**Investigative Questions**

**INTERDISCIPLINARY CAP STONE PROJECTS PROVIDE AUTHENTIC CAREER EXPERIENCE DURING SOCIO-ENVIRONMENTAL SCIENCE INVESTIGATIONS (SESI)**

Fifteen mentors were recruited and worked with the students during the SESI investigations. Research objectives designed to address the above goal include:

1. Using a geospatial curriculum approach with STEM-related mentoring in high school.
2. High-school level socio-environmental science investigations in the students’ local community.
4. Content—Data and Analysis.
5. Pedagogical frameworks of place-based education.
6. Analysis with Web-based mapping software.
7. Inquiry-based investigations.

As students developed their proposals, they were to focus on four or more of the following themes:

1. Energy and climate change reduction
2. Transportation and safety systems
3. Economic development, commercial areas and tourism
4. Created a new Web GIS map for their area to reflect their proposed changes.

**Tree Planting Project**

In this geospatial project, students were given a grant that would fund the planting of trees on the property of their school. They were to:

* Develop a proposal to plant trees at least two different areas on the property of their school using at least two different species.
* Identify the different locations that should be planted.
* Identify the species of trees that should be planted.
* Create a map in Web GIS that shows where the trees will be planted.

The winning plan will be implemented in the next school year.

**In our school, we developed a proposal to plant trees in at least two areas of the property of our school.

Student Tree Planting Proposal:

- **Location:**
  - 1. Developed a proposal to plant trees in at least two different areas on the property of their school using at least two different species.
  - 2. Identified the species of trees that should be planted.
  - 3. Identified the locations that should be planted.
  - 4. Created a map in WebGIS that shows where the trees will be planted.

**Finding of Date**

- **How would adding more trees to the campus help to reduce the heat temperature in the summer?**
  - By planting these trees there it will improve the school look. Make it look even better and help to reduce hot temperature in the summer.
  - Trees absorb carbon dioxide and give us more clean oxygen.
  - Trees help to reduce hot temperature in the summer.

**Natural Air Conditioner**

- Trees help to reduce hot temperature in the summer.
  - By planting these trees there it will improve the school look. Make it look even better and help to reduce hot temperature in the summer.
  - Trees absorb carbon dioxide and give us more clean oxygen.

**Data Collection**

- **How would you choose a tree for a specific area on campus?**
  - We will need to choose a tree for a specific area on campus to help reduce hot temperature in the summer.

**Data Summary for Culminating Project**

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<th>n</th>
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<td>(7.5%)</td>
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<tr>
<td>Proficient</td>
<td>22</td>
<td>(32.8%)</td>
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<td>Adequate</td>
<td>29</td>
<td>(39.3%)</td>
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<td>Needs Improvement</td>
<td>0-3</td>
<td>(11.6%)</td>
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<tr>
<td>Did Not Complete</td>
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**Data for Culminating Project**

Two doctoral students individually graded each student's submitted presentation using the Culminating project rubric. There were a total of 57 students included in the data. The rubric consisted of six individual grades, three related to Geospatial Data Analysis and three related to Geospatial Reasoning. Individual scores were assigned on a scale of 0-100, with a minimum score of 40 for each section and a minimum total score of 60. There was a total of 492 individual grades and 356 were initial grades resulting in an inter-rater reliability of 0.81. The raters then discussed the remaining grades and came to unanimous consensus. The unanimous grades are used to provide the data summaries below:

**Student Summary - Total Project**

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**Findings to Date**

1. Strong growth in teacher’s geospatial pedagogical content knowledge
2. Increased use by teachers both within and outside SESI activities
3. Teacher’s use of maps as media for inquiry, not for location or navigation
4. Teacher modeling to guide students’ analysis in GIS

**About Our School**

- **Adequate**
  - Needs Improvement: 0-3
  - Did Not Complete: 10

**About Our School**

- **Adequate**
  - Needs Improvement: 0-3
  - Did Not Complete: 10

**SESI materials are available**

https://eli.lehigh.edu/seisi/

Papers available at

https://eli.lehigh.edu/publications/research