Prentice Hall Science Explorer
Lesson Study Research

Background and Methodology

As part of a comprehensive plan to provide scientifically-based research for the Prentice Hall Science Explorer program, a modified Japanese Lesson Study approach was used to field test the ©2005 prototype under actual classroom conditions. In Japan, Lesson Study Research has been employed for a number of years as a tool for teachers to improve their curriculum. We adapted this methodology to focus on a Prentice Hall lesson, in order to test the effectiveness of and improve lesson pedagogy while in the program development stage.

This qualitative approach allows one to test, observe and improve lessons as they are being developed. The evaluation takes place under actual classroom conditions, where the lesson is judged based on student learning and receptivity to the lesson pedagogy, and the evaluation is undertaken by the instructing teacher and two teacher observers.

Three middle grades science teachers, teaching three different regular-level classes of 8th grade students at Randall Middle School in Lithia, FL participated in this lesson study research over a three-week period in April-May, 2003.

School Profile*

<table>
<thead>
<tr>
<th>FL State Grade 2003:</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Configuration:</td>
<td>6-8</td>
</tr>
<tr>
<td>Metro Status:</td>
<td>Suburban</td>
</tr>
<tr>
<td>Size:</td>
<td>1,315 students</td>
</tr>
<tr>
<td>Percentage of Capacity:</td>
<td>105%</td>
</tr>
<tr>
<td>Free and Reduced Lunch:</td>
<td>15.29%</td>
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</tbody>
</table>

*Source: School District of Hillsborough County, www.sdhc.k12.fl.us

The Science Explorer prototype lesson on “Measuring Earthquakes” (section 2 from the Earthquakes Chapter) was tested in the three different classrooms. On each occasion, one teacher taught the lesson, while the other two teachers, plus one Prentice Hall market researcher and one Prentice Hall editor, observed. A pre and post assessment (created and scored by the teachers) was administered to students in each class to help determine if learning improvement had taken place. The pre-test was given the day before actual instruction with the “Measuring Earthquakes” lesson; the same post-test was given the day after instruction took place. Each test took approximately 20 minutes to administer.

After each lesson iteration, the teachers participated in a 45-minute debriefing to discuss what worked and what did not work in the lesson, and what improvements they felt should be made. Afterwards, the teachers met as a team to revise the lesson for the following week. Based on the teachers’ recommendations, a design team revised the lesson and re-printed the new version to be distributed to students for the following week’s class. A 60-minute debriefing was held after the final lesson was taught to discuss in detail the rationale behind the changes they made, as well as to get feedback from the teachers on the study process.

A flowchart of the study process appears below.
Key Findings

- Student learning increased in all three lesson iterations. All three classes showed an average 10 point improvement or better from the pre to the post assessment. *(Note: only students who took both the pre-test and the post-test were evaluated. Scoring was completed by the instructing teachers).*

<table>
<thead>
<tr>
<th></th>
<th>Lesson Iteration 1</th>
<th>Lesson Iteration 2*</th>
<th>Lesson Iteration 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Mean Point Gain</td>
<td>14</td>
<td>10</td>
<td>18</td>
</tr>
</tbody>
</table>

*Note: Lesson Iteration 2 lasted only 55 minutes (due to an impromptu pep rally organized by the school), as opposed to the regular block period of 70 minutes for Iterations 1 and 3. This may have contributed to a slightly lower point gain for this iteration.*

- In addition, the teachers observed other indicators of student achievement with the Science Explorer lesson as revisions were made:
  - The ease with which students answered correctly the questions posed during class by the instructor improved with each lesson.
  - Student success with completing labs and activities increased with successive iterations (i.e., getting the “right answer” more often and more quickly).
  - Student concentration and attention to tasks (reading, following activities/labs) was at higher levels than previously observed.

- The three instructing teachers noted the following strengths of the Science Explorer ©2005 prototype:
  - The content is clearly stated and tells students what just what they need to know, without a lot of extras.
  - It’s easy for regular level kids to use and understand.
  - The illustrations are outstanding.
  - Has an effective lab (despite a few problems with making the data “work”).
  - The Reading Checkpoints emphasize the main points and cue the teacher to remember to make sure that kids are understanding the material – a good indicator if teacher can go on with the material or not.
  - The Reading Preview is helpful for a new teacher, or one without a background in science. It provides a way to make sure students are getting the key concepts.
Following is a summary of the suggestions for improvement, changes, and additions the teachers made to the “Measuring Earthquakes” lesson during and after each iteration. (*Note that the teachers felt no further changes were needed after Lesson 3).

<table>
<thead>
<tr>
<th>Lesson Element</th>
<th>Additions/Changes Lesson 1</th>
<th>Additions/Changes Lesson 2</th>
<th>Additions/Changes Lesson 3</th>
</tr>
</thead>
</table>
| Reading Preview | • Key Concepts modified to statement of objectives  
• Target Reading Skill modified to concept maps | • Key Concepts modified to statement of objectives  
• Target Reading Skill modified to concept maps | • Key Concepts modified to statement of objectives  
• Target Reading Skill modified to concept maps |
| Activities | • Added Foldable Activity | • Moved Discover Activity to bottom of page 61, after introductory paragraphs  
• Added Group Work Activities | • Moved Discover Activity to bottom of page 61, after introductory paragraphs  
• Added Foldable Activity |
| Reading Checkpoints | | • Reading Checkpoints modified to concept maps | • Reading Checkpoints modified to concept maps |
| Text/Content | | • Added Figure references into text  
• Added further detailed information about the Mercalli Scale | • Added Figure references into text  
• Added further detailed information about the Mercalli Scale |
| Illustrations | | • Added Illustration of Surface Waves | • Added Illustration of Surface Waves |
| Lab | • Added Map without cities identified | • Added Graph, with new Step 2 (interpretation)  
• Revised Data Table with new data points (substituted Chicago for Miami)  
• Added Map with scale (1km=200cm), but without cities identified | • Added Graph, with new Step 2 (interpretation)  
• Revised Data Table again, with new data for Denver  
• Added Map with scale (1km=200cm), with cities identified |
| Other | • Added Bellwork at beginning of class  
• Added Analogies | • Added Bellwork at beginning of class  
• Added Analogies | • Added Bellwork at beginning of class  
• Added Analogies |