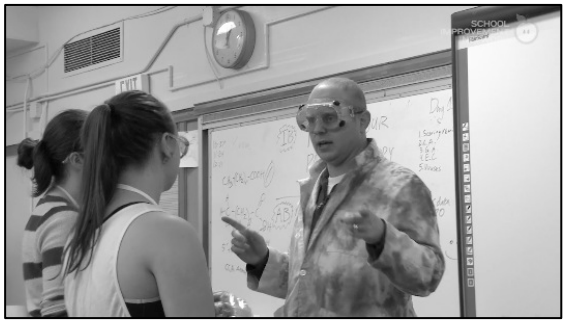
Evaluating Materials and Methods in a Science Experiment



Common Core in the Classroom Series

The Common Core in the Classroom series was created to provide educators with actual classroom examples of lessons aligned to Common Core standards and objectives.

About this Segment

In Mr. Jason Niedermeyer's International Baccalaureate Biology class at South Salem High School in Salem, Oregon, students determine the integrity of classmates' materials and methods notes for completing a diffusion experiment.

Pre-viewing Discussion Prompt

1. How do you promote critical thinking in the labs you design for your students?

Post-viewing Discussion Prompts

1. If you were the instructional coach observing this classroom, what 2-3 strengths in this lesson could you help the teacher identify?
2. What evidence of critical thinking and problem solving did the students demonstrate?
3. What constructive feedback could you give this teacher?

Lesson Evaluation

Rate the lesson's effectiveness (1 = not effective; 5 = very effective), and use your results to facilitate discussion and reflection.

1. Student learning targets were clearly communicated.
   1 2 3 4 5
2. Instructional activities led students toward meeting the objectives.
   1 2 3 4 5
3. Students were actively engaged.
   1 2 3 4 5
4. Teacher differentiated instruction.
   1 2 3 4 5
5. Assessments effectively monitored student progress.
   1 2 3 4 5

Reflection Questions

After watching the video, participants can answer the following questions to reflect on new learning:

1. How could Mr. Niedermeyer have effectively differentiated his instruction to meet the needs of students who might struggle during this lesson?
2. When was student collaboration at its best in the video?
3. What procedures help your students use materials effectively in class?

Teacher Lesson Plan

Teacher: Jason Niedermeyer	**School Name:** South Salem High School	**Location:** Salem, Oregon
Grade Level: 9-10	**Content Area:** Biology	**Lesson Duration:** 90 min., part 1 of 1	**Lesson Date:** December 5, 2013

Summary/ Overview	This lesson is designed to help students understand the importance of maintaining precision in recording methods, materials, and results in science experiments. Student groups will exchange their materials and methods notes from their most recent experiment and then conduct the experiment again, using each other's notes to see if they arrive at the same results.
Skill-Based Objectives & Deliverables	Students will conduct an experiment using another group's methods and materials list, determining how precisely the procedures directed to them produce the original result and offering suggestions for improvement.
Standard(s) Addressed	CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. CCSS.ELA-LITERACY.RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
Materials & Resources	Protein solution, carbohydrate solution, lipid solution, beakers, graduated cylinders, Ziploc bags, students' materials and methods notes, goggles, aprons
Procedures	1. Students put on safety gear (goggles, aprons, etc.). 2. Teacher matches student partner groups with each other. 3. Student teams look at their materials/methods notes, determine which is most detailed, and make adjustments/updates. 4. Students exchange methods/materials notes with another group. 5. Students conduct experiment using other group's notes. 6. Teacher monitors student progress during experiment. 7. Student groups compare results to notes and pictures of partner group and offer suggestions for making better procedures next time. 8. Class discusses importance of precision and detail in creating methods/materials for experiments. 9. Students clean up.
Assessment	Teacher will monitor progress during group work and use student work to inform future lesson planning.

Resources from School Improvement Network

Exploring the Common Core. CC 360 program. http://www.pd360.com/index.cfm?ContentId=5014

11th-12th grade chemistry: RST.11-12.3 & 9, HS-PS3-4 - Investigating Thermodynamics 1: Melting Ice. CC 360 segment. http://www.pd360.com/index.cfm?ContentId=7669

11th-12th grade chemistry: RST.11-12.3 & 9, HS-PS3-4 - Investigating Thermodynamics 2: Burning Marshmallows. CC 360 segment. http://www.pd360.com/index.cfm?ContentId=7670

Resource for Classroom Practice

Biology-Resources.com (n.d.). Biology Experiments. Retrieved April 28, 2014, from http://www.biology-resources.com/biology-experiments2.html