Project-Based Learning
A Comparison Between PBL and Conventional Teaching Methods.

Background
Project-based learning (PBL) was integrated into two 9th grade Earth science classes. Students have shown disinterest and appear unmotivated to learn science. I suspect this is from the fact that science has not been engaging but has been presented by rote teaching practices that do not engage or challenge students’ abilities. PBL was used to try to improve student engagement and motivate students to understand science content in a more real-world aspect and to provide deeper mastery of science concepts. I wanted to assess the value of PBL in teaching and understanding science compared to conventional instruction methods.

Primary Question
How will project-based learning enhance understanding of science concepts compared to current instructional strategies?

Sub-questions
1. Does a project motivate students to learn more than current teaching methods?
2. Can artifacts in a project or the project itself be used as the major assessment during a unit rather than a summative test?

Treatment

Weather Unit
• Class 1 (PBL Group): Created Children’s Book on Weather & Presented to Local Elementary Students
• Class 2 (Control): Learned Via Conventional Methods

Climate Unit
• Class 1 (Control): Learned Via Conventional Methods
• Class 2 (PBL Group): Created PowerPoint Presentation Regarding Global Warming & Presented to Community Panel

Data Collection & Analysis

<table>
<thead>
<tr>
<th>Questions</th>
<th>Data Source</th>
<th>Data Source</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBL vs. Regular methods.</td>
<td>Pre-unit test</td>
<td>Post-unit test</td>
<td>Knowledge rating</td>
</tr>
<tr>
<td>Motivation of PBL vs. Regular methods</td>
<td>Student interviews</td>
<td>Student survey</td>
<td>Teacher journal/log</td>
</tr>
<tr>
<td>Projects and artifacts as assessment tools</td>
<td>4th grade book creation</td>
<td>Panel presentation</td>
<td>Summative test</td>
</tr>
</tbody>
</table>

Results
• Engagement during PBL determines success of post test scores and project grades
• Tracking and noting engagement during PBL helps ensure involvement, group management, as well as grading and accountability during PBL process
• High achieving students benefit more from PBL than low achieving students
• PBL Design Determines Success
  – Incorporating peer review, engagement observations or tally sheets, rubric, and time for submitting a rough draft is a must.
  – Allow for a learning curve and leeway when doing a large project for the first time and when students are not accustomed to a project type (Writing a Children’s Book).

Comparison of post test low gain scores and engagement

<table>
<thead>
<tr>
<th>Low Gains and Unengaged during project</th>
<th>Low Gains and Unprepared on project due date</th>
<th>Low Gains on both weather and climate post tests</th>
<th>Low Gains on both post tests and unengaged during course of project</th>
<th>Mode of grades for low gain students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather Project Class</td>
<td>90%</td>
<td>60%</td>
<td>60%</td>
<td>83%</td>
</tr>
<tr>
<td>Climate Project Class</td>
<td>38%</td>
<td>0%</td>
<td>69%</td>
<td>46%</td>
</tr>
</tbody>
</table>

Note. Low gains students listed were at or below median score in both classes, (N=41).

Jared Torgerson        Duchesne High School        Duchesne, Utah