



Design Thinking Challenge: Design a Game

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Target Grade: 6-8 STEM or Design

Time Required: 10 Days (45 minute classes)

Standards:

- **MS-ETS1-1 Engineering Design:** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- **MS-ETS1-3 Engineering Design:** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Lesson Objectives:

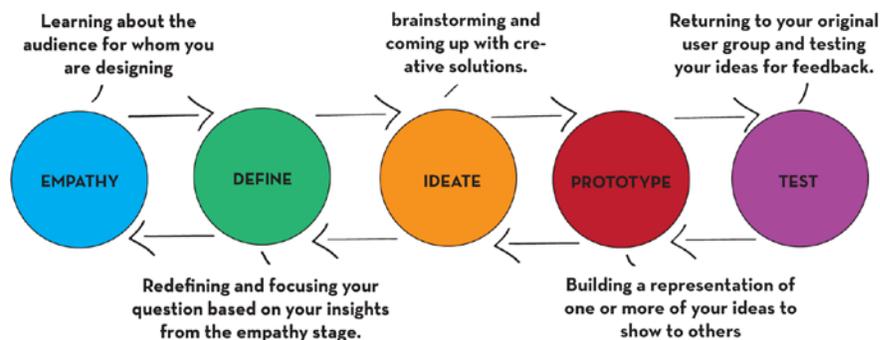
Students will:

- Understand the Design Thinking Process and how it relates to creating successful solutions to problems
- Analyze data from tests and use the data to create a better solution
- Define a problem and take steps to solve it

Central Focus:

This hands-on experience allows students to experience the engineering design cycle through the lens of Design Thinking. Students are using the Design Thinking process to create a content based board game for younger students to enjoy.

Background Information:





Design Thinking is a human-centred problem solving process. The basic steps of Design Thinking are Empathize, Define, Ideate, Prototype, and Test. In the Design Thinking model, a designer applies the process to benefit the user. In the Empathize phase, the designer conducts research using many methods in order to understand the user. The designer may observe the user, interview them, poll others who are involved with the user, and perform other tasks to bring about understanding of the user. The next phase is Define in which the designer combines all of the information gathered during the Empathize phase in order to identify a need or problem that the user experiences. During the Ideate phase, the designer brainstorms a wide range of ideas that could help solve the need or problem of the user. No idea is considered outrageous, but rather it is vital that the designer is creative and free to bring forth all ideas. While in the Prototype phase, the designer creates concrete representations of a few of the most promising ideas from the Ideate phase. The designer will then enter the Test phase in which the solutions are tested to make sure they are viable. Prototypes are presented to the user for feedback. The designer asks questions like, “Does this solution actually fit the need of the user?”. The process isn’t over after the initial testing. The designer enters into a cycle of Ideate-Prototype-Test using both the feedback from the user and the information from the tests to create the best solution possible. In order to use the Design Thinking process, designers must have skills in active listening, interviewing, and recording data, problem solving, and resilience. To identify the best solutions and create prototypes, knowledge and skills in various technologies are needed. Learning to seek out and connect with experts in various fields will increase the success of the designer. [Here](#) is a short video that explains the process.

Materials

- Provided Presentation
- Handout for students
- Cardboard boxes
- X-acto knife and scissors
- Paper towel tubes
- Index cards
- Markers and construction paper
- Some students may request other materials as they design their games.

Instruction

Day 1:

Using the attached presentation, guide students through a brief discussion of design thinking. Show them [this video](#) and allow them to explore this [site](#) to get an understanding of what design thinking projects can look like. [Here](#) is an example of a company that used design thinking. Lead a discussion with students to talk about how



the Design Thinking process is similar and different from the engineering design process. Students can fill out a Venn diagram to document the comparison.

Day 2:

Lead a conversation with the class to ensure that they have the space and space travel background knowledge required to create the game. Use slide 4 of the attached presentation. Make them aware that they will be using that information for their design challenge. When making groups, mix the students heterogeneously based on their comfort with the background knowledge required. Using slide 5 of the presentation, introduce students to the Design Thinking Challenge. Be aware that students' brains will start working on solving the challenge immediately. Have a conversation with them about how the Design Thinking Process requires them to get to know the problem and the user (grade 1, 2 students and teachers) better before proposing solutions. Hand out the guiding worksheet and have students look over what the challenge looks like with using Design Thinking. Allow for students to ask any questions about the process as pertains to the challenge.

Days 3-4:

During days 3-4 students will work through the first 2 pages of the handout. The students will write interview questions that will help them understand indoor recess, 1st and 2nd graders, and whatever other information will be helpful in creating the game. The teacher will arrange for a couple teachers and students to come to be interviewed. Interviews can be done in small groups, or as a class as a whole. If possible, it would also be advantageous for students to be able to witness and indoor recess to see what kinds of activities the students enjoy the most. Students should do the analysis with their groups only to infer and interpret what they heard from the teachers and students. Based on the information collected, students will refine their problem statement including the reason they refined it (evidence from the interview). Lastly, students should Ideate, or come up with 3 ideas for their game, rooted in the evidence from the empathy phase. Groups need to check in with the teacher after this step.

Day 5:

Groups will choose the one solution that they want to pursue and produce a sketch prototype that shows and explains how their game will work. In the last 10 minutes of class, groups will trade prototypes and give each other feedback.

Day 6:

Using their sketch prototype and feedback from classmates, groups will build a physical working prototype of their game.

Day 7:



Groups will test the prototypes. Phase 1: The group itself will test the game. Record their findings while being Mistake Mechanics/Success Strategists (see definitions in presentation). Phase 2: 1-2 other groups will test the game and write feedback. Record the finding on their guiding handout.

Day 8:

Groups will test the prototypes with 1st and 2nd grade classes and receive feedback. It is also important that students watch the customer play their game without intervening. They should take notes while watching. Results should be recorded.

Day 9:

Using the feedback and findings from the tests on Days 7-8, fix your prototype and create your final product of the game.

When it is convenient for 1st and 2nd grade teachers, bring the games to them for their students to start playing during indoor recess.

Day 10:

Have students complete the questions on slide 7 of the presentation to reflect over the process. As a class, discuss the questions and revisit the Venn Diagrams made on Day 1 to see if there is any more information they can fill in on it.

Differentiation

By nature, Design Thinking builds in differentiation because it is a form of personalized learning. Teacher will need to be aware of students' abilities and provide scaffolded supports as needed where students lack skills or confidence.

Assessment

Students will be assessed by using the worksheet "Design Thinking Game for 1st and 2nd Graders" as completed by the students and how they collaborated and collected data.

