Active Learning Applied

Simple Strategies for Complex Content

An Evidence-Based Teaching Group Presentation

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Presentation and handouts available at **med.und.edu/education-resources**
(See Evidence-Based Teaching under Teaching and Learning Resources)

Introductions

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Evidence for AL

- NSF & DoE SCALE UP (Beichner et al., 2007)
  - 16,000 students over 5 years
  - Well-designed AL science courses vs. non-AL
  - Rigorous, validated measures of learning
- Results
  - Higher scores on national tests, end-of-course exams, and measures of conceptual knowledge
  - 50% lower failure rates overall and for at-risk students

Beichner, R. J. et al. (2007). "The Student-Centered Activities for Large Enrollment Undergraduate Programs (SCALE-UP) project," in E. F. Redish and P. J. Cooney (Eds) *Research-Based Reform of University Physics*. College Park, MD: American Association of Physics Teachers

(More) Evidence for AL

- Three Meta-Analyses Over 15 Years
  - Moderate-to-large effect sizes across the board
    - Achievement, persistence, application of knowledge, exam scores, concept inventories
  - Smallest effect size observed would move a student from the 50th percentile to the 70th (from failing to passing)
- 2014 Meta-Analysis
  - Student exam and concept inventory scores increased by 0.47 SDs under AL
  - Average exam scores 6% higher in active learning
  - Students in traditional lecturing 1.5 times more likely to fail

What's Your Problem?

- Complexity
  - Too much information/information is too complex
- Transfer
  - They can answer questions but can't apply knowledge
- Processes
  - They don't understand what it looks like in action

What's Your Problem?

- Systems/Dynamic Content
  - They don't understand how different components influence and interact with each other
- Definitions
  - They memorize the definitions but can't use them
- Synthesis
  - They can't put everything together into a meaningful whole

Your Turn

- Anyone have an example of any of these?

AL Strategies: An Overview

- Handout provides more detail
- We'll cover two in more depth, today
- Ask questions any time!

Strategies

- 10-2
  - What
    - Pause for two minutes every 10 minutes
  - Why
    - Maximum amount of time we can attend meaningfully
    - One way to "Chunk & Reset" (see handout)

Strategies

- Q & A
  - What
    - Ask questions, promote question-asking
  - Why
    - The more questions students ask, the more they learn*
    - Research shows average student asks 1.5 questions per hour**
    - Students learn as much from someone ELSE asking a question as from formulating that question themselves***
    - Ungraded quizzes at beginning and end of lectures raises letter grades one full letter****

*Dillon, T.J. (1988). *Questioning and teaching: A manual of practice*. New York: Teachers College Press; Van der Meij, H (1988). Constraints on question asking in classrooms. *Journal of Educational Psychology*, 80, 401-405.
**Graesser, A. C., & Person, N. K. (1994). Question asking during tutoring. *American Educational Research Journal*, 31, 104-137.
***Otero, J., & Graesser, A. C.. (2001). PREG: Elements of a Model of Question Asking. *Cognition and Instruction*, *19*(2), 143–175. Retrieved from http://www.jstor.org/stable/3233815
****McDaniel, M. A., Agarwal, P. K., Huelser, B. J., McDermott, K. B., & Roediger, H. L. (2011). Test-enhanced learning in a middle school science classroom: The effects of quiz frequency and placement. *Journal of Educational Psychology*, *103*, 399-414.; Roediger, H. L., Agarwal, P. K., McDaniel, M. A., & McDermott, K. B. (2011). Test-enhanced learning in the classroom: Long-term improvements from quizzing. *Journal of Experimental Psychology: Applied*, *17*, 382-395.

Strategies

- Cases
  - What
    - Create a case that requires/integrates factual knowledge
  - Why
    - Helps build mental model of applied concepts
    - Integrates multiple concepts, processes, components into meaningful whole

Strategies

- Roleplays
  - What
    - A case that requires student input and demonstration of concepts
  - Why
    - Helps build dynamic and applied knowledge rather than inert memorization
    - Addresses sense of false confidence

Strategies

- Fishbowl
  - What
    - You and/or students model a case, process, roleplay while class observes
    - You interrupt at key points to ask questions, make observations, elicit responses, provide feedback
  - Why
    - May not have sufficient skills sets in each group to do
    - Time constraints may not allow all to do
    - Need a model to set the tone
    - You cannot be present in each group to help provide feedback
    - Vicarious learning can be almost as effective

Strategies

- Jigsaw
  - What
    - Divide students into groups to work on
      - A) same problem (generate multiple solutions to show diversity)
      - B) different aspects of the same problem (deep dive on components; synthesis across groups later)
  - Why
    - Distributes expertise and support/feedback (collective intelligence)
    - Allows deep dives into complex concepts or systems (divide and conquer)

Your Turn

- Has anyone used any of these strategies?
  - Jigsaw
  - Fishbowl
  - Cases
  - Roleplays
  - 10-2
  - Q & A

Fishbowl Example

- Accommodation in the Classroom

Design a Fishbowl Example

- Break into groups (Jigsaw)
- Identify one real instructional problem suitable for fishbowl (2 minutes)
- Generate a fishbowl strategy and plan to solve it (5 minutes)

Setting the Stage for AL

- Communicate
  - Share rationale
  - Set expectations
  - Get feedback
- Start small
  - Make the first one easy
- Build for success
  - Make the first one worth something
- Hold them accountable for preparation (e.g., iRAT/gRAT)

Conclusion

- Pick your battles
  - Don’t redesign everything—focus on things you CAN’T teach with existing methods
- Don’t expect them to love you
- Don’t underestimate the time or effort initially
- Don’t expect it to work exactly as you want until you’ve done it three times