Project-Based Learning and UbD in Elementary, Middle and High School Classrooms

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Sort & Mingle Warm-Up!

Sort

Do you prefer...???

- Hot, humid vs. cold, snowy days
- Cloud watching vs. star gazing
- Rain vs. snow
- Cumulous vs. stratus clouds
- NOAA.Gov or Weather.Com
Sorts and Mingle Warm-Up!

Mingle

• What is your favorite place on Earth?
• What is your favorite season?
• What is your favorite outdoor activity?
• What is your favorite weather/climate topic to teach?
• What is your least favorite weather/climate topic to teach?
The Magic Wand

• What would you do if you just found a magic wand that allows you to change three things about the way that science is taught.

• What would you change?

• Why it is important to make these changes?
Session Objectives

1. What is Project-Based Learning (PBL)?
   - Principles
   - Traditional Classroom vs. PBL Classroom

2. What is Understanding by Design (UbD)?

3. How are PBL and UbD applied to SWAC?
What do you know…?

• … about project-based learning?

• … about understanding by design?

What is Project-Based Learning?

Project-based learning is

• a teaching and learning approach that focuses on the big ideas of a discipline or disciplines,
• involves students in problem-posing, problem solving and other meaningful tasks,
• allows students to work autonomously to build their own learning over an extended period of time,
• and culminates in realistic, student-generated products.
Project-based learning...

- Deeply involves students in interdisciplinary experiences rooted to subject matter
- Focuses on students discovering questions and answers
- Encourages students to be independent learners with group support
- Allows students to create unique student products that support their understanding
Principles of PBL

• Learner-centered
• Authentic content and purpose
• Challenging projects
• Product, presentation, performance or exhibition
• Collaborative and cooperative learning
• Incremental and continual improvement
• Teacher facilitated
• Explicit educational goals
• Integrates technology
How does PBL influence teachers and teaching?

- Teachers are generally enthusiastic, motivated, and successful in their quest to implement project-based learning in their science classrooms (Rosenfield and Ben-Hur, 2001).

- Collaborative PBI curriculum development resulted in positive change in teachers’ understanding and practice of science and science teaching (Blumfield, 1994).

- School culture and mission and teacher prior knowledge and experience of PBI played a significant role in teachers successfully implementing PBI in secondary science classrooms (Toolin, 2004).

- PBI presents challenges to teachers in course and assessment design or the revision of existing ones (D’Amico, 1999).
How does PBL influence student learning and motivation?

• PBL maximizes the use of technological tools for analyzing, presenting, and communicating results (Grant, 2002; Morrison & Lowther, 2005).

• Student motivation and learning science significantly increased in PBL classrooms (Marx, 1994; Stratford & Finkel, 1996).

• Underrepresented HS students’ interest in science and science teaching increased as a result of engaging in a PBL summer program (Toolin, 2003).

• Student collaboration and the use of technology increased as teachers enacted several aspects of project-based science in their teaching practice (Marx, 1994).

• Student motivation and commitment to learning heightened while developing ocean software projects. (Yarnell)
### Differences in Traditional and PBL Instruction*

<table>
<thead>
<tr>
<th>Feature</th>
<th>Traditional</th>
<th>PBL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum</td>
<td>Textbook driven</td>
<td>Problem-solving</td>
</tr>
<tr>
<td>Sequence</td>
<td>Fixed units</td>
<td>Interdisciplinary</td>
</tr>
<tr>
<td>Assessment</td>
<td>Test and compare</td>
<td>Criteria based</td>
</tr>
<tr>
<td>Technology</td>
<td>Peripheral</td>
<td>Central, integral</td>
</tr>
<tr>
<td>Classroom</td>
<td>Working alone</td>
<td>Works in groups</td>
</tr>
<tr>
<td>Student role</td>
<td>Receiver</td>
<td>Discoverer</td>
</tr>
<tr>
<td>Goals</td>
<td>Mastery of facts</td>
<td>Understanding and application</td>
</tr>
</tbody>
</table>

Source: Buck Institute for Education

Curriculum Planning & Backward Design

http://www.youtube.com/watch?v=6Cagh0H7PPA&feature=related

1. Identify Desired Results
2. Determine Acceptable Evidence
3. Plan Learning Experiences

(Adapted from Wiggins and McTighe, 2003)
Begin with the End in Mind!

• What will your students know and be able to do as a result of this unit project?
• How will they interact and relate to each other and to adults?
• How will they think? How will they think about their own learning?

Most Importantly......

• How will students apply AND transfer their knowledge in the real world?
• How will the real world influence your student and your curriculum?
What’s the Big Idea?

• What are the enduring understandings or big ideas that students will know and be able to do by the end of the unit project?

• Examine national, state, district standards & Principles of Learning (see nylearns.org, eservices.nysed.gov/vls)

• Review curriculum expectations and other resources

• Establish curricular priorities
Create it!

PBL Planning:

• The Vision Stage
  – Determining the Big Idea

• Inquiry Stage
  – What is the desired result and how will students know when they have reached it?

• Build Stage
  – Planning the Learning Experiences

• Reflection Stage
  – Reflecting on how to improve the project
Model it!

- Project Planner
- Example from past participant
  - Sharron M. Prairie

- If time allows, more from Wiggins…

- http://www.youtube.com/watch?v=WsDgfC3SjhM&feature=related
Wrap it up!

- PBL Possibilities are endless
- Motivation and excitement for learning will increase
- Connected and collaborative learning will occur
- Students retain learning beyond testing
- Transfer of learning is the ultimate goal.
A Tour of the SWAC Website

• uvm.edu/~swac
References

http://www.ci.maryville.tn.us/schools/bennett%20PBL%20wTech.ppt#256,1,Project-Based Learning

Buck Institute for Education


http://videos.hightechhigh.org/

http://www.terc.edu/ourwork/g_38_3_sci.html

http://imet.csus.edu/imet2/stanfillj/workshops/pbl/description.htm#Project Examples