Project RISE: Reflective Instruction for Science Education
Southern Nevada Regional Professional Development Program
Great Teaching and Leading Fund Final Annual Report

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I. Summary

a. Program Name & Overall Goals/Objectives of Program

Project RISE (Reflective Instruction for Science Education) was conceived as a partnership between Southern Nevada RPDP, Lincoln County School District, and the Clark County School District to provide professional development for teachers and administrators focusing on the Nevada Academic Content Standards for Science (NVACSS). It sought to increase participants’ knowledge in science and engineering content and pedagogies as well as mechanisms for leading community of practice shifts by addressing the priority of Professional Development for Teacher/Leader Retention in the Areas of:

- (Primary) Nevada Academic Content Standards for Science (with a focus on integration of real-world applications and/or effective use of instructional technology), and
- (Secondary) Leadership Development (specifically designed to increase retention of effective educators and/or expand effective models of school improvement)

b. Abstract and Results Overview

Project RISE served teachers of science in Grade 2, Grade 5, and Grade 9 Biology, as well as building administrators who supervise these teachers. School teams, consisting of 1 administrator and a minimum of four teachers applied to participate. Implementation of the program was delayed, with its first workshop meeting on January 31, 2017. Sixty-one participants made up teams from 13 schools, consisting of 49 teachers and 12 administrators. Thirty-four participants represented elementary programs; 27 were from high schools.

The project began with four days of professional development for teachers and their administrators on the NVACSS and pedagogical strategies for meeting the standards. Subsequently, school-based teams developed units of instruction, received peer feedback, reviewed evidence of student learning, engaged in observation cycles in which participants examined student outcomes and the effectiveness of the units, and made revisions as needed.

The overarching goal of the project was that teachers and administrators will demonstrate a contextualized understanding of student three-dimensional learning and assessment, aligned with the NVACSS. Toward that end six specific objectives were delineated and evaluated via a comparison of pre- and post- science content exams, pre- and post- scores on the Science Teacher Efficacy Belief Instrument (STEBI-A), teacher and administrator versions of four reflective questionnaires, teacher portfolios, and participant input during workshop sessions.

Of the project objectives, four were deemed as met, one partially met, and one not met, as follows:

- 1a. In the pre/post comparisons of science content knowledge, significant increases in content exam scores were found for teachers at the 5th grade (8.9%) and 9th grade (7.7%) levels. Second grade scores also increased (2%), but not at
a statistically significant level. The objective, however, was deemed **partially met** as there were positive gains, but the increases fell short of the 20% target.

- 1b. Teachers fully participated in the development of a content-specific unit of instruction including: lessons, assessment elements, peer-review cycles, and explicit elements of 3D artifact generation. Teacher portfolios and teacher and administrator questionnaires document that this **objective was met**.

- 1c. Teacher efficacy scores on the STEBI-A decreased for self-efficacy (at a significant level) and outcomes efficacy (not significant level). The STEBI-A outcomes were below the 20% target increase. **Objective not met**.

- 2a. During a pre-observation conference, teachers and administrators documented collaboration about what would constitute evidence of student learning. Teacher portfolios and teacher and administrator questionnaires document that this **objective was met**.

- 2b. Administrators documented 3D components observed during classroom observations. Teacher portfolios and administrator questionnaires document that this **objective was met**.

- 2c. During a post-observation conferences, teachers and administrators documented evidence of student learning. Teacher portfolios and teacher and administrator questionnaires document that this **objective was met**.

While the two pre/post measures both fell short of target increases of 20%, qualitative evidence suggests that a sound majority of teachers embraced the approaches and strategies endorsed by the project, and along with their administrators, offered detailed next steps to sustain and expand project approaches. The abbreviated duration of the project provides one likely explanation for the lower than expected scores. Particularly in terms of the STEBI-A, it seems quite understandable that teachers’ self-efficacy measure might decline when learning about and implementing challenging, new pedagogical approaches within a relatively brief time frame. In addition, the content tests did not fully measure changes in the pedagogical knowledge that the participants incorporated. It seems likely that if the pre- and post-tests reflected what participants learned about the Nevada Academics Content Standards for Science (based upon the Next Generation Science Standards) and the various components and tools introduced for creating rigorous lessons and assessments, participants would show a greater increase in their knowledge related to the project. **Extensive evidence suggests that participants grappled with and largely learned to operationalize and improve their practice, and overall, exhibited a strong commitment to the goals of the project as well as satisfaction with how it was implemented.**

c. Next Steps

Finally, participants had almost universal praise for the project’s opportunities for collaboration and its focus to involve building administrators in this effort for improving science instruction. Clearly this is a well-conceived strategy for fostering informed leadership and successful implementation of project goals, including mechanisms for leading community of practice shifts. Questionnaire data suggest that these positive attributes made a significant impact on participants and their commitment to implement the innovative approaches introduced. Of course, sustaining
and expanding these changes will continue to be a challenge, but data gathered suggest that Project RISE established a solid foundation on which to build. Clearly continued resources will be needed to support the successful initial efforts that Project RISE has fostered, particularly as schools transition from working with a small number of “volunteers” to larger-scale implementation.

II. Grant Funded Activities

a. Name of Activity and Overview

Project RISE (Reflective Instruction for Science Education) was conceived as a partnership between Southern Nevada RPDP, Lincoln County School District, and the Science Curriculum and Professional Development Division of the Clark County School District to provide professional development for the Nevada Academic Content Standards for Science (NVACSS). Project RISE sought to develop a reflective community of practice among teachers and their supervising administrators in Grade 2, Grade 5, and Grade 9-Biology, in order to increase participants’ knowledge in: a) science and engineering content, b) science and engineering pedagogies, and c) mechanisms for leading community of practice shifts. Content focus is on engineering design for Grades 2 and 5, and on genetics and evolution for Grade 9 Biology.

Implementation of the program, which was to begin in fall 2016, was delayed until initial workshops began on January 31, 2017. See Appendix A for the project framework, revised timeline, and professional development schedule. Figure 1 (below) provides an overview of the project.
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Who</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/31/17</td>
<td>8:00 am - 4:00 pm</td>
<td>ECTA</td>
<td>All (61)</td>
<td>All teachers and administrators participate in Anchoring Experience of NVACS-S aligned, phenomenon based, engineering design lesson sequence. All participants establish a portfolio to document personal growth during this project.</td>
</tr>
<tr>
<td>2/1/17</td>
<td>8:00 am - 4:00 pm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/7/17</td>
<td>8:00 am - 4:00 pm</td>
<td>IDPL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/8/17</td>
<td>8:00 am - 4:00 pm</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Part 2 – Lesson Development and Review

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Who</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/16/17</td>
<td>4:00 pm - 8:00 pm</td>
<td>ES - Givens ES</td>
<td>Teachers (49)</td>
<td>Provide teachers collaborative school team time and RISE leadership team support for lesson development</td>
</tr>
<tr>
<td></td>
<td>3:30 pm - 7:30 pm</td>
<td>Biology - Durango HS</td>
<td></td>
<td>Provide teachers peer review protocol for developed lesson and evidence of student learning (artifact), and collaborative school team time and RISE leadership team support for lesson revision.</td>
</tr>
<tr>
<td>3/2/17</td>
<td>4:00 pm - 8:00 pm</td>
<td>IDPL</td>
<td>Teachers (49)</td>
<td>Team collaboration time for identifying strategic areas within lesson for embedding assessment/collaborative evidence of learning (artifacts)</td>
</tr>
<tr>
<td>3/4/17</td>
<td>8:00 am - 4:00 pm</td>
<td>IDPL</td>
<td>All (61)</td>
<td>Reflections from school teams shared as they relate to experiences with lesson development, artifact of student work generation and analysis, observation cycle and collaborative strategies for change.</td>
</tr>
</tbody>
</table>

### Part 3 – Observation Cycles

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Who</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/25/17</td>
<td>8:00 am - 4:00 pm</td>
<td>NWCTA</td>
<td>All (61)</td>
<td>Teacher and administrator collaboration workshop looking at student work to explore what the data is telling us, and how these strategies can be used globally to support rigorous science instruction</td>
</tr>
<tr>
<td>4/22/17</td>
<td>8:00 am - 4:00 pm</td>
<td>IDPL</td>
<td>All (61)</td>
<td>Teacher and administrator collaboration workshop looking at student work to explore what the data is telling us, and how these strategies can be used globally to support rigorous science instruction</td>
</tr>
</tbody>
</table>

### Part 4 – Next Steps/Collective Impact Model

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Who</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/13/17</td>
<td>8:00 am - 4:00 pm</td>
<td>IDPL</td>
<td>All (61)</td>
<td>Reflections from school teams shared as they relate to experiences with lesson development, artifact of student work generation and analysis, observation cycle and collaborative strategies for change.</td>
</tr>
</tbody>
</table>

**Figure 1. Project RISE Professional Development Schedule**

Sixty-one participants made up teams from 13 schools, consisting of 49 teachers and 12 administrators. Thirty-four participants represented elementary programs; 27 were from high schools.

Part I of the project began with four days of professional development for teachers and their administrators on the NVACS-S and pedagogical strategies for meeting the standards. Subsequently, in Part II, school-based teams worked on developing units of instruction in a series of workshops conducted from February 16 - March 4. Those sessions included peer feedback among teachers and collaborative review of assessments embedded within the unit by teachers and administrators. In Part III of the project on March 25th, participants attended a workshop in which they collaboratively reviewed evidence of student learning and discussed implications for the science instruction promoted by the project. In addition, teachers and administrators engaged in observation cycles in which participants examined student outcomes and the effectiveness of the units and revised them as needed.
c. Area(s) of Effectiveness Measured
   i. Improving Student Achievement
   ii. Improving Recruitment/Selection/Retention of Effective Teachers/Principals
   iii. Assisting Teachers/Administrators/Other Licensed Personnel
d. Effectiveness Measure for Each Area, Including Rationale for Chosen Measure
e. Implications for Future Implementation

As stated in the proposal, “The overarching goal for Project RISE is that teachers and administrators will demonstrate a contextualized understanding of student three-dimensional (3D) learning and assessment, aligned with the Nevada Academic Content Standards for Science (NVACS-S).” To accomplish this the project sought to address the following objectives:

1a. Teacher content knowledge will increase by 20%, as measured with content pre- and post-tests.
1b. Each teacher will participate in the development of a content-specific unit of instruction including: lessons, assessment elements, peer-review cycles, and explicit elements of 3D artifact generation. This will be used in the classroom during the spring of 2017.
1c. Teacher efficacy for NVACS-S-aligned instruction will increase by 20%, as measured on the Science Teacher Efficacy Belief Instrument (STEBI) version A (for in-service teachers).

2a. During a pre-observation conference, teachers and administrators will document collaboration about what will constitute evidence of student learning.
2b. Administrators will document 3D components observed during classroom observations.
2c. During a post-observation conference, teachers and administrators will document evidence of student learning.

The project’s original Outcome Accountability Plan, which aligns project objectives with proposed measures, appears in Appendix B. In addition to those data sources identified in the plan, teacher and administrator versions of four questionnaires each were administered to document project implementation, outcomes, and the overall effectiveness of the project. A description of the data sources and methods employed appears below, followed by the outcomes obtained and an analysis of the degree to which the project’s goals and objectives were met.

Data Sources and Methods

Data Sources

Two pre-test measures were administered during the first workshop meeting on January 31st to serve as baseline data. Post-tests for each were administered again on May 13th for comparison purposes.
1. **Content pre-tests for Grades 2, 5 and 9th grade biology** were created by project staff consisting of 30 items (Grades 2 and 5) and 44 items (9th Grade Biology), based on content addressed in project workshops and lesson development.

2. **The Science Teacher Efficacy Belief Instrument version A for in-service teachers (STEBI-A)** was administered to measure self-efficacy and outcome expectancy beliefs pertaining to science teaching. The instrument has been deemed valid and reliable for studying elementary teachers’ beliefs toward science teaching and learning (Riggs & Knochs, 1990). According to Bandura (as cited in Riggs & Knochs, 1989, p. 4), “behavior is enacted when people not only expect certain behaviors to produce desirable outcomes (outcome expectancy), but they also believe in their own ability to perform the behaviors (self-efficacy).” Thus, outcome expectancy and self-efficacy beliefs together support project goals to prepare participants to effectively address the NVACSS. The STEBI-A questionnaire, which consists of 25 items, 13 pertaining to self-efficacy beliefs and 12 pertaining to outcome expectancies, appears in Appendix C.

Teacher and administrator versions of four reflective questionnaires were administered between April 21 and May 13 to document various aspects of project implementation and for participants to reflect on their learning experience. Teachers completed questionnaires addressing lesson development, the NGSS Lesson Screener, the observation cycle, and their final reflections. Administrator questionnaires addressed artifact planning, the NGSS Lesson Screener, the observation cycle, and their final reflections. Each questionnaire consisted of both close-ended, Likert-type items and open-ended reflective prompts.

Teacher Portfolios were submitted at the conclusion of the project. Requested items included the original lesson shared with colleagues, a copy of a lesson screener for that lesson, the revised lesson, an artifact chart, examples of student artifacts, and documentation of the observation process.

Furthermore, **participant input during workshop sessions** were recorded on charts, including a discussion of what teachers and administrators perceived as key challenges to successful implementation of the project.

**Methods**

The **pre- and post- test data** were analyzed using a paired t-test for all measures, comparing pre and post scores for each participant. A paired t-test was found to be appropriate as the residuals were approximately normally distributed for all measures (skewness between -1.0 and 1.0, and Kurtosis between -2.0 and 2.0). Responses were excluded for: multiple responses, blank responses, and missing post-tests. Administrator scores were not analyzed separately, due to small sample size, but are included in the all-subjects analyses.

The STEBI-A and the respective **content exams** were administered via Google Forms at the initial workshop. Data were exported as Excel spreadsheets and later analyzed using IBM SPSS Statistics (2016). STEBI-A responses were recoded as directed (Riggs & Knochs, 1989) so that designated items were reverse scored to produce consistent values between positively and negatively worded items.
Reflective questionnaires were administered between April 21 and May 13. Quantitative items were compiled in Excel and analyzed using SPSS. Open-ended prompts were exported as text files and analyzed using HyperResearch qualitative analysis software. A common set of codes was established based on project objectives and the focus of the evaluation. Codes were modified as necessary to reflect the data that were analyzed.

Portfolio contents were scanned as PDF files, compiled, and reviewed. Reflective questionnaires that were included in the portfolio were compiled and analyzed as described above.

**Evaluation Results**

**Content Exams**

Figure 2 shows pre-test/post-test comparisons for the content exams. Only participants who completed both the pre and the post exams were included in the analysis. Significant findings are marked in bold with one asterisk noting where $p < .05$ and two asterisks noting where $p < .01$. Figure 3 depicts the data in graphic form.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Pre</th>
<th>Post</th>
<th>Mean Difference</th>
<th>Standard Deviation of Difference</th>
<th>Significance (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Grade All</td>
<td>14</td>
<td>60.8%</td>
<td>64.0%</td>
<td>3.2%</td>
<td>11.3%</td>
<td>.307</td>
</tr>
<tr>
<td>2nd Grade Teachers</td>
<td>12</td>
<td>59.5%</td>
<td>61.5%</td>
<td>2.0%</td>
<td>11.4%</td>
<td>.555</td>
</tr>
<tr>
<td>5th Grade All</td>
<td>13</td>
<td>70.0%</td>
<td>77.7%</td>
<td>7.7%</td>
<td>8.5%</td>
<td><strong>.007</strong></td>
</tr>
<tr>
<td>5th Grade Teachers</td>
<td>11</td>
<td>72.1%</td>
<td>80.3%</td>
<td>8.2%</td>
<td>8.9%</td>
<td>*.012</td>
</tr>
<tr>
<td>9th Grade All</td>
<td>26</td>
<td>57.6%</td>
<td>62.9%</td>
<td>5.3%</td>
<td>9.6%</td>
<td><strong>.009</strong></td>
</tr>
<tr>
<td>9th Grade Teachers</td>
<td>21</td>
<td>60.2%</td>
<td>67.9%</td>
<td>7.7%</td>
<td>8.7%</td>
<td><strong>&lt;.001</strong></td>
</tr>
</tbody>
</table>

*Figure 2. Content exams pre-test, post-test comparisons*
Figure 3. Content exams pre-test, post-test comparisons

Significant increases in content test scores were found for participants at the fifth and ninth grade levels. Second grade scores also increased, but not at a statistically significant level.

STEBI-A

Only fully completed scales were included in the analysis. A total of 46 participants completed both pre and post measures for self-efficacy; 42 for outcome expectancy. Figure 4 shows pre-test/post-test comparisons for the STEBI-A scores. As in the prior table, significant findings are marked in bold with two asterisks noting where p < .01. Figure 5 depicts the data in graphic form.
### Table 1: Pre-Post Comparisons for STEBI-A Measures

<table>
<thead>
<tr>
<th>Measure/Group</th>
<th>N</th>
<th>Pre</th>
<th>Post</th>
<th>Mean Difference</th>
<th>Standard Deviation of Difference</th>
<th>Significance (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self Efficacy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Participants</td>
<td>46</td>
<td>27.0</td>
<td>24.5</td>
<td>-2.6</td>
<td>5.0</td>
<td><strong>&lt;.001</strong></td>
</tr>
<tr>
<td>Teachers</td>
<td>37</td>
<td>26.5</td>
<td>23.8</td>
<td>-2.7</td>
<td>5.2</td>
<td><strong>.003</strong></td>
</tr>
<tr>
<td>Elementary</td>
<td>26</td>
<td>29.3</td>
<td>25.6</td>
<td>-3.7</td>
<td>4.2</td>
<td><strong>&lt;.001</strong></td>
</tr>
<tr>
<td>High School</td>
<td>20</td>
<td>24.1</td>
<td>23.0</td>
<td>-1.1</td>
<td>5.6</td>
<td>.409</td>
</tr>
<tr>
<td><strong>Outcome Expectancy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Participants</td>
<td>42</td>
<td>27.5</td>
<td>26.8</td>
<td>-0.7</td>
<td>5.0</td>
<td>.346</td>
</tr>
<tr>
<td>Teachers</td>
<td>36</td>
<td>28.1</td>
<td>27.3</td>
<td>-0.8</td>
<td>5.0</td>
<td>.339</td>
</tr>
<tr>
<td>Elementary</td>
<td>22</td>
<td>26.3</td>
<td>24.6</td>
<td>-1.6</td>
<td>4.5</td>
<td>.104</td>
</tr>
<tr>
<td>High School</td>
<td>20</td>
<td>28.9</td>
<td>29.1</td>
<td>0.3</td>
<td>5.4</td>
<td>.840</td>
</tr>
</tbody>
</table>

**Figure 4. STEBI-A pre-test, post-test comparisons**

Significant decreases were found for the STEBI-A self-efficacy scale among all participants, teachers, and elementary school personnel. There was also a small, yet not statistically significant decrease in STEBI-A OE-Scale (outcome expectancy) at all levels of analysis.

**Figure 5. STEBI-A pre-test, post-test comparisons**
Reflective Questionnaires

Likert-type items and open-ended prompts were compiled on various aspects of project implementation including the NGSS Lesson Screener, the lesson development process, artifact planning, and the classroom observation cycle. Each of these areas is addressed below, followed by participants’ final reflections on the project.

Lesson Development. Teachers were asked to think back over the process of developing and revising their lessons and reflect on the helpfulness of project activities during the initial workshops. Responses are compiled in Figure 6.

Teachers were quite positive about the lesson development process enacted during the workshops. More than 90% rated their preparation for developing lessons, the school collaboration, and working with their administrator as helpful (by assigning a 3 or 4 on the Likert scale). A majority found the initial PD experiences to be extremely helpful.

Virtually all teachers cited the opportunities for collaboration on lesson development as a “high” of the project. A teacher noted, “I think the collaborative experience was super helpful and useful. I think that when you work together as a team you can develop more in depth useful content for the students.” Another concurred, “Initially we felt overwhelmed coming up with an idea but as soon as we collaborated and wrapped our head around what we needed to do the developmental process flowed.” Another teacher added, “Having feedback from peers and admin helped me clarify the lesson and gave me confidence in the value of the lesson.” Supporting this notion, a teacher concluded,

Collaborating with my colleagues definitely made this experience better. It’s less stressful when you know you have help and when you can see that others are struggling like you at first. It was nice to talk through questions that arose and when we disagreed about

<table>
<thead>
<tr>
<th>Teachers</th>
<th>Not helpful</th>
<th>Extremely helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepare to develop lesson - experience NGSS lesson and examine instructional designs (days 1 and 2)</td>
<td>0.0% 7.8% 43.1% 49.0%</td>
<td></td>
</tr>
<tr>
<td>School collaboration to start developing lesson (days 3 and 4)</td>
<td>0.0% 5.9% 41.2% 52.9%</td>
<td></td>
</tr>
<tr>
<td>Working with your administrator as your group planned the lessons (days 1–4)</td>
<td>3.9% 5.9% 29.4% 60.8%</td>
<td></td>
</tr>
</tbody>
</table>

Figure 6. Lesson Development Process: Teachers

gave me confidence in the value of the lesson.”
something we could discuss and come up with a common conclusion to make our lessons better.

In addition to collaborating with peers, teachers noted the positives of collaborating with their administrators during the project. One teacher reflected,

I have never done anything like this with an administrator, and think this was one of the best parts of this program. She was committed to the program and her insight was very helpful in development of the lesson. I think she also learned what makes an effective science lesson.

Another added,

I felt comfortable and confident when my administrator observed my lesson over the numerous days. I think this was because he was involved throughout the whole creating of the lesson plan process and he knew what we were working on. It was awesome to know I was being supported by my principal during this engineering lesson!

It was also noted that having administrator participation would help with project implementation going forward. A teacher explained, “I know that through his participation in this grant he has seen the importance of teaching the NGSS Science Curriculum. He is committed to offering training and staff development to get everyone at the school site on board.”

The standards-based approach to improving science instruction was cited by many teachers as a strength of the project. One teacher stated, “This journey has been eye opening and truly helpful in learning how NGSS works. I have been to several trainings, however, this was the most helpful.” Another noted, “I loved day 1 and day 2! I learned so much about a good NGSS lesson from those two days. I especially liked being pushed through an actual lesson and feeling how a student would feel. It was challenging and I could feel myself being pushed.” Another teacher concluded,

The collaborative experience was powerful. Having the ‘protected’ time and common experiences with colleagues and our administrator to develop a common understanding of what NGSS is, the components of a 3D lesson and what the NEPF standards look like and sound like was extremely valuable.

Similarly, a participant explained,

Developing the lesson led to lots of discussion and debate, also made us look closely at the NGSS and really understand what we were responsible for teaching. I learned that developing a lesson using the 5E’s is very time consuming and overwhelming, but is very beneficial for in depth cumulative lessons.

While teachers were complementary about the substantive approaches to raise the bar on the quality of lesson planning, they often mentioned the amount of time involved and the difficulty of doing so. “If there was a low point in the lesson, it would be "lack of time" to really give the students ample time to really explore and think out a more rigor response.” Stated simply, one teacher noted, “The low point is facing the fact that this is an enormously time-consuming
process.” Another teacher concurred, “There aren't many lows except just the time it takes to create a lesson. It's a long process. That said it makes me a better teacher (so that's another high).”

Related to the time commitment was the rigor and complexity of the content. A teacher explained that at times “I felt overwhelmed...Looking for all elements of 3D in each part of the lesson was very intense and could be confusing.” Another teacher added, “Writing the detailed lesson plan was a bit tedious, but in the end, it was well worth it.” Similarly, another concluded, “Some of the lows were the amount of work and the time commitment, but overall this experience is invaluable.”

Artifact Planning. Administrators were asked to think back on the discussions of artifacts (evidence of student learning) that teachers planned to use and were asked to assess the helpfulness of the group discussions, peer feedback, and structured focus evidence of student learning. Findings are reported in Figure 7.

<table>
<thead>
<tr>
<th>Administrators</th>
<th>Not helpful</th>
<th>Extremely helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the group discussions about the artifacts each teacher planned to use help you understand the standards being addressed?</td>
<td>0.0%</td>
<td>72.7%</td>
</tr>
<tr>
<td>Was the feedback you heard teachers giving to each other helpful to you?</td>
<td>0.0%</td>
<td>81.8%</td>
</tr>
<tr>
<td>Did the structured focus on evidence of student learning help teachers develop stronger/more acceptable/more robust evidence of student learning?</td>
<td>0.0%</td>
<td>90.9%</td>
</tr>
</tbody>
</table>

Figure 7. Artifact Planning: Administrators

As noted in Figure 7, a large majority of administrators found the project activities pertaining to artifacts to be extremely helpful. Strengths of the process included the quality of the discussions among the participants and the connections they made to meeting the standards. One administrator explained, “I enjoyed the artifact planning tremendously...At first, we struggled with just the basic artifacts of tests and worksheets. It was a delight to see our teacher start to utilize models and explanations as they learned from Project Rise.” Another had a similar assessment. “The high was seeing my team have deep conversations about the artifacts they were planning to collect and whether they showed the student learning they were expecting. I really enjoyed the conversations I had with my team. It was extremely powerful.”

Pertaining to the standards, a participant noted,
The high in this process was really learning the NGSS, including the 3-Dimensions. By the end of the process, the teachers and I were confident about the implementation. Also, our confidence made it easier to gather buy-in from teachers. Specifically, when planning and implementing artifacts, teachers were nervous about utilizing science notebooks. In the end, it was much easier than they had originally planned.

Related to quality science instruction, one administrator noted, “I think when the team began thinking about artifacts to collect, it was about assigning a grade to be placed in their grade book. However, in subsequent discussions, artifacts were intentionally planned to demonstrate student mastery of the science standards being addressed. This is just good teaching. Another concluded, "I have already observed a change in my teachers science lessons and students models since we have started Project RISE. I know that this experience has helped build the foundation of great science instruction."

Administrators noted that the discussions about artifacts helped them derive insights about the thinking of their teachers. One stated,

It gave me great insight into where each teacher was in his or her thought process, his/her understanding of the standards and content, and his/her general instructional knowledge and approach. This will help me to better support my teachers as they work to implement the NGSS. The artifact review process is one we are considering utilizing in PLCs next year with the whole dept.

Another added,

Having these conversations, allowed me to see the high expectations teachers are setting for the students. Having this time to really dive into the standards, pairing them to the NEPF, then really deciding what evidence we will gather from the students was awesome. It really made us focus on what kids will learn and what they will say, do, or show us to know that they learned it.

Lows cited pertained to the time involved in planning. An informant noted in her reflection, “The low was listening to how much work each of my teachers put into their lessons.” Another concurred, “For the grant we had the time, but it wasn't realistic to think we will have this time during regular planning.” She added, though, “In the end, this was a successful process.”

Lesson Screener Process. The stated purpose of the NGSS Lesson Screener is to quickly review a lesson to see: (1) whether a lesson being developed or revised is on the right track; (2) if a lesson warrants further review using the Educators Evaluating the Quality of Instructional Products (EQuIP) Rubric for Lessons & Units: Science; and (3) to what extent a group of reviewers have a common understanding of the NGSS or designing lessons for the NGSS…The power of the lesson screener is in the productive conversations educators have while evaluating materials (i.e., the review process) (NGSS, 2016).

Participants were asked to think back over the process of using the lesson-screening tool and assess its helpfulness using a four-point Likert-type scale ranging from (1) Not helpful to (4)
Extremely helpful. Teachers’ responses appear in Figure 8, followed by administrators’ reactions in Figure 9.

<table>
<thead>
<tr>
<th>Teachers</th>
<th>Not helpful</th>
<th>Extremely helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the lesson screener tool help you understand the 3D nature of lessons?</td>
<td>0.0%</td>
<td>12.2%</td>
</tr>
<tr>
<td>As your group used the lesson screener, was the feedback you received from your colleagues helpful?</td>
<td>0.0%</td>
<td>10.2%</td>
</tr>
<tr>
<td>Did the lesson screener tool help you connect content standards with the NEPF standards?</td>
<td>0.0%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Based on this experience with the lesson screener, how likely are you to use it again with a group?</td>
<td>8.2%</td>
<td>26.5%</td>
</tr>
</tbody>
</table>

Figure 8. Lesson Screener Process: Teacher Perceptions

<table>
<thead>
<tr>
<th>Administrators</th>
<th>Not helpful</th>
<th>Extremely helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the lesson screener tool help you understand the 3D nature of lessons?</td>
<td>0.0%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Was the feedback you heard shared from the lesson screener helpful to the lesson author?</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Did the lesson screener tool help you connect content standards with the NEPF standards?</td>
<td>0.0%</td>
<td>7.7%</td>
</tr>
</tbody>
</table>

Figure 9. Lesson Screener Process: Administrator Perceptions

A large majority of participants rated the lesson screener as quite helpful, which is supported by teachers’ and administrators’ open-ended reflections. As one teacher noted: “The lesson screener is a fantastic tool to learn how to build an effective NGSS lesson and it also aids the teacher in maintaining records for the NEPF standards.” Another teacher explained, “The screener tool was helpful in breaking down the 3 dimensions. I especially liked the ‘NGSS lessons look less like this:’ and ‘NGSS lessons look more like this:’ section.” An administrator added, “I felt the
teachers really valued the screener in helping them gauge the grade level appropriateness of their lesson....the rigor. I felt the screener also helped [them] critique lessons without a personal bias."

The collaboration around the lesson screener, which included administrator participation, was cited by many as a strength. An administrator stated, “To see the teachers working closely together, as a team, was phenomenal.” Another administrator explained,

Having teachers being able to work with other teachers and share ideas strengthened their lessons and knowledge base. Being able to collaborate with other administrators and then coming back with your own team helped the process be reflective and meaningful. The time to spend as a team was invaluable and created rich academic discussion around science standards.

A teacher expanded on the value of receiving feedback when approaching new teaching practices. She explained, “The feedback really helped me see where I was hanging on to old beliefs or old styles and made my lesson much more effective. So the collaboration and feedback were essential to the process. It made this experience "'rich'" (meaningful, deep, valuable, worthwhile).

Several respondents, however, found the lesson screener tool to be overwhelming at times. Nearly 35% of teachers suggested that they would likely not use the tool again with a group. One teacher noted, “I find it a little overwhelming when developing my lesson alone because it definitely takes time.” Another teacher explained, “…it is too wordy for routine use. Once the process is learned, this document can be scaled down considerably to just the tables where entries are made.” Another added, “As an administrator, I understand the purpose, but this stressed out teachers. Again, we appreciated it as a teaching tool for coaching, feedback, or PD, but we will not be using this tool for planning.”

Despite citing the challenging nature of the lesson screener, participants expressed an overall appreciation for the affordances that tool makes available. Informants suggested that the tool sets a high bar that pushed them to consider further elements to add to a lesson. As one administrator concluded, “The rigor is there, as well as components to align with the NEPF." Another explained, “It's time consuming but incredibly worthwhile.” Overall, while some might not use the tool for each lesson, they seemed clear that it provided a very good, collaborative learning experience.

Observation Cycle. Participants were asked to think about the observation cycle for the lessons developed and taught and assess the helpfulness of various aspects of the process using a four-point Likert-type scale ranging from (1) Not helpful to (4) Extremely helpful. Teachers’ responses appear in Figure 10, followed by administrators’ responses in Figure 11.
Table 1: Observation Cycle: Teachers

<table>
<thead>
<tr>
<th>Item</th>
<th>Not helpful</th>
<th>Neutral</th>
<th>Helpful</th>
<th>Extremely helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning about the NGSS and 3D components helped the observation process.</td>
<td>0.0%</td>
<td>4.3%</td>
<td>47.8%</td>
<td>47.8%</td>
</tr>
<tr>
<td>Being part of and supporting my colleagues in lesson development, review and revision helped the observation process.</td>
<td>0.0%</td>
<td>2.2%</td>
<td>32.6%</td>
<td>65.2%</td>
</tr>
<tr>
<td>Being part of discussions and planning for evidence of student learning (artifact gathering) helped me prepare for observations.</td>
<td>0.0%</td>
<td>6.5%</td>
<td>50.0%</td>
<td>43.5%</td>
</tr>
<tr>
<td>Participating in our team collaboration around developing lessons helped me during the observation process.</td>
<td>0.0%</td>
<td>0.0%</td>
<td>41.3%</td>
<td>58.7%</td>
</tr>
<tr>
<td>Including our administrator in the team collaborations made the observation process more useful to me.</td>
<td>4.3%</td>
<td>6.5%</td>
<td>23.9%</td>
<td>65.2%</td>
</tr>
<tr>
<td>Our team collaboration led to more coherence in what students experienced.</td>
<td>0.0%</td>
<td>6.5%</td>
<td>37.0%</td>
<td>56.5%</td>
</tr>
</tbody>
</table>

Figure 10. Observation Cycle: Teachers

Teachers were asked to describe their experience with the observation process, including how they prepared for the observation, how collaboration with their administrator influenced the observation, and how what they’ve learned influenced the post-observation conferences. Overall, they were quite positive about the observation cycle, identifying the benefits of peer collaboration (item 2) and the participation of their administrators (item 5), among other factors. One explained,

Collaboration with colleagues was the most important part of the process. Our administrator's input and insight into what he looks for in a lesson was also important and helpful. I've learned that thoroughly looking through the standards with colleagues makes for far better lessons.

Another added, “To prepare for the observation, I sat with my administrator and discussed what the expectations were and what I hoped the outcomes would be. The collaboration was beneficial because it gave me time to reflect on what the best practices are.” Another teacher concurred that going over the lesson with her administrator “helped me feel more confident in relaying my expectations to my students.”
Teachers also discussed benefits of what they learned from the post observation conferences. One stated, “I learned that I need to scaffold the students writing descriptions…It was nice to work closely with admin on this project.” Another teacher mentioned, “My administrator did an excellent job of discussing my lesson and providing recommendations for future lessons. My plans for the future will include avoiding front-loading students with areas such as vocabulary which is more valuable to teach during the lesson.” Another teacher added, “During the post observation I learned that my students really feel comfortable explaining the process orally, but they still need help taking their thought process and putting it into writing. This is an area that I know I need to scaffold more, using sentence frames, think-pair-share, etc.”

Administrators were also asked to describe their experience with the observation process including specific examples of what they observed, how they prepared for the observations, and how confident they were about the science being taught. They were also asked to think back to observations and supervision of science teachers before participating in this project and to describe any differences in their confidence, knowledge, and skills for supervising science instruction.

<table>
<thead>
<tr>
<th>Administrators</th>
<th>Not helpful</th>
<th>Neutral</th>
<th>Helpful</th>
<th>Extremely helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning about the NGSS and 3D components helped the observation process overall.</td>
<td>0.0%</td>
<td>0.0%</td>
<td>45.5%</td>
<td>54.5%</td>
</tr>
<tr>
<td>Being part of and supporting my teachers in lesson development, review and revision helped the observation process.</td>
<td>0.0%</td>
<td>0.0%</td>
<td>27.3%</td>
<td>72.7%</td>
</tr>
<tr>
<td>Supporting discussions and planning for evidence of student learning (artifact gathering) helped me understand quality science instruction during observations.</td>
<td>0.0%</td>
<td>0.0%</td>
<td>9.1%</td>
<td>90.9%</td>
</tr>
<tr>
<td>Participating in our team collaboration around developing lessons helped me provide quality feedback during the observation process.</td>
<td>0.0%</td>
<td>0.0%</td>
<td>18.2%</td>
<td>81.8%</td>
</tr>
<tr>
<td>Our team collaboration around developing lessons led to more coherence in what students experienced.</td>
<td>0.0%</td>
<td>0.0%</td>
<td>18.2%</td>
<td>81.8%</td>
</tr>
</tbody>
</table>
Administrators reported a range of examples of what they observed, often citing engaged students using the engineering design model. One stated, “For example when I was talking with the second grade student about their buildings, they were able to share their design and what it was like to build it…Really high-level conversation happening.” Another mentioned seeing “simple...kids are doing all the heavy lifting here. Much less direct teaching. Kids more highly involved in the learning. The lessons were highly engaging.” Another administrator added, “During observation student-centered approaches seem to be the norm. So I prepared for the lesson by spending the majority of time talking to students asking them what they knew and how would it benefit them.”

As expected, administrators mentioned preparing for the observations during the pre-conferences with teachers. One stated, “I met with the team of teachers to decide what we were going in to look for. As a team we decided to look for student discourse and models.” Another noted, “We looked at NEPF standards and indicators together and discussed how each of them could be met by different components. We looked at the pre and post observation questions to better understand what I would be seeing in the observations and what I was looking for. We had a more common language as we worked our way through the process.

Expressing what was almost universally mentioned, another participant concluded, “It was very helpful, as an administrator, to be part of the planning process. I was privy to the thought process behind the selection of the specific lessons and the artifact selection. Another concurred and aptly summed up the process,

It was very beneficial for me to be able to be involved in collaborative lesson planning, artifact review, NGSS alignment, etc. with the teacher. I usually do not have that kind of background when I go in to observe. It was also helpful to be involved in discussion and feedback from other science teachers to improve the lesson prior to execution. I felt I had a solid understanding of the teacher’s objectives, thought process, strategies, and 3D practices. By the time I actually observed the lesson, it was difficult to provide much additional feedback as we had already discussed so much.

Administrators reflected on differences in their confidence, knowledge, and skills for supervising science instruction as a result of participating in the project. Several mentioned having greater confidence and expertise. For example, one noted, “The 5 E’s, evidence statements, and student artifacts helped me become better at observing. I can now talk to the 3D of science and lead a conversation/post observation to guide teachers to strengthen their knowledge in science teaching.” Another added, “I have higher standards for what I expect in a science lesson. I have a better skill set to have better post observation conferences with my teachers.”

Others reflected on similar themes of increased confidence and knowledge. For example:

Prior I was mostly just giving feedback based on the NEPF but I wasn't able to check for alignment with NGSS as I am now. Now I am able to observe through an NEPF
Instructional lens but also monitor the alignment of teacher practices with the NGSS and connect teachers to resources when they are not aligned.

I feel a lot more confident in what types of tasks we look for in our observation. The rigor of the student task is perhaps the most important thing to look for in observations, and I now know what types of tasks are important to look for in the NGSS. I also know how to better frame the conversation when observing science instruction.

My confidence completely changed due to the knowledge I gained. I now know how much more I need to grow and learn about the NGSS. I will continue to ask questions, seek information and collaborate with teachers to strengthen science across our campus.

Final Reflections: Teachers and Administrators. Teachers were asked to think back over the entire Project RISE from the first discussions of the Nevada Academic Content Standards for Science (NVACSS) (based on the Next Generation Science Standards) to developing, revising, teaching, and gathering evidence of student learning. Figure 12 reports on teachers’ final reflections on the project.

Teacher responses to the questionnaire items confirmed quite positive outcomes pertaining to the various components of the project. Nearly 87% assessed that the activities of the project helped them a great deal to improve their ability to integrate disciplinary core ideas (DCIs), science and engineering practices (SEPs), and crosscutting concepts (CCCs) in lessons (item 3), with the remaining respondents rating the item a “3” on a 4-point scale. In addition, more than 75% believed that their understanding of the Crosscutting Concepts (item 6) and their understanding of the Science and Engineering Practices (item 4) shifted a great deal as a result of their work in this project. While these data are based on the self-report of project participants, they nevertheless reflect impressive assessments of the degree of change impacted by the project.
To what extent did you meet the project goal of demonstrating a contextualized understanding of student 3D learning and assessment?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little</th>
<th>Some</th>
<th>Great</th>
</tr>
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<tbody>
<tr>
<td>0.0%</td>
<td>0.0%</td>
<td>28.9%</td>
<td>71.1%</td>
</tr>
</tbody>
</table>

To what extent did the activities of this project help you improve your science content knowledge?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little</th>
<th>Some</th>
<th>Great</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0%</td>
<td>8.9%</td>
<td>31.1%</td>
<td>60.0%</td>
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</table>

To what extent did the activities of this project help you improve your ability to integrate DCIs, SEPs, and CCCs in lessons?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little</th>
<th>Some</th>
<th>Great</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0%</td>
<td>0.0%</td>
<td>13.3%</td>
<td>86.7%</td>
</tr>
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</table>

To what extent did your understanding of the Science and Engineering Practices shift as a result your work in this project?

<table>
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<tr>
<th>Not at all</th>
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<th>Some</th>
<th>Great</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0%</td>
<td>0.0%</td>
<td>24.4%</td>
<td>75.6%</td>
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</table>

To what extent did your understanding of the Disciplinary Core Ideas shift as a result your work in this project?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little</th>
<th>Some</th>
<th>Great</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0%</td>
<td>0.0%</td>
<td>26.7%</td>
<td>73.3%</td>
</tr>
</tbody>
</table>

To what extent did your understanding of the Crosscutting Concepts shift as a result your work in this project?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little</th>
<th>Some</th>
<th>Great</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0%</td>
<td>0.0%</td>
<td>22.2%</td>
<td>77.8%</td>
</tr>
</tbody>
</table>

**Figure 12. Final Reflections: Teachers**

Administrators reflected on one over-arching question—the degree they reached the goal of this project. More than six in ten (61.5%) assessed that they reached the goal of the project to a great extent; the remaining respondents (38.5%) assessed reaching the project goal a “3” on the 4-point scale.

Participants addressed a number of open-ended prompts in their final assessments, including the project’s most and least helpful activities or events. Since the items were defined by the respondents rather than selected from specified options, clear-cut tallies are difficult. That said, a majority of respondents cited some component of the lesson development process, including 13 specific mentions of the lesson screener. Ten respondents cited working with the NGSS, including having time for discussions, and 10 cited time for collaboration during the project activities. Pertaining to the least helpful activity, the lesson screener was cited by 13 participants.
As previously discussed, the lesson screener was seen as being very helpful, but also cumbersome and time-consuming. An administrator noted, “The lesson plan screener was a cumbersome activity, but still very helpful.” A teacher added, “Although it helped me better understand how to find the effective components in a lesson, I struggle with the length of time it takes to utilize it effectively.” Eleven responded that all project activities were helpful.

Teachers and administrators were asked to think about the lesson they taught or observed and assess the engagement of the students, noting behaviors, comments from students, turn-in rate, etc. A large majority of the 58 responses (83%) were “positive, citing increased student engagement and better than average turn-in rates and learning outcomes. Respondents wrote about excited students working collaboratively to solve a real world problem. One teacher noted, “I felt my students were significantly more engaged, especially, when we could apply this to how the "real world" works. I was amazingly surprised as to the quality of work my students created when given the opportunity to be free thinkers without necessarily restricting them.” Others commented on the student-centered nature of the lessons. For example, an administrator observed,

The engagement and conversations I heard from students was fabulous. Students were really tuned into the activities. I can honestly say all students were engaged in the activity. I don't think I ever saw a teacher have to refocus a student during my observations, particularly when students were making modifications to their prototype. For example when I was watching students modify their building after they tested the prototype for the earthquake lesson, students were having some real high conversations about what they would do to create a more suitable structure.

Another agreed, “Seeing students develop prototypes, log their observations, and adjust their prototypes was awesome. I saw students problem solving at a high level. The detail they put in their models was also impressive.

Twelve percent of the responses were mixed or neutral. For example, some noted good levels of engagement, but mentioned some decline in enthusiasm over time or reservations about the quality of student work. One teacher explained, “Students were mostly engaged in lesson. It ran a little long and started to lose them on the final day. May need to shorten the lesson” Another cited that student engagement was good, “although note taking and final student work was lacking. It was difficult getting students to be timely and accurate with their work.”

Only 5% responded to this prompt negatively about the levels of student engagement. One stated, “The engagement was there, initially, then they got bored with it and thought it was way too long. They did not like thinking on their own and having to use their brain. Some of the ideas were abstract and they could not grasp it.” Another agreed, “The kids just want to write quick answers rather than trying to synthesize what they have learned.”

Administrators were asked to describe student understanding of the concept(s) taught based on evidence of student learning that teachers gathered. Of the 13 responses, 10 referred to high levels of student understanding that they observed, though some were derived from talking with students. Specific artifacts that documented that student met expected learning outcomes.
included science notebooks and journals, grade 5 prototype drawings and diagrams, creating filters final projects, the roof project, a PBL project, student reflections, drawings, and models. For example, one administrator assessed, “Student understanding was quite evident when tied to a PBL project. It required them to research, question, and critique what they were learning. This resulted in projects that were well designed and thought through.” One respondent expressed, “Students superficially understood the concepts taught. Students understood the concept in isolation and would not be able to translate that learning to other examples (elephants and tusks). Another administrator commented on the need for students to demonstrate their learning better in writing. She wrote, “They made amazing oral connections and defended them, but when writing them down they wrote the bare minimum at times.”

All participants were asked to reflect on what they learned and how they intend to use this in the future. Many respondents cited various aspects of lesson development, including the 3 dimensions, the 5E’s, use of the lesson screener, phenomena anchoring/beginning lessons with greater engagement, cross cutting concepts, engineering design and practices, more complex content and assessments, greater adherence to the NGSS, and the observation process. Teachers mentioned applying this learning in planning and implementing future lessons; administrators mentioned applying strategies presented within the project to enhance future observations. As one administrator wrote, “There was so much information that was presented during this Project RISE course that it was hard to really pinpoint a particular area of learning.” Across the many topics cited, however, a prominent area of learning included participants internalizing the value of collaboration by teachers and administrators, as well as by students. One administrator stated, “I think that the collaboration piece was the most important part of the entire process. Seeing the teachers come together was awesome.” Another administrator added, “I think more than anything, I learned the value of collaboration with the students as they are working on the project…My teachers were not only observing, but they were asking questions that generated high level responses from the students who in turn asked higher level DOK questions to their peers.” Another added, “I learned that lesson planning with the new curriculum is difficult and it is going to take the collaboration of all of my colleagues to create enriched lessons for all of our students to be successful.”

Others commented on specific aspects of the science process that they intend to implement. In summary, one teacher cited what many addressed, “I've learned how to implement engineering standards into my science lessons. I've learned how to pique the student's interest into problem solving. I will continue to implement these ideas in future lessons.” An elementary teacher added, “I have learned how much students love and how much students can learn through hands-on science. In the future I will go on to teach the STEAM science special at our school and have students complete activities daily that correlate with NGSS.”

Participants also described many changes in practice and how it impacted students. Many cited adopting a more student-centered approach in which the teacher becomes more of a facilitator of learning and students explore and apply scientific reasoning. A teacher explained, “Teaching this way slowed me down dramatically and it helps the students absorb more content.” Another added, “I have incorporated more science phenomena and the 3 D's of the NGSS science
instruction. This increased the engagement of my students due to making the content more student-driven and relevant to their lives.” A secondary teacher commented, “I have begun to modify my labs for next year to be more student driven and not as much cookie cutter, giving them step by step directions what to do. Now more present them with a problem and have them come up with a solution.” Another added, “I provide more opportunities for student collaboration and hands on experiments. I find that creates more opportunity for classroom discussion and questions.”

Respondents cited employing phenomena, science journals, and documenting evidence. A teacher explained, “I have changed the way I have students observe and write in their journals. Students are required to label all models and use words from the word bank in their finding.” Another teacher wrote, “I've changed how I use phenomena and instead of it being just an opener that captures the audience it is used as the goal for the whole unit.” Another added, “I am making my students use more critical thinking skills when providing their answers to questions and practice more graphing and data analysis skills.”

Another change pertains to the time allocated for science. An elementary teacher noted, “I have been spending more time on science and the kids are loving it. Whenever I say its science time they cheer!” An administrator mentioned “adding more science time into the master schedule in order to give the teachers ample time to teach the science standards. I will also add collaboration time as well in order to help the standards being taught.”

Finally, participants were asked about next steps their school will take to improve science instruction, how will these steps improve student learning, and what they think will be accomplished in the next year or two. An almost universal theme in the next steps involves implementing professional development to support those efforts introduced and to expand the scope of project approaches in the respective schools. A range of plans for PD were mentioned to include meeting this summer to work on assessments, formal professional development opportunities during the school year, and using Site-Based Collaboration Time (SBCT). One elementary teacher wrote, “We will provide PDs and use SBCT to review NGSS with staff. Over the next year or two, staff members will be able to understand and teach NGSS better and develop more effective, engaging lesson plans.” Another added, “We are going to have PDs on the DCIs, CCCs, and SEPs for the staff, provide a dedicated time for science instruction, and purchase EiE kits.” Similarly, another stated, “School wide initiatives to improve science instruction include school wide meetings to discuss science curriculum objectives, mentoring staff on planning for science instruction and developing science instruction over multiple content areas.”

Another prevalent theme related to PD is the need for collaboration to support and implement new and challenging practices. A secondary teacher commented, “Collaboration, Collaboration, Observation, Collaboration! Cooperating with others greatly improves thoughts and/or ideas about a subject. Our team plans on continuing to use our SBCT to focus on NGSS CONTENT LESSONs and development of assessments.” A biology teacher added,
We plan to collaborate more, perhaps re-evaluating how much time we devote to each lesson and to common assessments that incorporate the lessons that we are individually doing, hopefully in the next year. Within 2 years, we expect this should work more smoothly because those students will have experienced the new curriculum in middle school.

Administrators brought up the issue of accountability for implementing project goals going forward. One explained, “I will add collaboration time, seek out funding, provide staff development, and ensure teacher accountability throughout the year.” Another added, “I understand our school’s next steps well. It will improve learning because of the higher standards and demands. I think the first year will be like pulling teeth with some teachers but the second year will be better because they know I will not lower my standards or requests.”

Finally, many respondents alluded to multiple factors that they plan to address in their long-term plans. An elementary teacher noted,

Our school has decided to implement a STEAM special that will mainly consist of the engineering aspect of science, we are converting our pods into a maker space, building a school garden, and applied for a science grant. There has already been SBCT science time where we have introduced the new science standards and given time for teacher collaboration to delve into the FOSS kit and long-term plan. We plan on having for SBCT allotted time for science and want teachers to not be afraid of science!

One teacher underscored the value of administrative involvement and support when thinking about next steps. She noted, “I'm a little foggy because we did not have an administrator on our team. It is a difficult program to complete without the admin component.”

**Teacher Portfolios**

Forty-five teachers submitted portfolios, which ranged from 42 to 340 pages. The mean number of pages was 101; the median was 84. A review of portfolio contents documented adherence to the expectations of the project including original lessons, lesson screeners, revised lessons, examples of student artifacts that approach, meet, and exceed expectations, pre-observation forms, and post-observation reflections or forms. In addition, several of the reflections that were included in the portfolio were analyzed and reported in the Reflective Questionnaires section of this report. Due to the varied nature of individual portfolios and the scope of content submitted, further systematic analysis was not employed.

**Other Aspects of Project Implementation**

Participant input during workshop sessions were compiled from charts, entered into an Excel spreadsheet, coded, and analyzed for themes. A discussion of strengths and challenges follows.

**Strengths.** Elementary school participants discussed what they liked about the project’s focus during an introduction to engineering workshop component. A key strength cited was the problem solving orientation in which children function as engineers and in some cases build
upon unsuccessful outcomes. They also saw as strengths the project’s student-centered approach and its many real world applications.

Challenges. A review of challenges gleaned from two workshop discussions yielded several common themes. Many participants raised the issue of time, particularly the time to collaborate with colleagues to plan and implement the program. In a related theme, teachers and administrators cited the need for high quality, ongoing, professional development to receive: (a) training on the content and teaching strategies, (b) modeling from mentor teachers, and (c) time to work with colleagues, including planning for cross-curricular lesson ideas. Elementary personnel mentioned several times the challenge of figuring out how the project approaches might fit with FOSS. And finally, many participants cited the need for a range of materials, including technology, to support the implementation of the program.

Evaluation of Goals and Objectives

Project RISE’s six objectives are evaluated in Figure 13, followed by a discussion of the degree to which the project’s objectives and overarching goal were met.
<table>
<thead>
<tr>
<th>Objective</th>
<th>Evidence/Where Found</th>
<th>Summative Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a. Teacher content knowledge will increase by 20%, as measured with content pre- and post-tests.</td>
<td>Significant increases in content test scores were found for teachers at the 5th grade (8.9%) and 9th grade (7.7%) levels. Second grade scores also increased (2%), but not at a statistically significant level (Table 1, Figure 1).</td>
<td>Objective partially met. While scores increased for all levels, all fell short of the 20% target increase.</td>
</tr>
<tr>
<td>1b. Each teacher will participate in the development of a content-specific unit of instruction including: lessons, assessment elements, peer-review cycles, and explicit elements of 3D artifact generation.</td>
<td>Teacher portfolios and teacher and administrator reflective questionnaires</td>
<td>Objective met.</td>
</tr>
<tr>
<td>1c. Teacher efficacy for NVACS-S-aligned instruction will increase by 20%, as measured on the Science Teacher Efficacy Belief Instrument (STEBI) version A</td>
<td>Teacher efficacy scores on the STEBI-A decreased for self-efficacy (at a significant level) and outcomes efficacy (not significant level) (Table 2, Figure 2).</td>
<td>Objective not met. STEBI-A outcomes were well below the 20% target increase.</td>
</tr>
<tr>
<td>2a. During a pre-observation conference, teachers and administrators will document collaboration about what will constitute evidence of student learning.</td>
<td>Teacher portfolios and teacher and administrator reflective questionnaires</td>
<td>Objective met.</td>
</tr>
<tr>
<td>2b. Administrators will document 3D components observed during classroom observations.</td>
<td>Teacher portfolios and administrator reflective questionnaires</td>
<td>Objective met.</td>
</tr>
<tr>
<td>2c. During a post-observation conference, teachers and administrators will document evidence of student learning.</td>
<td>Teacher portfolios and teacher and administrator reflective questionnaires</td>
<td>Objective met.</td>
</tr>
</tbody>
</table>

**Figure 13. Evaluation of Project Objectives**

**Discussion**

Project RISE’s overarching goal is that teachers and administrators will demonstrate a contextualized understanding of student three-dimensional (3D) learning and assessment, aligned with the Nevada Academic Content Standards for Science. In terms of measures of content knowledge, the pre/post content outcomes all increased, but fell short of the 20% target set by the
project. In view of the positive gains, that objective was deemed partially met. The STEBI-A outcomes, however, fell well short of target measures for teacher self-efficacy and outcomes expectancy, and therefore deemed not met.

The remaining project objectives were deemed as met, based largely on documented evidence in teacher portfolios and extensive survey items and reflective prompts gleaned from multiple questionnaires. Pertaining to the content exams and STEBI-A outcomes, one likely contributing factor was the late start for the project, which decreased time for project implementation by approximately three months. Particularly in terms of the STEBI-A, it seems quite understandable that teachers’ self-efficacy measure might decline when learning about and implementing challenging, new pedagogical approaches within a relatively brief time frame. Qualitative evidence suggests that a sound majority of teachers embraced the approaches and strategies endorsed by the project, and along with their administrators, described next steps to sustain and expand project approaches. Overall, qualitative data support strong commitment to the goals of the project as well as satisfaction with how it was implemented.

Pertaining to the content tests, while they address some engineering methods and perspectives (i.e., in Grades 2 and 5), they do not directly reflect the changes in pedagogical knowledge that the participants have incorporated. Going from teacher directed pedagogy (i.e., lecture, worksheets) to student-centered inquiry is a huge change for many teachers. It seems that if the pre- and post-tests reflected what participants learned about the Next Generation Science Standards (NGSS) and the various components and tools introduced for creating rigorous lessons and assessments, participants would very likely show a greater increase in their knowledge related to the project. Evidence suggests that participants grappled with and largely learned to operationalize and improve upon their practice, an outcome that was not addressed by the pre/post quantitative measures.

Finally, participants had almost universal praise for the project’s opportunities for collaboration and its focus to involve building administrators in this effort to improve science instruction. Clearly this is a well-conceived strategy for fostering informed leadership and successful implementation of project goals, including mechanisms for leading community of practice shifts. Questionnaire data suggest that these positive attributes made a significant impact on participants—both teachers and administrators—and their commitment to the innovative approaches introduced. Of course, sustaining and expanding these changes will continue to be a challenge, but data gathered suggest that Project RISE established a very solid foundation on which to build.

Next Steps

A cursory analysis of the challenge of improving teaching and learning in science points to an obvious solution—prepare teachers for creative, research-based practices and they will implement the desired changes. And that, to some extent can be done. Change in schools, however, is a complex process that takes years to achieve, particularly with challenging innovations, as promoted by Project RISE. One explanation for this difficulty is that an organization will not change until individuals within it change. Michael Fullan (2001), a renowned expert on educational change, characterized this challenge as the 25/75 Rule for Educational Change. Twenty-five percent of the solution is having good directional ideas; 75% is figuring out how to get there in one local context after another.
In reviewing participants’ discussion of next steps for the project, it seems clear that much support will be needed. For the participants, the collaboration described serves as a key ingredient for moving forward. Furthermore, the informed leadership of building administrators is invaluable for continued change. Much of the plans for next steps involve a combination of formal and informal professional development and support, and this appears to be well conceived. For those seeking additional grants, the resources they provide will be a welcome addition to support their efforts. For those who are on board and have embraced the project goals, it is helpful to recall the PD experiences that helped get them there. Hopefully, district-level planners will consider this as well. According to Fullan, the “good idea” is only 25% of the battle; 75% involves thoughtful implementation support in the local context. Clearly, continued resources will be needed to support the good intentions and successful initial efforts that Project RISE has fostered, particularly as schools transition from working with a small number of “volunteers” to larger-scale implementation.

III. Budget Summary

a) Narrative Overview of Use of GTL Funds Awarded

The Reflective Instruction for Science Education (RISE) project was awarded $432,170. These funds were expended to support the priority of professional development for teacher/leader retention in the Nevada Academic Content Standards for Science (NVACSS) with a focus on integration of real-world applications and/or effective use of instructional technology with an embedded leadership development component. Funds awarded were used in accordance with the accepted grant application to provide opportunities for teachers of science in Grade 2, Grade 5, and Grade 9 Biology, as well as building administrators who supervise these teachers.

The grant was written to support a total of 23 school teams (20 from Clark County School District (CCSD), and 3 from Lincoln County School District (LCSD)). Several obstacles were experienced at the start of this project including delay in access to the awarded funds, that hindered LCSD and CCSD from fully participating. Ultimately, school teams, consisting of 1 administrator and up to four teachers from 13 schools participated in Project RISE.

Specifically, funds were used to provide professional development and instructional materials supporting the project’s central goal that participants (teachers and administrators) will demonstrate a contextualized understanding of student three-dimensional (3D) learning and assessment, aligned with the NVACSS.

b) Brief Description of Expenditure Categories and Description

Personnel: Participants were provided 4 substitute days for the institute/anchoring experience that totaled $17,610. Teachers and administrators received compensation at $30/hour for off contract (Saturdays, and evenings) project workshops, development, revision, and facilitation totaling $89,606 and $11,730 respectively. Standard NDOE approved fringes totaled $3,528.16. Throughout this project teachers committed to spending a minimum of 63 hours off contract time, and administrators committed to spending a minimum of 35 hours of off contract time engaged with: project trainings and workshops (after school and on weekends), school team collaboration in lesson and unit development, evaluation of student artifacts to make
instructional decisions, use of productive observation cycles based on evidence of student learning, shifting communities of practice as instructional leaders at their schools, and generating a portfolio, documenting their professional learning and reflections throughout the project.

Professional trainings included teacher and administrator support providing instructional materials and resources for the schools to carry out project goals. Support materials for lesson and unit development included: Engineering is Elementary instructional materials $18,041 (grades 2, and 5), DNA, heredity, genetics, and evolution $13,924.73 (high school biology), Uncovering Student Ideas/Formative Assessment Probes and NGSS Standards Books $10,899.84.

Total Expenditures: $165,339.73

c) Awarded Funds vs. Unexpended Funds

The difference of $266,830.87 between the amount awarded ($432,170.60) and the amount expended ($165,339.73) was due to fewer school teams from both CCSD and LCSD than anticipated. As noted above, the budget was written to support a total of 23 school teams (20 from CCSD, and 3 from LCSD). Several obstacles were experienced at the start of this project including delay in access to the awarded funds, that hindered LCSD and CCSD school teams from participating. Ultimately, school teams, consisting of 1 administrator and up to four teachers from 13 schools participated in Project RISE. Fund categories were used consistently as outlined in the grant; unexpended funds were due to fewer participants, despite active recruitment.
References


Appendix A: Project Framework & PD Schedule

Project RISE: Reflective Instruction for Science Education (2016-2017 GTLF grant) is a collaborative grant between the Southern Nevada Regional Professional Development Program, Instructional Design and Professional Learning Division of the Clark County School District, and Lincoln County School District. Its purpose is to specifically and explicitly target teacher understanding of and ability to translate the Nevada Academic Content Standards for Science (NVACSS) into classroom, 3-D instruction. With a focus at grades 2, 5, and 9 teachers will work through curricula and developing units/integration framework materials and understand the need to use student generated artifacts to make instructional decisions.

**Goal:** Participants (teachers and administrators) will demonstrate a contextualized understanding of student three-dimensional (3D) learning and assessment, aligned with the NVACSS.
# Professional Development Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Location</th>
<th>Who</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/31/17</td>
<td>8:00 am - 4:00 pm</td>
<td>ECTA</td>
<td>All (61)</td>
<td>All teachers and administrators participate in Anchoring Experience of NVACSS-aligned, phenomenon-based, engineering design lesson sequence. All participants establish a portfolio to document personal growth during this project.</td>
</tr>
<tr>
<td>2/1/17</td>
<td>8:00 am - 4:00 pm</td>
<td>IDPL</td>
<td>All (61)</td>
<td>Provide teachers collaborative school team time and RISE leadership team support for lesson development</td>
</tr>
<tr>
<td>2/7/17</td>
<td>8:00 am - 4:00 pm</td>
<td>IDPL</td>
<td>Teachers (49)</td>
<td>Provide teachers peer review protocol for developed lesson and evidence of student learning (artifact), and collaborative school team time and RISE leadership team support for lesson revision.</td>
</tr>
<tr>
<td>2/8/17</td>
<td>8:00 am - 4:00 pm</td>
<td>IDPL</td>
<td>All (61)</td>
<td>Team collaboration time for identifying strategic areas within lesson for embedding assessment-collecting evidence of learning (artifacts)</td>
</tr>
<tr>
<td>3/2/17</td>
<td>4:00 pm - 8:00 pm</td>
<td>ES - Greens ES Biology - Durango HS</td>
<td>Teachers (49)</td>
<td>Teacher and administrator collaboration workshop looking at student work to explore what the data is telling us, and how these strategies can be used globally to support rigorous science instruction</td>
</tr>
<tr>
<td>3/16/17</td>
<td>4:00 pm - 8:00 pm</td>
<td>ES - Greens ES Biology - Durango HS</td>
<td>Teachers (49)</td>
<td>Teacher and administrator collaboration workshop looking at student work to explore what the data is telling us, and how these strategies can be used globally to support rigorous science instruction</td>
</tr>
<tr>
<td>3/25/17</td>
<td>8:00 am - 4:00 pm</td>
<td>NWCTA</td>
<td>All (61)</td>
<td>Reflections from school teams shared as they relate to experiences with lesson development, artifact of student work generation and analyses, observation cycle and collaborative strategies for change.</td>
</tr>
<tr>
<td>4/22/17</td>
<td>8:00 am - 4:00 pm</td>
<td>IDPL</td>
<td>All (61)</td>
<td>Reflections from school teams shared as they relate to experiences with lesson development, artifact of student work generation and analyses, observation cycle and collaborative strategies for change.</td>
</tr>
<tr>
<td>5/13/17</td>
<td>8:00 am - 4:00 pm</td>
<td>IDPL</td>
<td>All (61)</td>
<td>Reflections from school teams shared as they relate to experiences with lesson development, artifact of student work generation and analyses, observation cycle and collaborative strategies for change.</td>
</tr>
</tbody>
</table>
## Appendix B: Outcome Accountability Plan (Unmodified)

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Baseline</th>
<th>Measure of Progress</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective 1.A</strong>&lt;br&gt;Measure growth in teacher content knowledge&lt;br&gt;Benchmark: 20% increase in content knowledge</td>
<td>Pre-test specific to standards addressed (Grades 2, 5, and 9)</td>
<td>Post-test specific to standards addressed (Grades 2, 5, and 9)</td>
<td>September 30, 2016&lt;br&gt;May 1, 2017</td>
</tr>
<tr>
<td><strong>Objective 1.B</strong>&lt;br&gt;Document standards-based lesson/unit&lt;br&gt;Benchmark: 1 lesson/unit per teacher</td>
<td>None</td>
<td>Lesson/unit from each teacher posted&lt;br&gt;Lesson/unit from each teacher peer-reviewed</td>
<td>March 15 – May 1, 2017</td>
</tr>
<tr>
<td><strong>Objective 1.C</strong>&lt;br&gt;Document change in teacher efficacy&lt;br&gt;Benchmark: 20% increase in self-reported efficacy</td>
<td>STEBI-A baseline</td>
<td>STEBI-A post-test</td>
<td>September 30, 2016&lt;br&gt;May 1, 2017</td>
</tr>
<tr>
<td><strong>Objective 2.A</strong>&lt;br&gt;Measure evidence of student learning&lt;br&gt;Benchmark: Positive change in student learning</td>
<td>Teacher and administrator will collaboratively determine what will constitute evidence and set a goal.</td>
<td>Teacher and administrator will report student learning progress.</td>
<td>October 15, 2016&lt;br&gt;May 1, 2017</td>
</tr>
<tr>
<td><strong>Objectives 2.B and 2.C</strong>&lt;br&gt;Measure implementation of 3D components in classroom instruction&lt;br&gt;Benchmark: 3D components observed&lt;br&gt;Benchmark: Formative and summative assessments observed</td>
<td>None</td>
<td>Administrators will document a complete observation cycle (pre-observation, observations, post-observation) for each teacher</td>
<td>October 1 – April 30, 2017</td>
</tr>
</tbody>
</table>
Appendix C: STEBI-A

Science Teaching Efficacy Belief Instrument*

Please indicate the degree to which you agree or disagree with each statement below by circling the appropriate letters to the right of each statement.

SA = Strongly Agree  
A = Agree  
UN = Uncertain  
D = Disagree  
SD = Strongly Disagree

1. When a student does better than usual in science, it is often because the teacher exerted a little extra effort. SA A UN D SD
2. I am continually finding better ways to teach science. SA A UN D SD
3. Even when I try very hard, I don’t teach science as well as I do most subjects. SA A UN D SD
4. When the science grades of students improve, it is most often due to their teacher having found a more effective teaching approach. SA A UN D SD
5. I know the steps necessary to teach science concepts effectively. SA A UN D SD
6. I am not very effective in monitoring science experiments. SA A UN D SD
7. If students are underachieving in science, it is most likely due to ineffective science teaching. SA A UN D SD
8. I generally teach science ineffectively. SA A UN D SD
9. The inadequacy of a student’s science background can be overcome by good teaching. SA A UN D SD
10. The low science achievement of some students cannot generally be blamed on their teachers. SA A UN D SD
11. When a low achieving child progresses in science, it is usually due to extra attention given by the teacher. SA A UN D SD
12. I understand science concepts well enough to be effective in teaching elementary science. SA A UN D SD
13. Increased effort in science teaching produces little change in some students’ science achievement. SA A UN D SD
14. The teacher is generally responsible for the achievement of students in science. SA A UN D SD
15. Students’ achievement in science is directly related to their teacher’s effectiveness in science teaching. SA A UN D SD
16. If parents comment that their child is showing more interest in science at school, it is probably due to the performance of the child’s teacher. SA A UN D SD
17. I find it difficult to explain to students why science experiments work. SA A UN D SD
18. I am typically able to answer students’ science questions. SA A UN D SD
19. I wonder if I have the necessary skills to teach science. SA A UN D SD
20. Effectiveness in science teaching has little influence on the achievement of students with low motivation. SA A UN D SD
21. Given a choice, I would not invite the principal to evaluate my science teaching. SA A UN D SD
22. When a student has difficulty understanding a science concept, I am usually at a loss as to how to help the student understand it better. SA A UN D SD
23. When teaching science, I usually welcome student questions. SA A UN D SD
24. I don’t know what to do to turn students on to science. SA A UN D SD
25. Even teachers with good science teaching abilities cannot help some kids learn science. SA A UN D SD

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