

APPLY TECHNOLOGICAL DESIGN and SCIENTIFIC HABITS OF MIND

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

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. Suggested activities for standards 12 D, E and F at stage C, 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 (11B)***, students should experience sufficient learning experiences to develop the following:
 - Describe an observed cause and effect “dilemma” in terms of its science principles.
 - Generate critical and creative questions associated with the “dilemma”.
 - Record observations into sequential or cause and effect categories.
 - Describe design conditions of the phenomenon that can be influenced by change.
 - Determine procedural sequence, success criteria and design options to safely test the choices of variables associated with the dilemma.
 - Design appropriate graphic display of data according to success criteria variables.
 - Construct design prototype, following classroom rules for preparation, procedures and clean-up.
 - Collect and display data from investigation accurately and honestly.
 - Use scientific technologies (tools) and incorporate appropriate safety precaution.
 - Recognize the necessity of controlled variables and carefully recorded observations.
 - Compare data sets from classroom observations (and timed intervals, if applicable).
 - Identify reasons why different designs can accomplish the same effect differently.
 - Summarize knowledge that was gained through careful observations.
 - Communicate the findings to explain the observations, patterns, and explanations of tested principle, and
 - Generate future design modifications and alternative applications for design.
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 12D, E and F at stage C for specific assessment features.

Examples of Student Work not available

Time Requirements

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