

Design Thinking Unit Plan

This is a brief description of three classroom lessons that comprise the first half of a “Design Thinking” unit. Each lesson has a set of objectives, classroom practices, and assessments. A cumulative rubric and standards alignment for the unit are provided at the end.

Lesson 1: Defining a Problem

Student Learning Objectives:

Students will:

- Describe an issue that can be addressed through “design”

Background Info for Class Discussion:

- “Design Thinking” is a procedure that anyone can use to approach a problem and find a solution.
- “Design” is the process of understanding how we interact with the world around us, and what we can do to make that easier for people.

Classroom Procedure

1. **Set (10 Minutes)**

- a. Open with the work of Katerina Kamprani, whose project “The Uncomfortable,” demonstrates objects with negative design qualities.
 - i. <http://www.kkstudio.gr/projects/the-uncomfortable>

2. **Class Discussion (10 Minutes)**

- a. Why do these objects make us laugh?
- b. Why are they called “uncomfortables?”

3. **Short Lecture (10 Minutes)**

- a. Introduce the “Design Thinking” process. Name and define the steps of the process:
 - i. Define - Identify a problem to be solved
 - ii. Research - Learn about the problem and the person or people experiencing it
 - iii. Prototype - Invent and propose a solution
 - iv. Test - Try out the solution
 - v. Refine - See if the solution worked, and if it didn’t, why.
 - vi. Iterate - Adjust the solution to get closer to solving the problem.
- b. Give a specific example (find one off this list: <https://theaccidentaldesignthinker.com/2017/09/16/40-design-thinking-success-stories/>)

4. **Partner Work (10-15 Minutes)**
 - a. Students to brainstorm in groups of 2 or 3 to list objects that have been designed to be easier to use
 - b. Each group shares out one thing on their list at a time, but no two groups can share the same object. Encourage students to list things they can see in the classroom if they get stuck. Continue until each group has exhausted their list.
 - c. Check for Understanding: Students turn in their brainstorms.
5. **Class Discussion Key Points (10 Minutes)**
 - a. “Design Thinking” is a way of solving problems, and it’s all around us.
 - b. Have students come up with an example or suggested problem.
 - c. Remind students that in this phase we are not thinking of solutions, just identifying problems.
6. **Individual Work (10 Minutes)** Students list three people: A friend, a family member, and themselves, and for each person write down a problem that they have that might be solved by design thinking. Stress again that students shouldn’t worry about solving problems, just identifying them.
 - a. Students turn in their lists as a closing activity.

Assessment

- Assess partner work for completeness
 - Did the students clearly identify designed objects?
 - Was each group able to identify how the design of the object made that object more functional?
- Asses student lists for clarity and understanding
 - Did the student name three people?
 - Did they identify clear problems?

Lesson 2: Research the Situation

Student Learning Objectives

- Demonstrate good interview etiquette.
- Synthesize information from different sources (online research, direct observation, interviews, etc.) to inform their understanding of a problem.

Background Info for Class Discussion

- The most important part of “Design Thinking” is to remember that *no solution exists in a vacuum*; in other words, it’s crucial to know who your solution is for.
- The more we understand about the situation that a problem or issue occurs in, the better our solution can be. If we misunderstand the situation, our solution could make things worse!
- Lots of different people can have similar problems, but the same solution won’t always work for all of them.

Classroom Procedure

1. **Set (10 minutes)**
 - a. Review the six steps of the “Design Thinking” process
 - b. Students should draw a simple diagram showing how each step of the process leads to the next one
 - c. Drawing on student work, draw the diagram and highlight the first two steps.
2. **Class Discussion (10 minutes)**
 - a. Give 2 examples of “bad” solutions to problems
 - i. Cane Toads were introduced in Australia to control the cane beetles population, but they had no natural predators, and immediately their population exploded and they’re now a huge nuisance
 - ii. A dead whale washed ashore in Florence, Oregon and the Highway Department decided to use dynamite to get rid of the carcass, but the explosion just spread whale guts over 800 feet of beach, significantly worsening the problem.
 - b. Open Discussion: What kinds of things do we need to know in order to solve a problem?
 - i. Who it affects
 - ii. Where or when it happens
 - iii. Why it happens
 - iv. What other factors affect it
 - c. How do we get those answers?
 - i. Interviews
 - ii. Research

iii. Direct Observation

3. Individual Work (15 minutes)

- a. Return students' problem suggestions from the last lesson.
- b. Students will choose one problem from that list, and list five things they would need to know to solve the problem.
 - i. For each of those five things, students should list an avenue of research
- c. Students will identify a person involved in the problem. Either the person who is having the problem or someone who is involved.
 - i. Students will list five interview questions that they can ask that person to learn more about the problem. (Students can not interview themselves.)

4. Modeling (15 minutes)

- a. Describe proper interview procedures. Discuss:
 - i. Note-taking or recording
 - ii. How to care for an interview subject
 - iii. The importance of clarity in your questions
- b. Pick a student volunteer and bring them to the front of the class. Have them interview you using the questions they wrote in the previous exercise. The answers don't matter, have the class give feedback on their interview technique.

5. Free Work (10 Minutes)

- a. Students should revise their interview questions based on the previous lesson.
- b. When they are done, they can practice interviewing each other in pairs.
 - i. Observe the interviews
- c. Students will turn in their finalized list of questions.

6. Homework

- a. Students will complete a short research project, answering the five questions they developed.
- b. Students will conduct a short interview with a subject, and turn in the responses they get and a short reflection on how the interview went.

Assessment

- Assess interview techniques in class
 - Are students clearly stating their questions?
 - Are they giving their subjects time to answer?
 - Are they taking notes?
- Assess research methodology
 - Did the students clearly outline the information they needed?
 - Did they choose appropriate avenues to get that knowledge?
 - Did they research appropriately, and did they learn what they needed to?

Lesson 3: Prototype a Solution

Student Learning Objectives

- Evaluate a proposed solution to a problem for workability, possible downsides, and potential for success

Background Info for Class Discussion

- Sometimes, having a solution that doesn't work for you can be worse than no solution at all.
- In this stage of the "design thinking" process, we're looking for the "least bad" solution, rather than the "best" solution.
- It's important to be clear about how we'll KNOW that the problem is solved.
- If we don't solve the problem 100% it's ok, we'll iterate on the solution later.

Classroom Procedure

1. **Set (5 Minutes)**
 - a. Show this video: <https://www.youtube.com/watch?v=RBOqfLVCDv8>
2. **Class Discussion (10 Minutes)**
 - a. Is this a good way to turn on a Christmas tree?
 - i. Why or why not?
 - b. A solution to a problem can be elegant or overcomplicated
 - c. Introduce the concept of finding the "least bad" solution, rather than the "best" solution
3. **Temperature Check (10 Minutes)**
 - a. Ask students to share out some of their findings from their research
 - i. What surprised them?
 - ii. In what ways were the problems more complicated than they thought?
 - iii. In what ways were they simpler?
4. **Individual Work (10 Minutes)**
 - a. Have each student draft a solution to the problem they're trying to solve.
 - b. Solutions should be laid out in steps
 - c. Have students think about what kinds of materials (if any) or permission (if any) they'd need to solve their problem
 - d. Students should turn in a "Feasibility Study" listing the steps to complete the solution, and any materials or permission they need. If they need anyone's help, that should be listed too.
5. **Pair Work (10 Minutes)**

- a. Working in teams of 2, each group should come up with the “worst possible outcome” of the proposed solution to each of their problems.
 - b. Encourage students to get creatively awful. How could each solution go REALLY bad? Their answers should be unlikely, but not impossible, and should identify the step in the solution where things go wrong.
6. **Share Out (15 Minutes)**
- a. Have each team briefly present their worst-case scenarios for each solution.
 - b. Class discussion: Did anyone want to change their solution after they heard the worst possible outcome? What kinds of changes might help?
7. **Homework**
- a. Students will write up three possible outcomes of their proposed solution, from best to worst case
 - i. This write up should include a “success metric.” How does the student know that the problem is solved?

Assessment

- Assess the student “feasibility studies”
 - Have they laid out all of the steps of their proposed solution? Is anything missing?
 - Have they accurately described any materials or permission they’d need to enact their solution?
- Assess the “possible outcomes” document
 - Has the student given three plausible outcomes?
 - Has the student thought through the realistic consequences of their solution?

Cumulative Assessment Rubric:

Objective Assessed	Below Expectations	Meets Expectation	Exceeds Expectations	Mastery
“Design Thinking” understanding	Can't name or use the steps of the design thinking process	Names and clearly understands the individual steps of the design thinking process	Understands the relationship between the design thinking process	Uses the steps of the design thinking process iteratively to focus in on better and better solutions
Identifying an Issue	Can not decide on an issue to address Issue is unformed or unclear	Clearly identifies an issue to be addressed	Clearly identifies an issue to be addressed and the effect it has on the person experiencing it	Identifies an issue and demonstrates empathy for the person experiencing it
Deep Understanding of the Problem	Does not do research, or research is minimal	Has done adequate research to clearly understand the problem	Has researched the problem, and either the person experiencing it, or the situation in which the problem occurs	Has researched the problem, and BOTH the person experiencing it, AND the situation in which the problem occurs
Proposing a Solution	Solution is nonexistent, unworkable, or insufficient to address issue	Solution is basically complete, though not well fleshed out	Solution is thoughtfully constructed, taking into account the specific situation	Solution is thoughtfully constructed, and takes both the situation and the person experiencing the situation
Evaluate Solution	Student does not think about the outcome of the solution	Student considers the outcome of the solution	Student can clearly express a potential outcome of the solution	Student can clearly express both positive and negative outcomes

Standards Assessed	
CTE ICT/AME Foundational Standards http://www.cde.ca.gov/ci/ct/sf/documents/ctestandards.pdf	
ICT 2.4.1.1	Formulate judgments about the ideas under discussion and support those judgments with convincing evidence.
ICT 2.4.2.3	Apply appropriate interviewing techniques: <ol style="list-style-type: none"> a. Prepare and ask relevant questions. b. Make notes of responses. c. Use language that conveys maturity, sensitivity, and respect. d. Respond correctly and effectively to questions. e. Demonstrate knowledge of the subject or organization. f. Compile and report responses. g. Evaluate the effectiveness of the interview
ICT 5.1	Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks.
ICT 5.2	Understand the systematic problem-solving models that incorporate input, process, outcome, and feedback components.
ICT 5.3	Use critical thinking skills to make informed decisions and solve problems.

“Unwrapped” Concepts (Students need to know)	“Unwrapped” Skills (Students need to be able to do)	Bloom’s Taxonomy Levels
The steps of the “design thinking” process (define, research, ideate, prototype, test, iterate)	Recognize a problem that is shared among several different people or groups of people	Understand
The relationship between a population and a problem	Create interview questions that deepen student understanding of the problem.	Analyze
Research interview protocols	Invent solutions for the problems that students have researched, using the information they’ve identified.	Create

Essential Questions	Big Ideas
<p>How do you identify and describe a problem that needs to be solved?</p> <p>How do you make questions that will let you learn more about the problem?</p> <p>How do you come up with solutions that might address the problem?</p> <p>How do you use new information to change how you think about a problem or a solution?</p>	<p>The Design Thinking process allows students to approach a problem from the point of view of the person or people that experience that problem.</p> <p>It's very important that students develop empathy and try to put themselves in the shoes of their interviewee.</p> <p>No problem has only one solution. Every potential solution has upsides and downsides, students need to be able to identify those.</p>
Supporting Standards	
<p>AME Media and Design Arts Pathway Standards A 1.2.1 Solve a visual arts problem that involves the effective use of the elements of art and the principles of design.</p> <p>ICT Information and Support Services Pathway A8.1 Develop the purpose and scope of a project.</p>	