HISD SciPack Deployment

Presentation on Outcomes from the Study of a SciPack Deployment in the Houston Independent School District during School Year 2009-2010
SciPack Study Design & Process

- **Selection of SciPacks:** After careful consideration and based on content alignment with the Texas Essential Knowledge and Skills for Science, the HISD staff selected the *Earth’s Changing Surface* and *Force & Motion* SciPacks for use in the study.

- **Participants:** Teachers were recruited from two programs within HISD: SLLC (5th grade teachers) and Abrazo (6-8th grade teachers). Programs included new and experienced teachers and teachers new to the HISD district.

- **Study design:** A two pretest-posttest delayed-treatment control group design involving stratified random assignment was used for the study. Sixty teachers were randomly assigned to one of two groups (Groups A & B) based on a pre-assessment and self-efficacy results; 4 teachers dropped out of the study in the early stages. Of the 56 remaining teachers, 29 had been assigned to Group A and 27 to Group B. Participants were trained in use of the SciPacks during the summer of 2009.

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<tr>
<th>Group</th>
<th>Treatment</th>
<th>Control</th>
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<tbody>
<tr>
<td>A</td>
<td>Force &amp; Motion</td>
<td>Earth’s Changing Surface</td>
</tr>
<tr>
<td>B</td>
<td>Earth’s Changing Surface</td>
<td>Force &amp; Motion</td>
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**SciPack Timeline**

**SciPack Schedule:** Group A teachers took the *Force & Motion* SciPack during the months of July – September while teachers in Group B served as the control group and were not exposed to this SciPack. During the months of October and November, Group B took the *Earth’s Changing Surface* SciPack and Group A served as the control group. Teachers received access to both SciPacks starting November 16.

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<tr>
<td>A (n = 29)</td>
<td>Take <em>Force &amp; Motion</em> SciPack (<strong>treatment</strong>) (n = 19)</td>
<td>Explore Learning Center free resources, create collections, develop PD plan (<strong>control</strong>)</td>
<td>Full access to all Learning Center resources after completing first SciPack</td>
<td>Take <em>Earth’s Changing Surface</em> SciPack (n = 14)</td>
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<td>B (n = 27)</td>
<td>Explore Learning Center free resources, create collections, develop PD plan (<strong>control</strong>)</td>
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<td>Take <em>Force &amp; Motion</em> SciPack (n = 7)</td>
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SciPack Completion

- 24 teachers (43%) across both groups completed *Earth’s Changing Surface*
- 26 teachers (46%) across both groups completed *Force and Motion*

**Force & Motion:**
- Group A (treatment): 19 teachers completed the *Force & Motion* SciPack
  - Abrazo = 5
  - SLLC = 14
- Group B (control): 7 teachers completed the *Force & Motion* SciPack
  - Abrazo = 2
  - SLLC = 5

**Earth’s Changing Surface:**
- Group B (treatment): 10 teachers completed the *Earth’s Changing Surface* SciPack
  - Abrazo = 3
  - SLLC = 7
- Group A (control): 14 teachers completed the *Earth’s Changing Surface* SciPack
  - Abrazo = 3
  - SLLC = 11
• Teachers worked on the SciPacks in multiple settings. Teacher average log-ins to SciPacks:
  - *Earth’s Changing Surface*: 14.82 (SD = 8.20)
  - *Force and Motion*: 15.21 (SD = 6.51)

• Other SciPacks accessed by teachers: *Solar System* (N = 36; training SciPack); *Ocean’s Effect on Weather and Climate* (N = 5); *Earth, Sun, and Moon* (N = 3). One teacher each accessed *Cell Structure and Function; Resources and Human Impact; Energy*
Science Teaching Efficacy and Preparedness to Teach Science

- Overall, teachers had significantly higher self-efficacy to teach science following participation in study (range of scores from 16 to 80):
  - Pre-participation: 63.47 (SD = 10.25)
  - Post-participation: 66.63 (SD = 7.67)

- Overall, teachers significantly increased their preparedness to teach earth science and force and motion over the course of the study. On a 4-point scale, teachers reported the following:
  - Earth science: Increase of 0.44 point
  - Force and motion: Increase of 0.36 point

- No significant differences were found between treatment group’s change and control group’s change for teaching efficacy or preparedness.
Science Teaching Practices

- Instructional strategies and student practices generally did not change over the course of the study. Although still small changes, by winter 2010 as compared to summer 2009, teachers reported more frequent use of the following instructional strategies:
  1. Demonstrating a science related principle or phenomenon
  2. Having students design or implement their own investigations

- The study timeline may have influenced application of instructional strategies (e.g., teachers already covered earth science content in their classroom before starting Earth’s Changing Surface SciPack)
Overall, teachers (n = 24) significantly increased their content knowledge of earth science over the course of the study:

- Assessment scores increased approximately 12 percentile points.

No significant differences were found between treatment (n = 10) and comparison (n = 14) groups; however, the trend was in a positive direction with treatment teachers achieving higher gain scores than control teachers:

- Treatment teachers increased their content knowledge of earth science by approximately 17 percentile points, compared to 8 percentile points for control teachers.
Teacher Content Knowledge: Force and Motion

• Overall, teachers (n = 26) significantly increased their content knowledge of force and motion over the course of the study:
  ➢ Assessment scores increased approximately 12 percentile points.
• No significant differences were found between treatment (n = 19) and control (n = 7) groups; however, the trend was in a positive direction with treatment teachers achieving higher gain scores than control:
  ➢ Treatment teachers increased their content knowledge of force and motion by approximately 16 percentile points, compared to 5 percentile points for control teachers.
Student Content Knowledge: Earth Science

- 5th grade students of treatment teachers gained significantly more earth science knowledge than students of control teachers.

- Students of treatment teachers had gain scores of 17 percentile points, compared to nearly 12 percentile points for students of control group teachers.
Student Content Knowledge: Force & Motion

- 6th and 8th grade students of treatment teachers made significantly greater gains in force and motion content knowledge than their control group counterparts.
  - Scores increased approximately 10 percentile points for students of teachers in the treatment group, compared to 2 percentile points for students of control group teachers.

- Force and motion knowledge changed significantly for 6th grade students of treatment teachers (approximately 13 percentile points).

- Though still a positive trend, force and motion knowledge did not change significantly for 8th grade students (approximately 6 percentile points).
Summary of Findings

- Slightly less than half of all participants ($N = 56$) completed Earth’s Changing Surface (43%) and Force & Motion (46%) Sci Packs. Participants completed the Sci Packs in multiple settings, approximately 14-15 settings on average.

- Teachers’ sense of efficacy for teaching science increased over the course of the study, suggesting positive effects of the professional development experience. Further, teachers significantly increased their perceived preparedness to teach earth science and force and motion over the course of the study.

- Science teaching practices generally did not change over the course of the study; the study timeline may have influenced teachers’ application of new knowledge and classroom instruction.

- As a group, teachers significantly increased their content knowledge in earth science and force and motion. Further, treatment teachers achieved higher gain scores than control teachers in both content areas.

- Students of participating teachers improved their performance in earth science or force and motion. Fifth-grade students in treatment teachers’ classrooms scored significantly higher on an earth science assessment than did those in control teachers’ classrooms. In addition, 6th- and 8th-grade students of treatment teachers had force-and-motion gain scores that were significantly larger than the gain scores of students in control teachers’ classrooms.

- Moderate attrition rates may have influenced the lack of statistically significant results; however, positive findings reported in this study are very encouraging and confirm a need to continue to test the effects of this model of teacher professional development on the students of the Sci Pack completers.