Appendix B: A Sample Project Calendar from the Sinking Cities Group

WEEK ONE

Monday

Objectives

1. By the end of class, the student will demonstrate knowledge of sea level rise vocabulary and concepts through completion of jigsaw activity and worksheet to be assessed by the teacher for completion and observation of student presentations.
2. By the end of class, the student will collaborate with group members to complete a jigsaw activity and share their finds to the class to be assessed by the teacher through observations and follow up questions.

Standards

- ES.10 The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include:
    - a) Physical and chemical changes related to tides, waves, currents, sea level and ice cap variations, upwelling, and salinity variations;
    - e) economic and public policy issues concerning the oceans and the coastal zones including the Chesapeake Bay

Learning Activities

1. Entry Event
2. Jigsaw Groups
3. Jigsaw Summary
4. Sharing with the Class

Assessment

- Group Presentations, Collection of Concept Map and Teacher questions

Success Skills

- Teamwork, Time management

Wednesday

Objectives

1. By the end of class, the students will create individual group calendars of project due dates, time spent on each section of the project, and what students still need to learn in order to complete the project.
2. By the end of class, the student will demonstrate knowledge of sea level rise of water thermal expansion to be assessed by the teacher through a data chart.
3. By the end of class the student will demonstrate how land based ice and sea ice affect sea level rise differently through a lab report to be assessed by the teacher.

Standards

- ES.2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. Key concepts include
    - a) science explains and predicts the interactions and dynamics of complex Earth systems
    - e) evidence is required to evaluate hypotheses and explanations; observation and logic are essential for reaching a conclusion; and

- ES.10 The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include:
    - a) Physical and chemical changes related to tides, waves, currents, sea level and ice cap variations, upwelling, and salinity variations;
    - b) Importance of environmental and geologic implications
    - e) economic and public policy issues concerning the oceans and the coastal zones including the Chesapeake Bay

Learning Activities

1. Teacher Demonstration
2. Student Demonstration
3. Project Brainstorming / Planning

Assessment

- Lab report

Success Skills

- Critical Thinking
- Self-Management

Friday

Objectives

1. The student will compute and analyze the mean and measures of variance (standard deviation, range) for a given data set on sea level with 90% accuracy, as assessed by teacher review of student work.
2. The student will compute and analyze the percent increase of the mean sea level with 90% accuracy, as assessed by teacher review of student work.
3. The student will analyze, interpret, and make predictions using a given data set on sea level through mathematical models (i.e. graphing via Excel) with 90% accuracy, as assessed by teacher review of student work.

Standards

- A.9 The student, given a set of data, will interpret variation in real-world contexts and calculate and interpret standard deviation.
- A.11 The student will collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve real-world problems.

Learning Activities

1. Shmoop Video - Normal Distribution
2. Lecture - Guided Practice
3. Excel Data Analysis
4. Hampton Roads Data

Assessment

- Review of student work on lesson packet
- Review of student work on Excel graphs

Success Skills

- Critical Thinking

WEEK TWO

Tuesday

Objectives

1. Using their groups' data set, the student will apply their calculated sea level rise rate to a fifty-year period to accurately determine and map the new high tide line on a topographic map of the Hampton Roads area, as assessed by teacher review of student calculations and mapping before the end of the class period.
2. Before the next class, the student will compose a brief (max two-page, double spaced) reflection paper that explores the hypothetical impact of sea level rise on a favorite or meaningful place as assessed by the teacher for style, formatting, and creativity through a teacher created rubric.
3. Throughout the lesson, the students will practice critical thinking skills through research and by synthesizing information from multiple sources as assessed by the ability to apply information to topographic maps during the mapping activity and by the creative application of other sea level rise scenarios to the Hampton Roads area in the reflective essay.

Standards

- ES.1 The student will plan and conduct investigations in which
  - c) scales, diagrams, charts, graphs, tables, imagery, models, and profiles are constructed and interpreted;
  - d) maps and globes are read and interpreted, including location by latitude and longitude;
- ES.2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. Key concepts include:
  - a) science explains and predicts the interactions and dynamics of complex Earth systems;
  - b) evidence is required to evaluate hypotheses and explanations;
  - c) observation and logic are essential for reaching a conclusion;
- ES.10 The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include:
  - b) Physical and chemical changes related to tides, waves, currents, sea level and ice cap variations, upwelling, and salinity variations;
  - e) economic and public policy issues concerning the oceans and the coastal zones including the Chesapeake Bay
- ES.11 The student will investigate and understand the origin and evolution of the atmosphere and the interrelationship of geologic processes, biologic processes, and human activities on its composition and dynamics. Key concepts include:
  - d) potential changes to the atmosphere and climate due to human, biologic, and geologic activity.

Learning Activities

1. NOAA's Digital Coast Sea Level Viewer
2. Hampton Roads Sea Level Change
3. Topographic Mapping Review
4. Hampton Roads Mapping

5. Infographic Modelling
6. Introduction of Hampton Roads Reflection Assignment

Assessment

- Think-Pair-Share Activity
- Teacher Observation
- Topographic Mapping quiz
- Teacher review of student-created map

Success Skills

- Critical Thinking

Thursday

Objectives

1. By the end of the Unit, the student will design a persuasive infographic including a mission/purpose statement, Trend Line graph, sea level topo map, sea level projections, community level impacts, science behind sea level rise blurb, images, and relevant sources to be assessed by the teacher with a content rubric.
2. Students will collaborate with group members to organize the infographic tasks to be assessed by the teacher by a teacher/group progress report conference during class.
3. Students will assess their own knowledge and gaps through discussion and Q/A with other groups and the teacher, to be assessed by the teacher through a checklist.
4. Students will evaluate (internet) sources to be assessed by the teacher through a master checklist.
5. Students will discuss and evaluate what makes an image meaningful to be assessed by the teacher through questioning.

Standards

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    - e) evidence is required to evaluate hypotheses and explanations; observation and logic are essential for reaching a conclusion; and
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Learning Activities

1. Internet Safety & Source Validation Activity
2. Infographic Work Session
3. Model Final Project
4. Teacher Checkpoint

Assessment

- Teacher review and observation of student responses during Teacher Checkpoint

Success Skills

- Team Work
- Critical Thinking

WEEK THREE

Monday

Objectives

1. By the end of the Unit, the student will design a persuasive infographic including a mission/purpose statement, Trend Line graph, sea level topographic map, sea level projections, community level impacts, science behind sea level rise blurb, images, and relevant sources to be assessed by the teacher with a content rubric.
2. By the end of the lesson, students will write a draft of their oral presentation using at least one of the key elements of persuasive presentations including logos, ethos and/or pathos to be turned into the teacher for written feedback.
3. By the end of the next class period, the student will collaborate with group members to divide up the speaking parts of the presentation so that everyone speaks at least once as assessed by teacher observation and individual conferences with groups.
4. By the end of the class, students will demonstrate self-management strategies by reassessing their group's progress on infographic tasks, quality and frequency of on-task behavior and timely completion of tasks matching their project calendars to be assessed for completion by the teacher through a brief group exit ticket.

Standards

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    - b) Importance of environmental and geologic implications
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Learning Activities

1. Public Service Announcement Work Session
2. Persuasive Writing Activity
3. Teacher Checkpoint

Assessment

- Teacher observation and review of student responses during Teacher Checkpoint
- Teacher review of student work and responses during persuasive writing activity

Success Skills

- Team Work
- Communication

Wednesday

Objectives

1. The student will demonstrate self-management by adhering to group's project calendar and meeting deadlines set by group members, with 100% accuracy, assessed by teacher observation.
2. The student will collaborate with group members to complete project requirements and meet deadlines, with 100% accuracy, as assessed by teacher observation.

Standards

- ES.10 The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include:
    - b) Importance of environmental and geologic implications
    - e) economic and public policy issues concerning the oceans and the coastal zones including the Chesapeake Bay

Learning Activities

1. Work Session for all PBL assignments
2. Hampton Roads Reflection

Assessment

- Teacher review of student questions and work ethic during work session
- Teacher review of student work on reflection assignment

Success Skills

- Team Work
- Self-Management

Friday

Objectives

1. Students will evaluate their projects by a content rubric/comments sheet to be self/peer assessed.
2. Students will orally present their PSA and infographic to two other student groups to be peer assessed by a content rubric.
3. Students will revise their infographics and PSA based on feedback to be assessed by the teacher through observation and a checklist.

Standards

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    - d) potential changes to the atmosphere and climate due to human, biologic, and geologic activity.

- English 9.1 The student will make planned oral presentations independently and in small groups.
    - b) Use relevant details to support main ideas.
    - d) Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.
    - e) Use verbal and nonverbal techniques for presentation.
    - g) Credit information sources.
    - k) Summarize and evaluate information presented orally by others.
    - l) Assume shared responsibility for collaborative work.

Learning Activities

1. In-Class Presentation of Public Service Announcement
2. Critiques and Revision of Presentations
3. Self-Assessment of Collaboration

Assessment

- Teacher review of student work and presentation
- Teacher review of student responses on self-assessment

Success Skills

- Team Work
- Communication