

ANALYZING THE RESEARCH OF THE EARTH

Performance Standard 12E/11B/13B.J

Students will apply the processes of technological design in historic, current and potential earth science research technology settings accordingly:

- *Knowledge:* Describe the technologies used in meteorological, geological, and oceanographic research and societal implications within and between earth sciences and the natural sciences as a whole.
- *Application:* Research specific earth science technologies from historic foundations and purposes to current applications and future demands and societal expectations.
- *Communication:* Report findings of earth science technology research and analysis of societal connections to these research settings.

Procedures

1. ***In order to know and apply concepts that describe the features and processes of Earth and its resources (12E), the concepts, principles and processes of technological design (11B), and the concepts that describe the interaction between science, technology and society (13B)***, students should experience sufficient learning opportunities to develop the following:

- Research the technological designs, engineering principles and scientific processes associated with the earth sciences, including;
 - historic and current innovations and modifications for research applications,
 - existing design constraints associated with access to tools, materials and time,
 - design progression of modifications of technology,
 - necessary safety features and considerations,
 - measuring, recording and display features and tolerances, and
 - analysis requirements for research settings and evaluations.
- Analyze societal interactions associated with earth science research, in terms of;
 - international cooperation and competition settings,
 - applicable societal beliefs and attitudes,
 - global distribution of need, benefit and risk,
 - environmental impact,
 - local, state, national, and global scientific policies, and
 - effect on job markets and everyday life.
- Present research to explain applications to historic, current and future settings.
- Generalize the societal impact of scientific research and technological innovations in the earth sciences.

Note to teacher: This activity coordinates knowledge associated with standard 12E, while addressing the performance descriptors for stage J within standard 11B and the societal interactions of 13B.

2. Have students review and discuss the assessment task and how the rubric will be used to evaluate their work.

3. Set the stage for student research as a culmination activity in course or unit planning. Students should be advised to incorporate effective strategies, formats and resources to research and make presentations, for example:

- factors which affect local and global weather and climate,
- interrelationships of earth-to-solar phenomenon,
- topographical influence to weather and climate,
- determination of relative and absolute geological age,
- effect of human-influenced erosion and deposition on topographic/geologic strata,
- connection of oceanographic features or disturbances to meteorologic or geologic conditions,
- ocean level changes associated with global climate,
- projections of freshwater supplies and usage, and
- testing of scientific theories associated with origin and evolution of Earth's oceans, atmosphere and land masses, etc.

4. Report findings and generalize societal attitudes and beliefs, common obstacles and success factors, and make future projections for advanced earth science technologies.

5. Evaluate the student's performance using the Science Rubric as follows and add the scores to determine the performance level:
 - *Knowledge*: The diversity of earth science technologies is described correctly and sufficiently.
 - *Application*: The individual research contained all required components and provided complete, accurate and up-to-date information.
 - *Communication*: Research findings were presented effectively and generalizations about earth science research were well-reasoned and sufficiently detailed.

Examples of Student Work not available

Time Requirements

- 1-2 days for assignment orientation; 1-2 weeks for in/out of class research; 2-3 days for presentations; 1 day for generalizations.

Resources

- Science Rubric