DO **NOT** PLAY WITH THE ITEMS ON YOUR TABLE

... yet.

Image Source: [http://www.sparklebox.co.uk/3341-3350/sb3345.html](http://www.sparklebox.co.uk/3341-3350/sb3345.html)

sandra.metoyer@cehd.tamu.edu
College Readiness for Success in the Sciences

Sandra Metoyer
Education Research Center at Texas A&M University
Texas A&M Educator Preparation Collaborative

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sandra.metoyer@cehd.tamu.edu
What should your students know and/or be able to do after completing your class?

Discuss a few important “enduring understandings” you want students to gain from your class.
Texas College and Career Readiness Standards

The emphasis on college readiness was introduced by Texas as part of the Closing the Gaps Initiative (2000) prior to the federal emphasis on college readiness (Achieve in 2004). It was followed by House Bill 1 in 2005, “Advancement of College Readiness in Curriculum.”

The CCRS were released in 2009 prior to the Common Core standards (Achieve in 2010).

Texas was the first state to identify and include College and Career Readiness in their state academic standards.

Revisions to the TEKS include alignment with and integration of the CCRS cross-disciplinary skills at all grade levels.

sandra.metoyer@cehd.tamu.edu
High school competent versus college ready

Failure rates in some entry-level courses approach 50 percent (Conley 2007):

A few BIG differences:

- More rapid pace in college,
- College courses are more likely to emphasize a series of key thinking skills
- College instructors expect students to already know how to make inferences, interpret results, analyze conflicting explanations of phenomena, support arguments with evidence, solve complex problems that have no obvious answers, draw conclusions, offer explanations, conduct research, engage in the exchange of ideas, and generally think deeply about what they are being taught – with little or no modeling or support for these skills.
- Little to no scaffolding provided
- Little to no formative assessment
- Little to no facilitation of peer support
- Little to no differentiated instruction
- Lots of weight given to fewer grades
- No extra credit
- Instructors often have little to no professional training as teachers
What does the CCRS *look like* in the science classroom?

• The *typical* way (refer to example)

• The Demonstration

• Confirmation Labs (cookbook)

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**Lab: Separation of a Mixture**
1. Weigh out 5 grams of a mixture containing NaCl and NaHCO₃
2. Heat the mixture in a crucible dish for 10 minutes using a Bunsen burner.
3. Weigh the mixture after heating.
4. Re-heat for 10 minutes.
5. Re-weigh the mixture after the second heating.
6. Subtract the mass of the solid before heating from the mass of the solid after heating.
7. Calculate the percent of NaHCO₃ in the solid mixture using the chemical equation provided.

Image source: http://blog.msbethea.com/?p=112

Image Source: http://www.vforteachers.com/essay_5_ECS.htm

sandra.metoyer@cehd.tamu.edu
Inspiring Key Cognitive Skills: Shifting the *typical* activity to incorporate CCRS skills

- Unknown substance
- Salt
- Water
- Stir stick
- Tub for mixing

Directions:

1. Preferably with a partner, decide in advance what you want to do with these three items (make a plan!)
   - If you have two sets of materials between you and your partner, make two different plans (compare!)
2. Implement your plan(s)
3. **Observe carefully**
4. Document your observations

sandra.metoyer@cehd.tamu.edu
Formulating Investigable Questions

Questions are the basis of all inquiry

1. Record as many questions as you can in the next 5 minutes.

2. Pick one “best” in your pair to share with the group.

3. Sort your selected best questions into:

   **Investigable questions**
   
   versus

   “QWWNIT”
Then what...

**Turning Questions**

- Scan for possible variables
- What factors in the question can be observed, measured, or changed?
- How can the question be turned into practical action?

**Tie the process and skills to CONTENT**

- For your grade level, what are some science content ideas or terms that you could tie into this activity?

sandra.metoyer@cehd.tamu.edu
CONTENT MATTERS!
Always make connections between the process/skills and the content EXPLICIT

Some Ideas:
• Conservation of mass versus volume
• Physical change versus chemical change – how do we know?
• Characteristics of a fluid versus a solid – which is it?
• Predicting movement of solvent molecules across a partially permeable membrane based on solute concentration (osmosis)
• Proportional reasoning to solve problems (e.g., as X increases, y increases/decreases; density)
• Measure the gain/loss of heat energy (thermodynamics)

*Deductive Reasoning* versus *Inductive Reasoning*

sandra.metoyer@cehd.tamu.edu
How can we foster college science success with the CCRS?

1. **Arouse Curiosity**
   - Model Observation
   - Allow *time* for student exploration (let them do it if at all possible!!)
   - Allow *time* for students to formulate their own questions
   - Model CCRS skills and the identification of researchable or investigable questions –over, and over, and over, and over again
   - **Provide discrepant events***
     - Offend the student’s intuition!
     - Discrepant to the student
     - “Turn” your cookbook labs/demos/activities into student tasks that integrate more of the CCRS skills

2. **Accompany the new experience with familiar information (building mental connections – schema )**

3. **Use as many gateways to the human brain as possible (five senses)**

4. **Connect skills and processes to CONTENT (always!)**

5. **Model your own curiosity and science with JOY & ENTHUSIASM!**
How can we foster College Ready Skills?

What does the CCRS have to do with College Science Success!?

Your students will not be taught “how to think” in college. They will not be taught how to “self-monitor” their own learning. They will not be taught how to work independently, or how to work collaboratively. They will not be taught study habits or time management. They will not be taught how to persevere to complete a task.

Yet, it will be assumed by many college instructors that they have (or should have) the skills, habits, and attitudes required for career/college success.

High school competent is not the same as college ready.

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Questions?

Thank you!

Sandra Metoyer
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http://erc.cehd.tamu.edu

http://donaldclarkplanb.blogspot.com/2011/04/is-higher-education-classic-bubble-7.html