

American Chemical Society New Faculty Workshop

Assessment: A Tool to Support Student Success

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What aspirations do you have for your students?

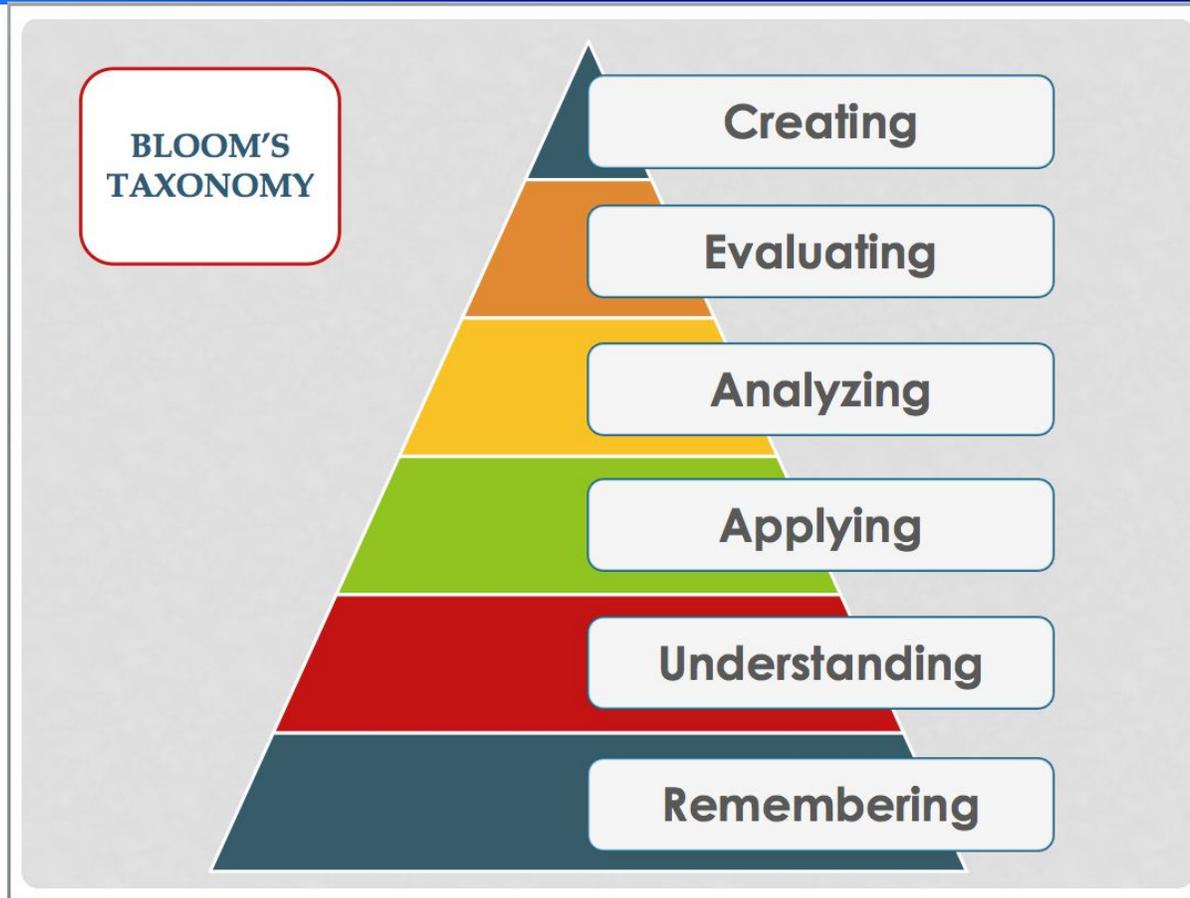


Measuring success

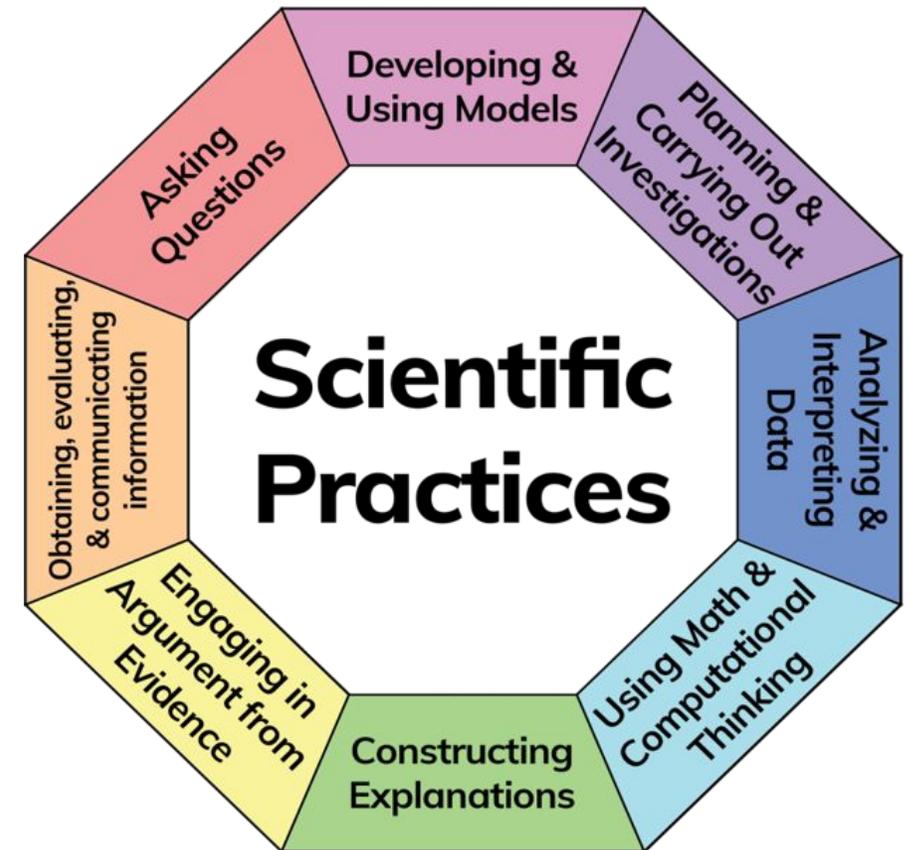
- How will you know that your students have achieved this goal?
- When you ask a question, do you know what skills your students must use to answer it?



Learning comes in multiple ways, shapes and forms



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Schwarz, C. V., Passmore, C. M., & Reiser, B. J. (2017). Moving beyond “knowing” science to making sense of the world. In C. V. Schwarz, C. M. Passmore & B. J. Reiser (Eds.), *Helping students make sense of the world through next generation science and engineering practices* (pp. 3-21). Arlington, VA: NSTA Press.

Dissecting questions

- In groups, examine and analyze exam questions.
 - Estimated time: 10 min.
 - Record your discussion, then we will come back together to debrief.



Dissecting questions

The reaction, $2 \text{HI} (\text{g}) \rightarrow \text{H}_2 (\text{g}) + \text{I}_2 (\text{g})$, exhibits second-order kinetics at $400 \text{ }^\circ\text{C}$. If the reaction begins with a concentration of $1.0 \times 10^{-3} \text{ M}$ for HI and drops to $3.56 \times 10^{-4} \text{ M}$ after 243 sec, what is the rate constant, k , (with correct units) for the reaction?

Rate this question.

- Where is this on the difficulty scale?
 - What Bloom's category is this question?
 - What scientific practice (NGSS) does this question address?
-

Dissecting questions

Use your understanding of periodic variations in element properties to answer the following questions.

- A) Based on their positions in the periodic table, list the following atoms in order of increasing atomic radius, such that the smallest atom is listed first, and the largest atom is listed last: Sr, Ca, Si, and Cl.
- B) Of the five elements Al, Cl, I, Na, Rb, which has the most endothermic reaction? (X represents an atom.)



- C) What name is given to the energy for the reaction in part (B)?
- D) Provide a brief explanation for your selection for (B).
- E) The ionic radii of the ions S^{2-} , Cl^- , and K^+ are 184, 181, 138 pm respectively. Explain why these ions have different sizes even though they contain the same number of electrons.
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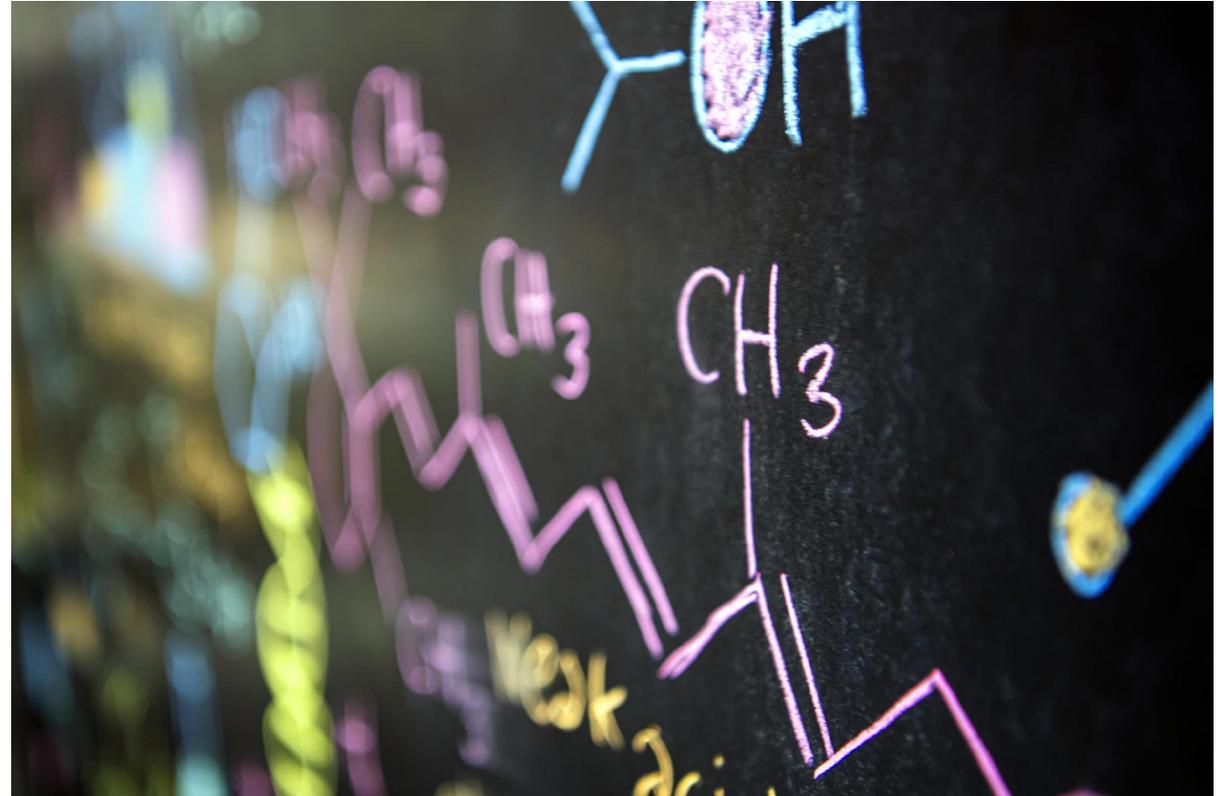
Writing questions

- What are your priorities when writing a question
 - Easy to grade? (large class)
 - Easy to write? (less faculty time in preparation)
 - Very accurately dissects student thinking
 - Equity or fairness (does not include culturally loaded examples, does not favor native English speakers, graded with a rubric)
 - Illustrates multiple skills at the same time (integration or application of knowledge)
 - Isolates a single critical skill
 - Be intentional as you write questions
 - Use variety so that not all questions are alike
-

What do you do if half of your class fails the first exam?

In groups, discuss this scenario.

- Estimated time: 10 min.
- Be prepared to share.



Thoughts on the exam scenario



What themes emerged from your discussion?

How do you know your students are learning?

Students **stop** paying attention after about **10-18** minutes of class time.

What do we do to prevent "losing" them in class? How do we check for understanding?



Johnstone, A. H. and Percival, F., Attention breaks in lectures. *Educ. Chem.*, **1976**, *13*, 49-50.

Formative Assessment

- Implement **during** the learning process to capture feedback on student learning.
 - Instructor can **modify** teaching and **improve** student understanding.
 - Should be **integrated** into the curriculum and **frequently** implemented (10-20 min, every class!)
 - Could be graded for **participation** or other **low stakes** grade.
-

Formative Assessment

- Also called Classroom Assessment Techniques (CAT).



- What are some ways that we can do this?
-

Classroom Assessment Techniques

- Think-pair-share
- Muddiest point
- Concept mapping
- One minute paper
- Clicker question(s)
- Case studies
- Pre/post questions
- Statement corrections (works with published papers)
 - **And many, many more!**



Summative Assessments

- Typically used for **evaluation**.
- Occur at the **end** of the learning experience.
- Tend to be **high** stakes.
- Often occur **infrequently**.

This can cause test anxiety and set the stage for academic dishonesty.

Rethinking Summative Assessments

- Increase **frequency** by using smaller sub-units per exam rather than a mid-term and final.
- How do we support students so that they learn from mistakes?
 - Consider **exam corrections** coupled with **self-reflection**.
 - Provide **constructive feedback**.
 - Encouraging but specific actionable feedback so that improvement is possible.
 - What was the mistake?

Assessments Support Student Success

Faculty Perspective

- Monitor the learning of your students.
- Provide feedback to students on areas to improve.
- To evaluate your teaching practices.
- Show that you care about your students learning.

Student Perspective

- Monitor their own learning.
- Know what specific areas to improve.
- Improves their confidence and critical thinking skills.

Muddiest Point

- What are you still unsure about in terms of designing and executing an effective assessment?



Closing Thoughts

- Consider how you will build assessment into your Teaching/Learning Tidbit.
- Attitudinal Assessment
 - The student perception of their performance and experience.
 - Helps faculty to assess their assessments.



Resources

- Classroom Assessment Techniques: A Handbook for College Teachers 2nd Edition by Thomas Angelo
- [Fifty Classroom Assessment Techniques](#), Angelo and Cross
- [Field-tested Learning Assessment Guide](#)

