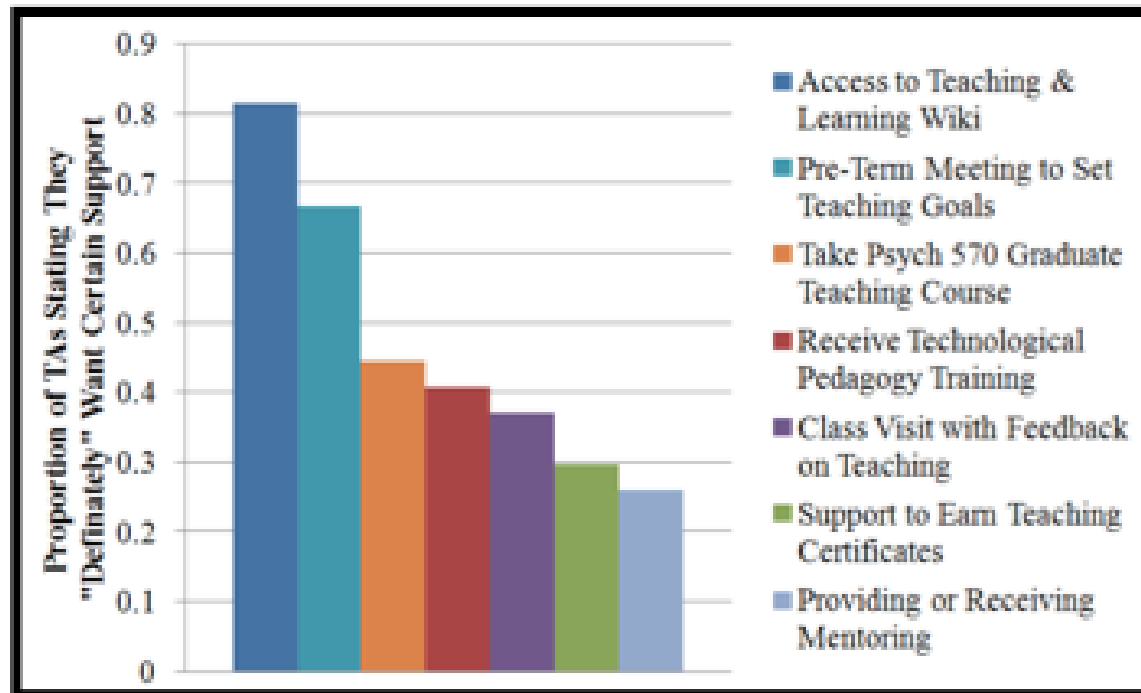
Step 5: Close the loop to alter resources and support as appropriate

3. How can we practice evidence-based teaching & learning?



Teaching

TAs' Attitudes Were Most Positive Towards Training Activities With Immediate Benefits

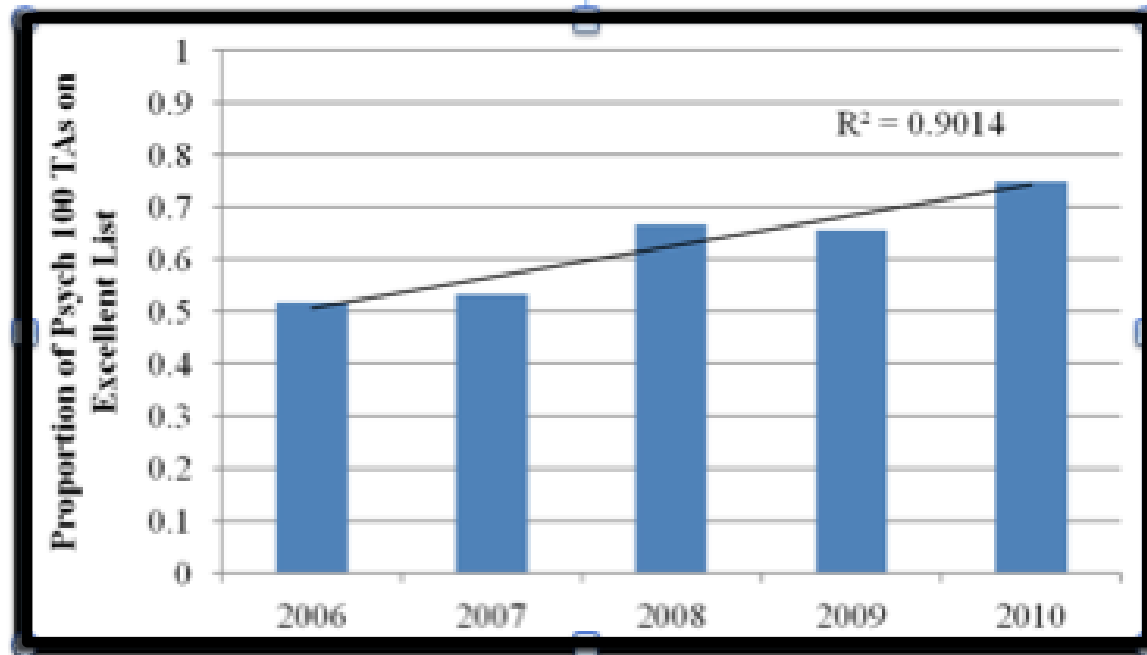


3. How can we practice evidence-based teaching & learning?



Teaching

Proportion of Psych 100 TAs on Excellent List Increased



3. How can we practice evidence-based teaching & learning?

Tips from the trenches about supporting teachers!

- When providing support to teachers it's a delicate balancing act – honor experience and provide access to new information
- Using an approach like self-determination theory can help to develop competence, autonomy, & relatedness (Deci & Ryan)
- Data is never causal, but can use statistical methods to look for predictor variables (logit mixedmodels)

Goal is to explore using evidence-based practice in our work

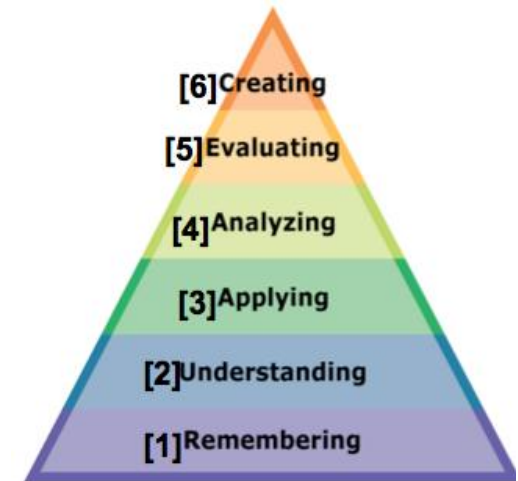
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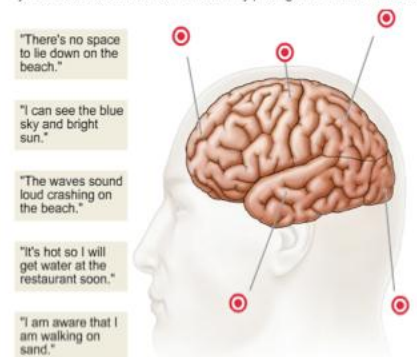
- Evidence-based teaching and learning can be flexible and efficient
- And it can give us new information:
 - ✓ In terms of preparation “rich get richer”
 - ✓ Ability to read a text seems to predict learning
 - ✓ Must support text reading and provide layered ways to learn material (e.g., clickers, online quizzes, note matrices)

4. What are the take home messages?

- Current work is exploring ways to improve student learning by using pedagogically appropriate:
 - ✓ Development of higher thinking skills (Bloom et al., 1956; Anderson et al., 2001; Henricks-Lepp et al., 2014)
 - ✓ Online homework tools (Carlson et al., 2012)
 - ✓ Active engagement with videos (Mayer, 2008)



The aim here is to apply the global workspace model to this new situation where you are walking on the beach on a warm summer day. Please click on the 5 statements that reveal awareness and show what brain region allows you to be conscious of that information by placing it on the correct red target.



Thank you very much!

- Texas Community College Teachers Association & Marylou Robbins
- Introductory Psychology teachers and students at the University of Illinois, Urbana-Champaign
- APS Fund for Teaching & Public Understanding of Psychological Science
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Crystal Carlson



Genevieve
Henricks-Lepp



Jenna
Wiedenbenner

Any questions or thoughts?

- Please email me at sgrison@parkland.edu