(D) Teacher Resource. Share Rubric (1 of 3)

You will know the level to which your students have achieved the **Learning Outcomes**, and thus the **Instructional Objective(s)**, by using the suggested **Rubrics** below.

Instructional Objective 1: To produce a presentation that aligns with criteria

Related Standard(s) (will be replaced when new NRC Framework-based science standards are released):
National Science Education Standards (NSES)
(E) Science and Technology: Abilities of Technological Design
Technological designs have constraints. Some constraints are unavoidable (e.g., properties of materials, or effects of weather and friction); other constraints limit choices in the design (e.g., example, environmental protection, human safety, and aesthetics). (Grades 5-8: E2e)

Learning Outcome	Expert	Proficient	Intermediate	Beginner
LO1: Explain how proposed scientific and technological solutions address environmental and other constraints	Explanation is grounded in sound and insightful scientific and technological facts and theory.	Explanation is grounded in sound scientific and technological facts and theory.	Explanation is grounded in mostly sound scientific and technological facts and theory.	Explanation is not grounded in sound scientific and technological facts and theory.

(D) Teacher Resource. Share Rubric (2 of 3)

National Science Education Standards (NSES)
(F) Science in Personal and Social Perspectives: Science and Technology in Society
Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research. (Grades 5-8: F5b)

Learning Outcome	Expert	Proficient	Intermediate	Beginner
LO2: Summarize how priorities in the design address societal challenges per criteria	Summary of how priorities address societal challenges is clear and insightful.	Summary of how priorities address societal challenges is clear.	Summary of how priorities address societal challenges is mostly clear.	Summary of how priorities address societal challenges is unclear.
LO3: Explain how technologies address societal challenges within constraints	All technological solutions clearly link to a problem.	Most technological solutions clearly link to a problem.	Few technological solutions link to a problem.	Technologies are superfluous and not linked to a problem.

(D) Teacher Resource. Share Rubric (3 of 3)

Related Standard(s) (will be replaced when new NRC Framework-based science standards are released):

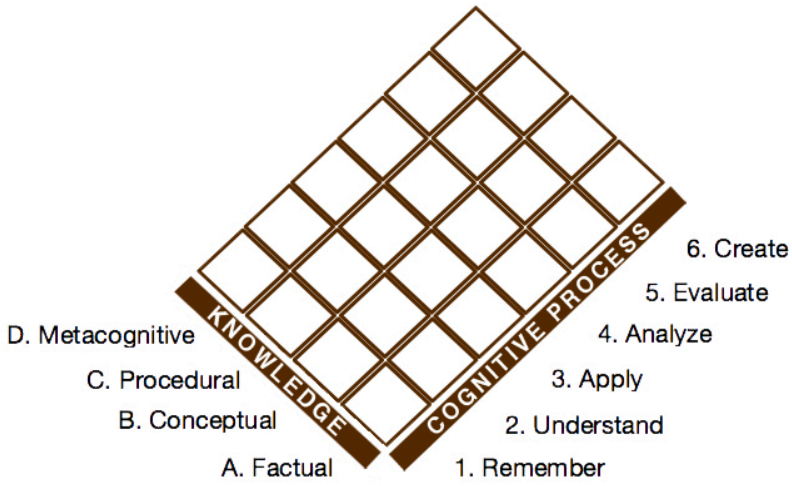
21st Century Skills. Communication and Collaboration: Communicate Clearly.

Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts.

Related Rubrics for the Assessment of Learning Outcomes Associated with the Above Standard(s):

Learning Outcome	Expert	Proficient	Intermediate	Beginner
LO4: Critique presentation skills per criteria	Critique of presentation skills is honest and accurate. Critique informed all improvements.	Critique of presentation skills is accurate. Critique informed some improvements.	Critique of presentation skills is mostly accurate. Critique informed few improvements.	Critique of presentation skills lacks accuracy. Critique informed very few improvements.
LO5: Execute communication per criteria	Presenter used most Presentation Tips to deliver a well-conducted talk; communication of the design, its constraints, and the problems it solves was extremely clear.	Presenter used many Presentation Tips to deliver a well-conducted talk; communication of the design, its constraints, and the problems it solves was very clear.	Presenter used some Presentation Tips to deliver a fairly well-conducted talk; communication of the design, its constraints, and the problems it solves was clear.	Presenter used few Presentation Tips to deliver a talk; communication of the design, its constraints, and the problems it solves was not clear.

(E) Teacher Resource. Placement of Instructional Objective and Learning Outcomes in Taxonomy (1 of 3)

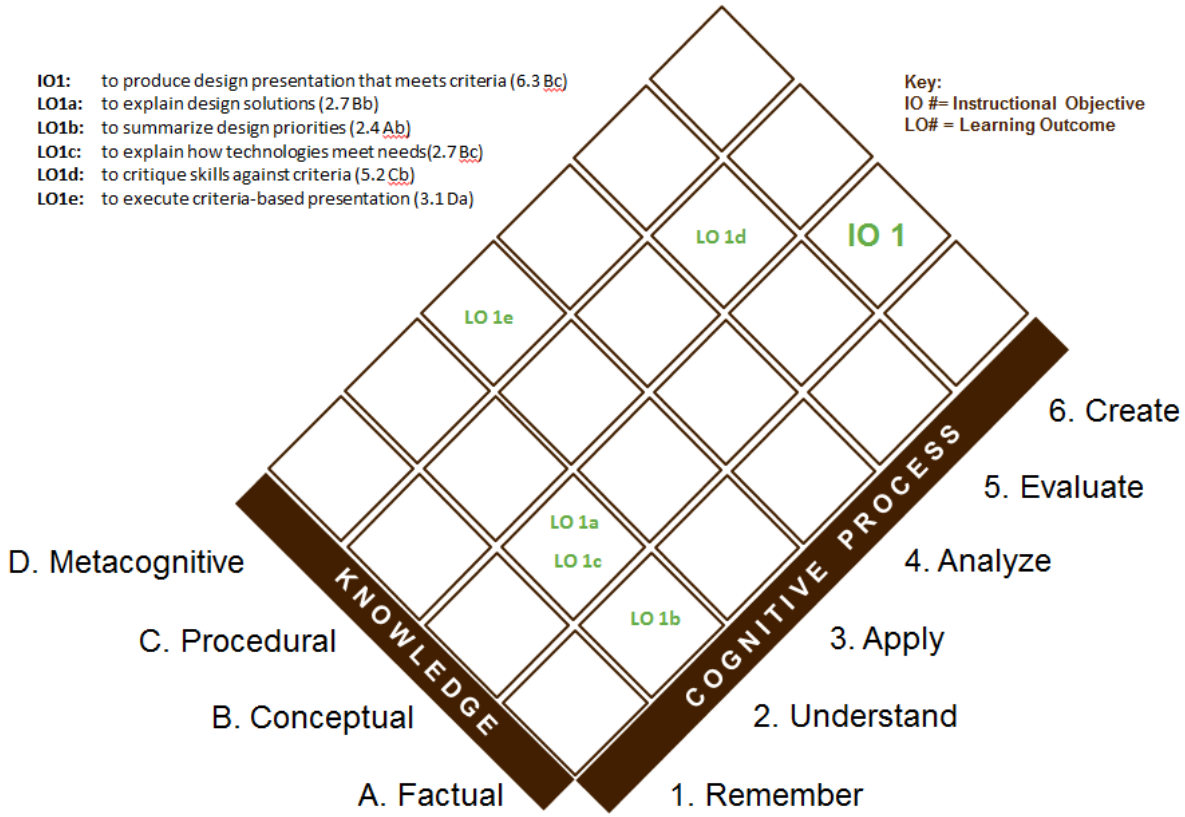


This lesson adapts Anderson and Krathwohl's (2001) taxonomy, which has two domains: Knowledge and Cognitive Process, each with types and subtypes (listed below). Verbs for objectives and outcomes in this lesson align with the suggested knowledge and cognitive process area and are mapped on the next page(s). Activity procedures and assessments are designed to support the target knowledge/cognitive process.

Knowledge	Cognitive Process
A. Factual **Aa:** Knowledge of Terminology **Ab:** Knowledge of Specific Details & Elements **B. Conceptual** **Ba:** Knowledge of classifications and categories **Bb:** Knowledge of principles and generalizations **Bc:** Knowledge of theories, models, and structures **C. Procedural** **Ca:** Knowledge of subject-specific skills and algorithms **Cb:** Knowledge of subject-specific techniques and methods **Cc:** Knowledge of criteria for determining when to use appropriate procedures **D. Metacognitive** **Da:** Strategic Knowledge **Db:** Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge **Dc:** Self-knowledge	**1. Remember** **1.1** Recognizing (Identifying) **1.2** Recalling (Retrieving) **2. Understand** **2.1** Interpreting (Clarifying, Paraphrasing, Representing, Translating) **2.2** Exemplifying (Illustrating, Instantiating) **2.3** Classifying (Categorizing, Subsuming) **2.4** Summarizing (Abstracting, Generalizing) **2.5** Inferring (Concluding, Extrapolating, Interpolating, Predicting) **2.6** Comparing (Contrasting, Mapping, Matching **2.7** Explaining (Constructing models) **3. Apply** **3.1** Executing (Carrying out) **3.2** Implementing (Using) **4. Analyze** **4.1** Differentiating (Discriminating, distinguishing, focusing, selecting) **4.2** Organizing (Finding coherence, integrating, outlining, parsing, structuring) **4.3** Attributing (Deconstructing) **5. Evaluate** **5.1** Checking (Coordinating, Detecting, Monitoring, Testing) **5.2** Critiquing (Judging) **6. Create** **6.1** Generating (Hypothesizing) **6.2** Planning (Designing) **6.3** Producing (Constructing)

(E) Teacher Resource. Placement of Instructional Objective and Learning Outcomes in Taxonomy (2 of 3)

The design of this activity leverages Anderson & Krathwohl's (2001) taxonomy as a framework. Pedagogically, it is important to ensure that objectives and outcomes are written to match the knowledge and cognitive process students are intended to acquire.



(E) Teacher Resource. Placement of Instructional Objective and Learning Outcomes in Taxonomy (3 of 3)

The design of this activity leverages Anderson & Krathwohl's (2001) taxonomy as a framework. Below are the knowledge and cognitive process types students are intended to acquire per the instructional objective(s) and learning outcomes written for this lesson. The specific, scaffolded 5E steps in this lesson (see 5.0 Procedures) and the formative assessments (worksheets in the Student Guide and rubrics in the Teacher Guide) are written to support those objective(s) and learning outcomes. Refer to (E, 1 of 3) for the full list of categories in the taxonomy from which the following were selected. The prior page (E, 2 of 3) provides a visual description of the placement of learning outcomes that enable the overall instructional objective(s) to be met.

At the end of the lesson, students will be able

IO1: to produce design presentation that meets criteria

6.3: to produce

Bc: knowledge of theories, models, and structures

To meet that instructional objective, students will demonstrate the abilities:

LO1a: to explain design solutions

2.7: to explain

Bb: knowledge of principles and generalizations

LO1b: to summarize design priorities

2.4: to summarize

Ab: knowledge of specific details and elements

LO1c: to explain how technologies meet needs

2.7: to explain

Bc: knowledge of principles and generalizations

LO1d: to critique skills against criteria

5.2: to critique

Cb: knowledge of criteria for when to use appropriate procedures

LO1e: to execute criteria-based presentation

3.1: to execute

Da: strategic knowledge