

APPLY TECHNOLOGICAL DESIGN AND SCIENTIFIC HABITS OF MIND

Performance Standard 11B/13A/13B.B

Students will apply the concepts, principles and processes of technological design within classroom investigations accordingly:

- *Knowledge*: Understand the concepts, principles and processes of technological design.
- *Application*: Apply the appropriate scientific habits of mind when investigating science concepts.
- *Communication*: Incorporate the scientific technologies and processes of technological design into classroom investigations and reports.

Note to teacher: These concepts could be embedded into technological design investigations in varying combinations. Suggested activities and assessments for standards 12C and D at stage B, incorporate many of the performance descriptions for Standard 11B.

Procedures

1. ***In order to know and apply the concepts, principles and processes of technological design (11A) and the accepted practices of science (13A) and apply scientific technologies (13B)***, students should experience sufficient learning experiences to develop the following:
 - Generate questions and strategies to test science concepts using critical and creative thinking.
 - Ask questions about cause and effects of scientific concepts or principles that can be modeled or tested in a technological design investigation.
 - Propose ideas for how to model or test student-generated questions about curricular science concepts.
 - Identify criteria for measuring the success of proposed model or test of concept.
 - Prioritize possible model or test solutions from a given list for investigation possibilities.
 - Choose procedural steps for construction and testing from provided options for investigation.
 - Identify safety hazards associated with classroom investigation.
 - Suggest variables for testing criteria factors.
 - Sketch the projected final design.
 - Construct the selected technological design, using provided tools and materials.
 - Select appropriate technologies for measuring and recording data.
 - Record anecdotal data from design process.
 - Label accurate observations fully and carefully.
 - Evaluate construction success.
 - Test design based on pre-determined criteria through multiple trials.
 - Explain why similar investigations should but may not produce similar results.
 - Collect quantitative data from tests, using appropriate measuring methods.
 - Identify circumstances which distort how variables interact.
 - Communicate results of investigation.
 - Present group results, including testing data to evaluate design success in testing scientific concept/principle, procedures followed and possible additional suggestions for redesign.
 - Evaluate best design to solve or resolve original tested questions.
2. Separated assessment of 11B may not be practical. Significant research has demonstrated the value of inquiry-based, hands-on, life-long learning for students. The emphasis of technological design is incorporated into the wording of all performance descriptions for Goal 12, in stages A-J. A spiraling, inquiry-based curriculum is encouraged for all classrooms. Specific performance descriptions may be emphasized in different technological design investigations in order to build mastery of each concept or process of technological design.
3. See suggested procedures for 12 C and D at stage B for specific assessment features.

Examples of Student Work not available

Time Requirements

- Initial introduction of processes may require additional time as needed by students.

Resources: Science Rubric