

1. **SPRING 2017**
2. **SCED 342 CONCEPTS IN EARTH AND SPACE SCIENCE**
3. **SLO assessed:**

#### **SLO1.1**

**STUDENTS WILL BE ABLE TO: DEMONSTRATE AN UNDERSTANDING OF THE DCI'S IN PHYSICAL SCIENCE (PS), LIFE SCIENCE (LS), AND EARTH AND SPACE SCIENCE (ESS)**

- PRE AND POST TEST USING MASTERTINGGEOLOGY (ASSESSMENT OF SPACE SCIENCE CONCEPTS)

#### **SLO 3.1**

**STUDENTS WILL BE ABLE TO: CREAT STANDARD-BASED LESSON PLANS**

- PLACE-BASED GROUP PROJECTS

#### **4. Assessment Methodology Used:**

##### **1.1:**

Sample Size: 76

Sampling Strategy: 10-question pre and post assessment

Data collection: Students took a, 10 question, pre and post assessment of space science content knowledge. The data was collected and analyzed using MasteringGeology, an online platform attached to the textbook for the class. Questions were generated from two journal articles (M.Zeilik, 1998 and C. Turk, 2016), comparing preservice teachers' worldwide. The questions were multiple choice, with one correct answer (see appendix C). The data collected provided a quantitative answer to the content knowledge gained during the course of the class. Pretests were taken prior to starting the space science portion of the class and posttests were taken the last lab day of the semester. Students were instructed that their assessment scores would not affect their grade. The assessment scores were strictly used to judge the successfulness of the space science portion of the class. Overall assessment results would be used to determine possible future modifications needed in the class.

Data analysis: Student assessments were graded based on correctness. Pre and post assessment scores were compared and any positive gain would suggest that content knowledge was gained during the space science portion of the class.

**3.1:**

Sample Size: 80

Sampling Strategy: Evaluation of Oral Presentation (Placed-based group projects)

Data Collecting: Students were given guidelines with grading standards for oral presentations (see appendix B) at the beginning of the semester. Over the course of the semester students had multiple opportunities to work on the oral presentations.

Students were excepted to make modifications to preexisting lesson plans to make them not only place-based but modified to meet the NGSS. Data was collected after all groups had finished the presentations.

Data Analysis: Students were assessed on their performance during oral presentations. A rubric (see appendix B) was used to score the groups on lesson modifications and the NGSS used during their presentation. Scores regarding that section (Lesson Modifications and NGSS) had a possible point-range from 0 (no modifications and/or no standards stated or explained), to 3 (modification made and standards stated and explained). An overall score of a 3 indicates that students were successful in modifying a current lesson plan to meet the NGSS.

**5. Assessment Results:**

<b>Student Learning Outcome</b>	<b>Sample and Sample Size</b>	<b>Measure</b>	<b>Percent of Students Achieving</b>
1.1	76	Posttest score increase or unchanged	81% achieved a positive gain in their score
3.1	80	Scores on the lesson modification and NGSS component of the Group Project	58% achieved a 3 on that component showing that they understand how to modify a lesson plan to meet the NGSS

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## 1.1

Pretest average: 3.63

Posttest average: 5.19

49 students increased their score by an average of 2.73 showing a net gain of almost 3 concepts gained over the course of the class

14 students decreased their score by an average of -1.21 (negative gains could suggest students simply guessed during the assessments either pre or post)

13 students scores remained unchanged showing no concept knowledge gained

Posttest Variance in scores ranged from -2 to 7 over their pretest scores.

81% of students achieved a positive gain in their score suggesting that concept knowledge was gained over the space science section of the course.

## 3.1

Class average score on (the modification and the NGSS component of the oral presentation) was a 2.3 out of 3 total points.

47 students received a score of a 3 on this component of the oral presentations

15 students received a score of a 2 on this component of the oral presentations

9 students received a score of a 1 on this component of the oral presentations

9 students received a score of a 0 on this component of the oral presentations

## 6. Analysis / Interpretation of Results

### 1.1

Percent Correct:

Question 1 Pre 37.0% Post 56.6%

Question 2 Pre 11.1% Post 63.6%

Question 3 Pre 11.3% Post 39.0% (56.6% answered it doesn't rotate on its axis)

Question 4 Pre 53.1% Post 33.8% (41.0% answered at Sunrise)

Question 5 Pre 50.6% Post 50.6%

Question 6 Pre 63.0% Post 77.9%

Question 7 Pre 35.6% Post 61.3%

Question 8 Pre 55.6% Post 83.8%

Question 9 Pre 12.3% Post 11.1% (68.8% answered everyday at noon)

Question 10 Pre 32.5% Post 50.8%

Results were shared with the class during the last discussion day of the semester.

Students could individually look and score and go over questions that were missed. The assessment results show areas that I will focus on more during the labs next semester.

Question 3 (Lunar Rotation) results indicate that additional time during the moon lab is required; students still do not understand this concept. Question 4 (Lunar Phases) results indicate that students either guessed during the pretest or were confused by the material delivered over the course of the Moon lab and assigned reading; students had a better understanding of this content prior to taking this course. These results suggest that additional time and reading is required to gain content knowledge in this area. Question 9 (The Sun's position in the Sky) results indicate that this is the weakest area in space science knowledge; and additional time both in lab and reading in the text is required in this content area. Overall the class had a positive gain on 7 of the 10 questions suggests that space science content knowledge was gained during this course.

### **3.1**

Results were shared with students during the group project debrief discussion day. Groups were presented with their score on the presentation as well as a written explanation of any points missed. In some cases suggestions were made on areas where points were missed. Each group was given a chance to go over their results with me and ask questions in regards to any missed sections. The results suggest that more class time is needed going over the NGSS. The results also suggest that students are not confident in modifying preexisting lesson plans. A 58% success rate is below my expectation for the class.

## **7. Planned Program Improvement Actions Resulting from Outcomes (if applicable)**

### **1.1**

After statistical analysis was performed on the percent correct questions 3,4, and 9 need additional attention. These concepts (3.Lunar Rotation, 4.Lunar Phases, and 9.Sun's Position in the Sky) were readdressed during the final review and were questions added to the lab final. Results after readdressing these concepts were Question 3 (percent correct 65.4%, a gain of 26.4% posttest results), Question 4 (percent correct 90.1%, a gain of 56.3% from posttest results), and Question 9 (percent correct 87.5%, a gain of 76.4% from posttest results). The results on the final indicate that extra time was needed in the three content areas and that after readdressing those topics during the final review students gain content knowledge in those three areas.

Planned revisions include integrating more space science knowledge into the context of the class and adding additional lab time dedicated to each of the above subjects, additional homework and reading assignments will be added to these areas.

### **3.1**

Planned revisions based on feedback from students during the debrief was that more one-on-one time was need with me. Even groups that received full credit in all areas said that they would have like to have dedicated one-on-one time with me during the group project prep days. This semester individual time has been allocated to each group during the group project prep days and is stated in the syllabus.

Students also expressed their concern with familiarity with the NGSS. Many students said that they were not familiar with the standards at all coming into the class but felt a little more comfortable leaving the class. Ideally I want all my students to feel very comfortable with the standards. Revisions were made this semester that require students to actively look at the standards and apply them to the content material discussed each week in class. This semester the first week I had an in-class activity where each group had to find the standards for specific topics and share their results with the class. This required them to familiarize themselves with the NGSS website (many students expressed to me that they had never used the website before and were not familiar with reading the standards). Revision were also made to end of every lab and applied this semester. Every lab now has assigned homework questions regarding the standards discussed during that lab. The questions are designed to have students explore the standards and current preexisting activities for each topic. Every discussion day we review these questions and have an open discussion on activities students found online, CCC's, DCI's, and modifications needed to make activities meet the NGSS.

Based on these modifications to the class I expect an increase in the percent of students achieving the modifications and the NGSS component of the place-based group projects

## **8. Planned Revision of Measures or Metrics (if applicable)**

*A possible revision of a measure might be to recommend a change in the assignments that are evaluated for program assessment, or the number of assignments examined, and by whom. A metric revision might be for program faculty to decide to change the "bar" for acceptable performance.*

**9. Planned Revisions to Program Objectives or Learning Outcomes (if applicable)**

*After examining the assessment data it might be appropriate to revise one or more of the Program Objectives or Student Learning Outcomes.*

**II. Appendices**

**A. Assessment Data Summaries (see Appendix A (1.1, 3.1))**

**B. Measurement Standards (see Appendix B (1.1))**

**C. Survey Instruments- MasteringGeology online platform (1.1)**