

Lesson Plan: Applying Design Thinking to Improve Projects

Introduction

During a series of lessons in which grouped students are attempting a Design Challenge with the Extraordinaires Design Studio®, the following lesson is conducted to emphasize the need for critical examination during the design thinking process, especially when students believe they are nearly completed with their work.

Learning Objective & Standards

Given the current status* of their Design Challenge project and new Think Cards, students will use their knowledge of domain-specific design vocabulary to review their Design Challenge invention in order to justify the invention's design elements that work and formulate changes to the elements that need improvement.

- **NGSS, 3-5-ETS1-1.** Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- **NGSS, 3-5-ETS1-2.** Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- **ISTE, Creativity and innovation**
 - **1a.** Apply existing knowledge to generate new ideas, products, or processes.
 - **1b.** Create original works as a means of personal or group expression.
- **ISTE, Communication and collaboration**
 - **2d.** Contribute to project teams to produce original works or solve problems.
- **CCSS.ELA-LITERACY.W.5.2.B.** Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
- **CCSS.ELA-LITERACY.W.5.2.D.** Use precise language and domain-specific vocabulary to inform about or explain the topic.

*Status of the students' inventions: By this lesson, the students' inventions have been conceived, researched, costed, and designed (preliminarily or completely, in sketches, digital blueprints, or early physical prototypes).

Materials

- Each group's current iteration of their Design Challenge invention.
- Think Cards for Design Projects, or a shared Extraordinaires Design Studio®.

Anticipatory Set or Do Now

The teacher will present the following sentence to the class: "By _____ the new skateboard, the designer made it better because it now _____."

Each group gets one of the following verbs: *decorating*, *motorizing*, *reshaping*, or *resizing*. Each group completes the sentence by placing the design verb in the first blank, and then writing a phrase in the second blank based on the context that the design verb.

With the teacher's moderation, the groups share their sentences aloud, describing how the design verb changed the product and *affected the cost, production, and use* of the skateboard.

Direct Instruction

The teacher will give to students the definitions of these design verb words and phrases: *adapt* [changing size, shape, color, or material to suit different purposes or environments], *automate* [making something in part or in total able to operate without human effort], *integrate* [combining different things into one thing], and *make sustainable* [creating something so it will not harm the environment].

Formative Assessment

- As a whole class, the teacher will ask students to give examples of how familiar products and technologies in the real world that were once believed to be “perfect” were changed when one of the four design verbs was applied to it. (Possible responses could include glasses with transition lenses, escalators in place of stairs, cell phones with cameras, and egg cartons made from recycled newspaper.)
- The teacher will follow up each example by asking, “How did that change help people?”
- The teacher should make sure that students understand the vocabulary in context before moving on to the activities.

Student Activities

Once the groups are organized in their work spaces with their Design Challenge invention, the teacher will distribute to each group two or three Think Cards that match the group’s Design Project type. (If possible, the Think Cards given to the groups should be different from the Think Cards used in a previous lesson.) As a group, students will perform the following activities:

- Read the IMPROVE section on the cards (altogether or one at a time).
- Discuss possible responses to the prompts in those sections.
- Use relevant design verbs in their discussions.
- Choose the way the group wants to express its members’ inspection of their Design Challenge invention, but their observations must be recorded in some form.
- Justify which design aspects of their invention do not require any modifications and explain why.
- Formulate a plan to make improvements to their invention as inspired by the Think Cards’ IMPROVE prompts with an emphasis on making it better for their client. This includes listing what each group member will have to research independently and what actions they plan to take during the next group session.

Independent Practice

Each student in the group should research one or more of the improvements as they pertain to the design verbs used in the lesson. Their findings should be brought to the next group session.

Summary

One member from each group will informally present to the whole class a brief summary of the improvements that they plan to work on at the next group session and how those improvements will help their Extraordinaire.