

# Who we are





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Scholarship & Innovation

Foundations of design and design thinking

What design thinking is

**Design thinking and STEAM** 

Teaching, STEAM and design thinking

Wrap up

Q & A



# **Design Thinking**

# Design

## We live in a

# **Designed world**

## We live in a

# **Designed world**





























## We live in a

# **Designed world**

99% invisible

























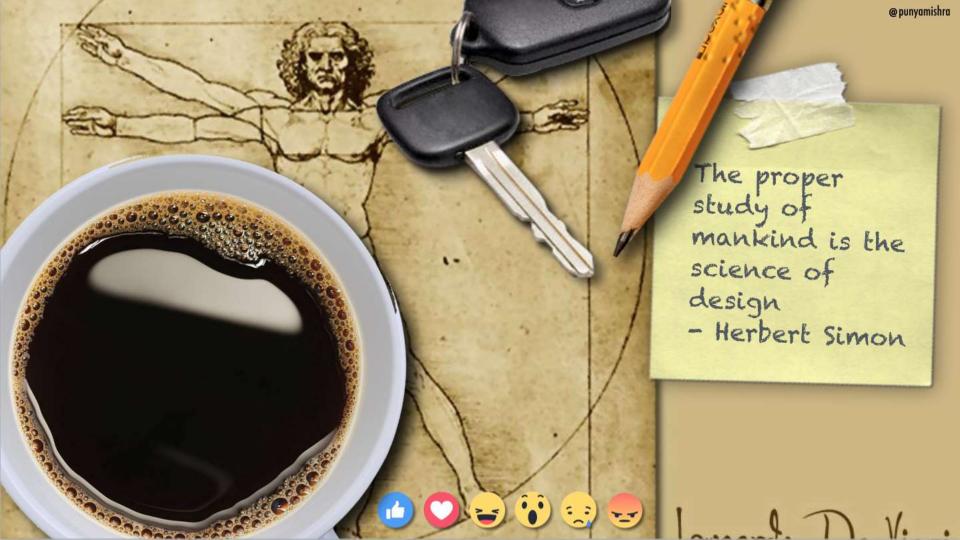




	Sciences	Arts	Design
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What we care about? (Values)	Objectivity, rationality, neutrality, universalism, organized skepticism, and a concern for 'truth'	Subjectivity, creativity, commitment, imagination, a concern for "justice"	Practicality, empathy, ingenuity and an emphasis on the "particular"







**Defining design** 

**Structure adapted to a purpose ~ David Perkins** 



**Defining design** 

## Structure adapted to a purpose ~ David Perkins























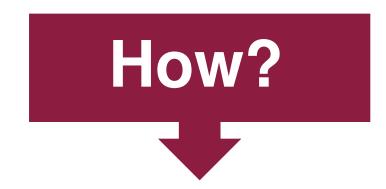




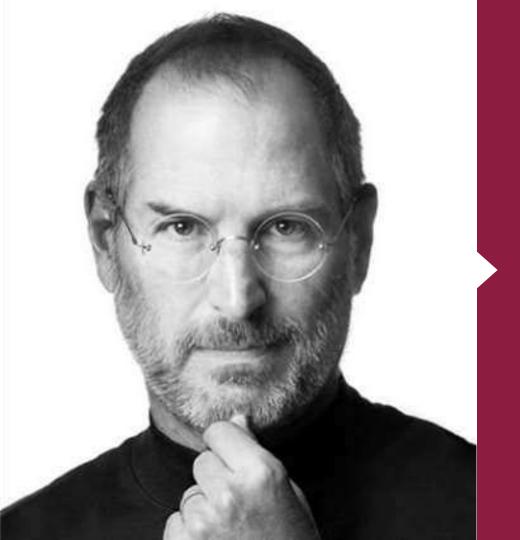






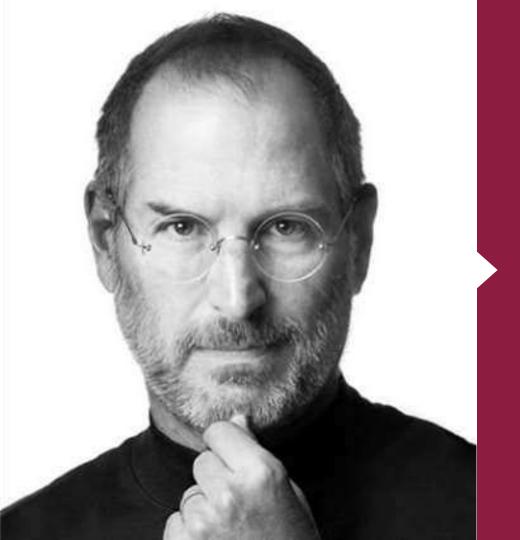






Life can be much broader once you discover one simple fact: **Everything** around you was made up by people that were no smarter than you and you can change it, you can influence it, you can build your own things that other people can use.

Once you learn that, you'll never be the same again ~ Steve Jobs



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**Every aspect of education is made up** 

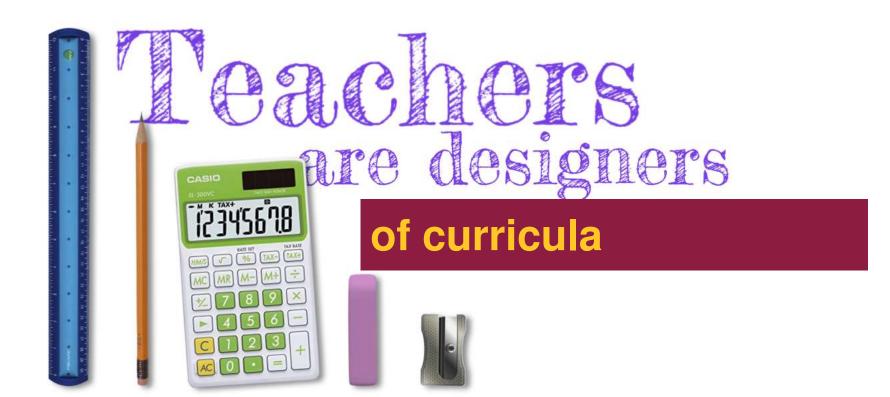


Every aspect of education is designed

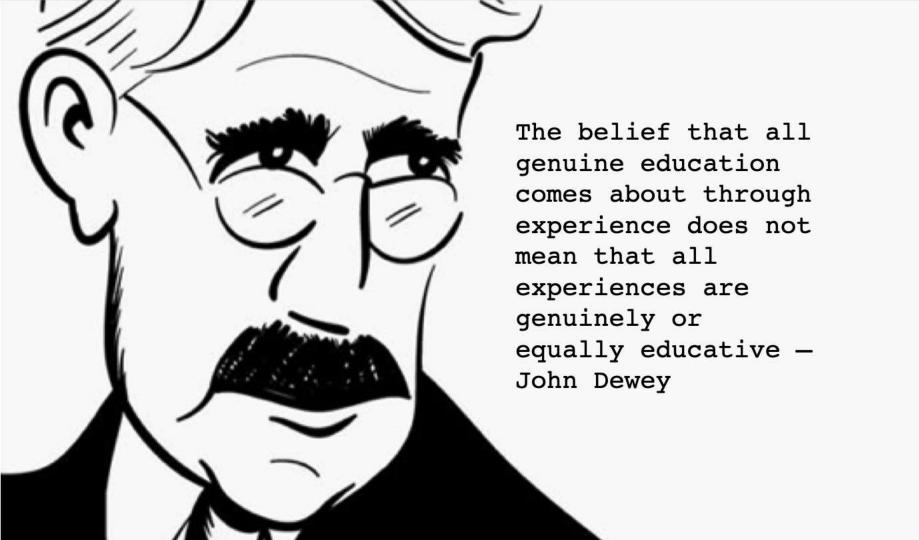












Dewey's 4 impulses for learning

#### Inquiry



**Finding things out** 

#### Communication



Interacting with others

#### Construction



Making or building things

#### **Expression**



The artistic touch



# Creative, interdisciplinary human-centered problem solving





# What is design thinking?



### What is design thinking?

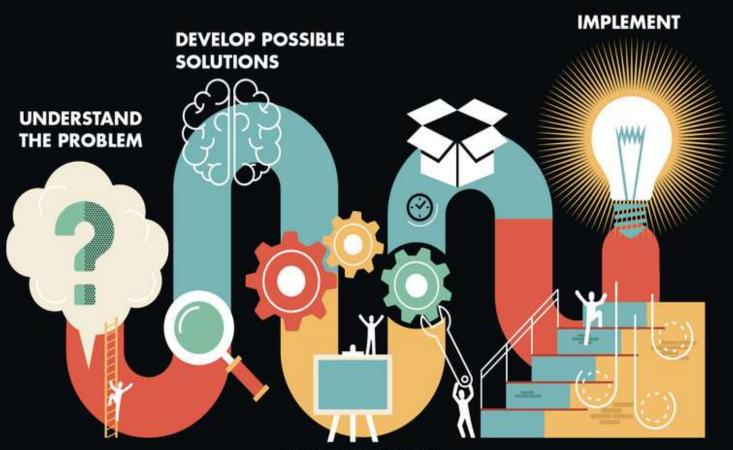
Design thinking refers to the cognitive, strategic and practical processes by which design concepts are developed.

~ Wikipedia

### What is design thinking?

Design thinking is an iterative process seeking to understand the user, challenge assumptions, and redefine problems in an attempt to identify alternative strategies and solutions that might not be instantly apparent with our initial level of understanding.

~ Interaction Design Foundation, 2020

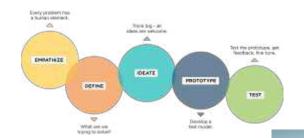


PROTOTYPE, TEST, & REFINE

### So many design thinking models...



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### ...but most are really similar



**DESIGN THINKING** 

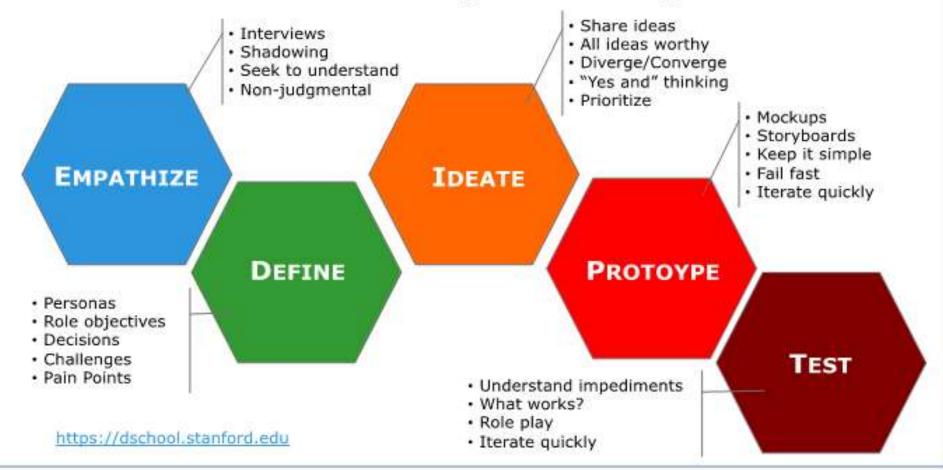




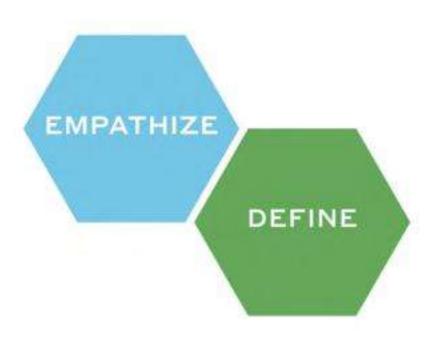


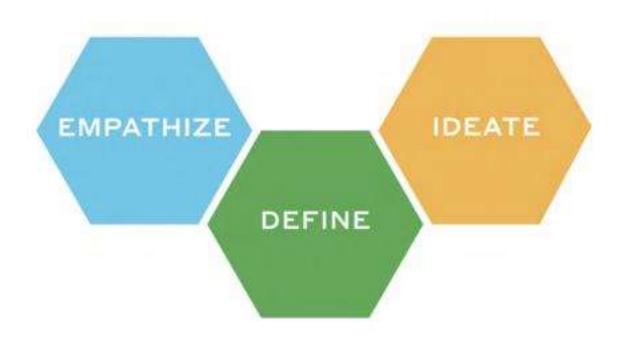


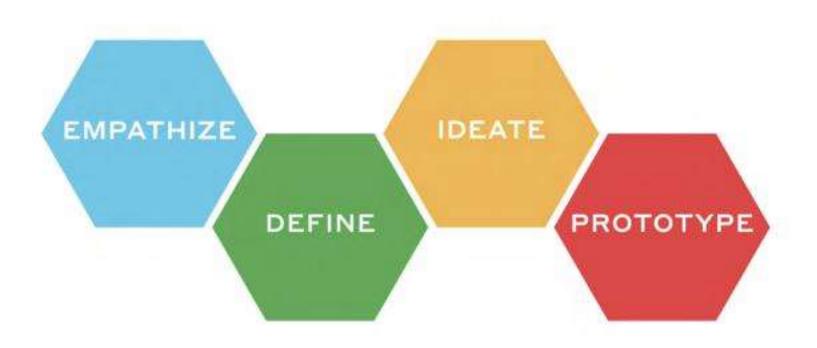
### Stanford d.school Design Thinking Process

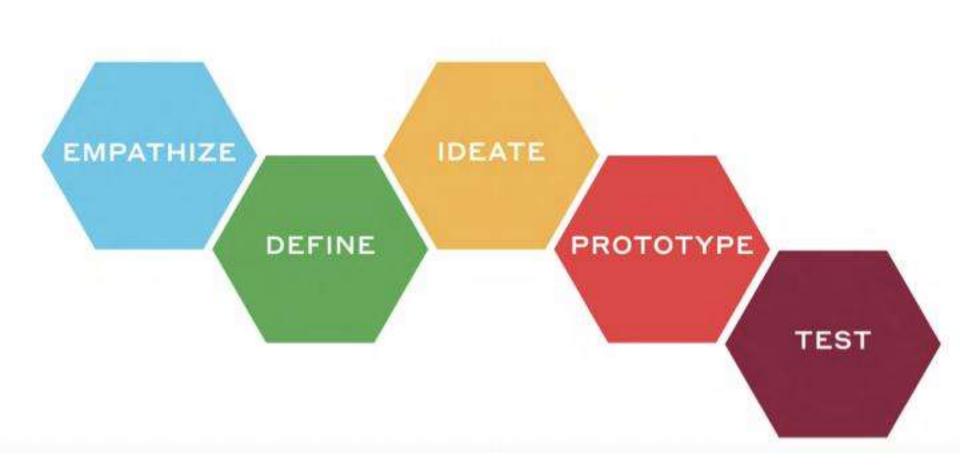














# Why design thinking and STEAM?

Dewey's 4 impulses for learning

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## design thinking is STEAM?

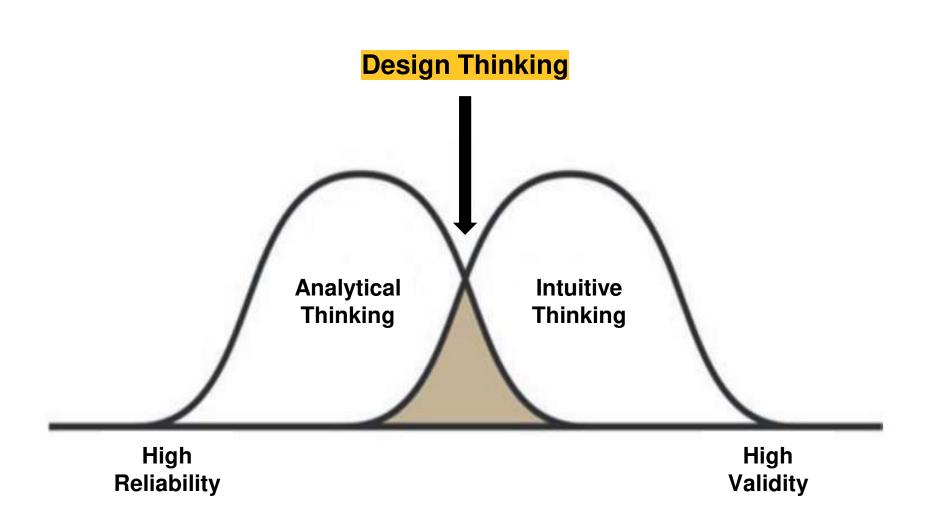
### **Design thinking**

An purposeful, analytic and creative process that engages a person to experiment, create and prototype models, gather feedback, and redesign.... Goes beyond disciplinary boundaries

Design melds STEAM together and provides a framework for re-thinking STEAM curriculum

Beyond simple connections and surfacelevel combinations of subjects...

### Creative, interdisciplinary human-centered problem solving



# What does it mean for educators and learners to be designers?

### **Educators as designers**

### **Educators as designers**

- Engage with authentic, interdisciplinary and real-world projects
- Build resiliency and problem-solving ability
- Cultivate an open-minded and creative approach
- Develop a deeper understanding of self, others, and the task at hand (through empathy and inquiry)
- Contribute to a culture of creative problem-solving
- Develop a designerly identity (& sense of agency in the world)

### Learners as designers

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Design snapshot:

Blending disciplines in a real-world shoe design project

- "Fancy feet" project
- STEM and aesthetics come together in shoe design
- Developed with ideas from the Teach Engineering website
- 9-year-olds explored the roles of designers and engineers in shoe manufacture, experimented with materials, and then designed and constructed their own pairs of shoes.

- Students posed their own statistical questions to investigate their feet and shoes, and those of their peers
- Learned about "natural and processed" materials

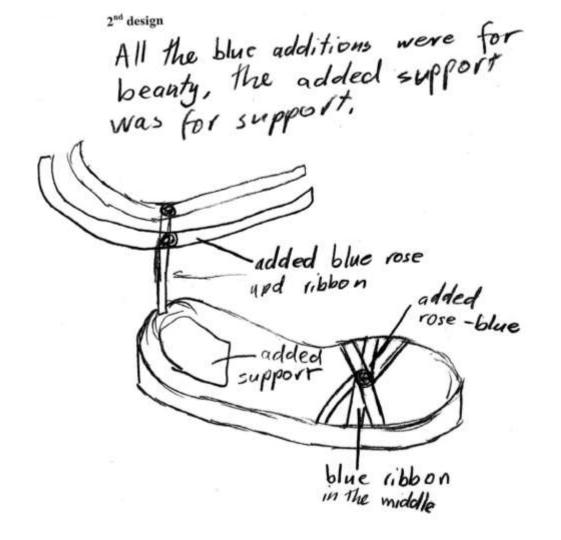
- Students (a) identified a design need (problem/challenge);
- (b) identified properties of common materials for shoe design;
- (c) applied design processes including **generating ideas**, **planning**, and designing desired shoes
- (d) **selected appropriate materials** for creating their shoes;
- (e) **constructed an initial model**, taking into account given constraints; and
- (g) **tested, evaluated, and suggested ways to improve** their product

Students go through these phases or modes of design...but that's not all they are doing.

The teacher designed the project to ensure that opportunities to gather information and knowledge were embedded along the way

Before designing their shoes, kids answered prepared questions to scaffold their thinking. Questions should be open-ended to allow them to generate ideas.

Fig. 3 A 3-D redesign sketch displaying both features and explanations



top vow 2nd design put plastic around the hould thing. sand paper 23.6 cm moke it to make it pritty taller 10cm

Sid von bord to make it

### **Toward "Informed Design"**

- Getting kids to learn while designing.
- Bigger picture projects over time
- Multiple disciplines connect in real-world types of tasks

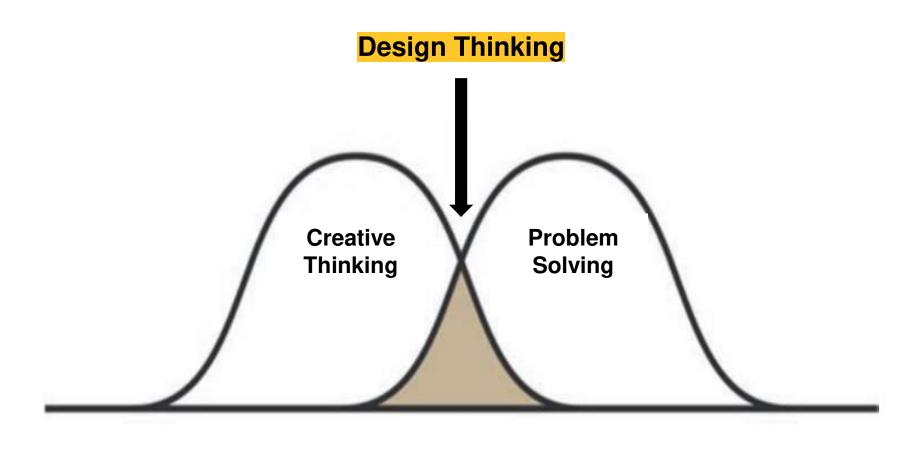
Design snapshot:

Breaking traditions in

Spanish and going to the real world

## Katherine: 4th grade teacher

- Teaching elementary level Spanish lessons to introduce students to new vocabulary
- Seeking more interdisciplinary, engaging and creative lessons
- She worked through the design process to develop a creative STEAM project to teach the subject matter...and much more.



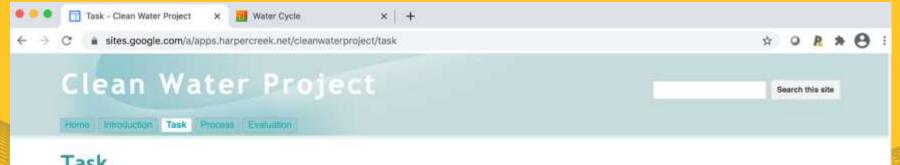
## **Design Processes for the Teacher's Thinking**

- Empathy Informal interviews/surveys to understand student motivations and interests
- Define Let kids spend time with issues to make connections between school and their world
- Ideate Brainstorm on an idea with several fellow teachers
- Prototype Come up with a lesson plan for first run of project
- Test Try it with kids, take notes and observe what works

## Clean water issues in Spanish speaking countries

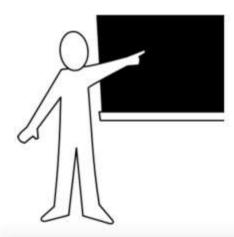
Initial goal: A better Spanish vocabulary lesson

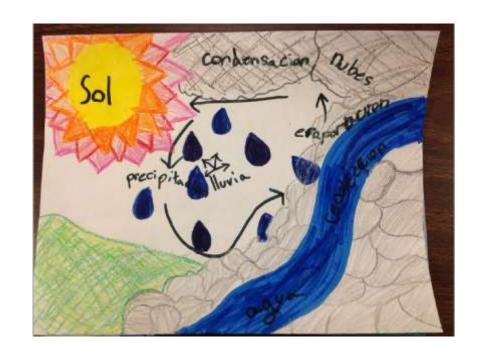
Outcome: Interdisciplinary STEAM project where students researched the scientific dimensions of water usage, and considered problems that happen in Spanish speaking countries, learning about the water cycle, and brainstorming to teach other students about the intersection of these issues.

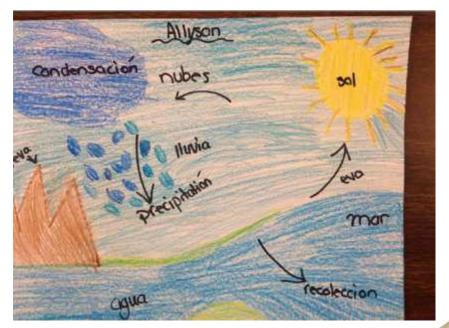


#### Task

You are responsible for teaching other students in the school about the water crisis in a Spanish speaking country. You will be researching information about a chosen country and designing a solution to their water problem.







## **Clean and Dirty Water Board Game**

- Provided kids with clean and dirty water tokens
- Dirty water tokens exceeded the clean water tokens
- Rationing water
- Using empathy, helping if someone ran out



"Learning about design thinking came at a great moment in my teaching career. It allowed me to feel like a designer. I believe this process of design promotes creative thinking, collaboration, student ownership and responsibility of learning...you could take many different paths through and modify this process as needed.

Without it, I would have struggled creating this project for my students. As a designer, it was exciting to see the development and changes from start to end."

~ Katherine

Design Thinking in Teacher Education

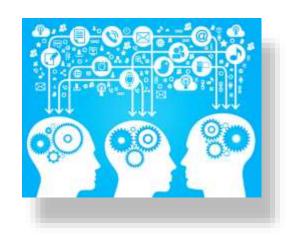
Design Thinking in Teacher Education

## Major Themes

Becoming Open to Uncertainty

Valuing Empathy

Seeing Teaching as Design



## Becoming Open to Uncertainty

"We think we know why problems occur. We think we have the answers. So often we skip empathizing and understanding and defining and jump right into a solution. We struggle to look at all the factors, reframe the problem, or **be okay with the uncertainty**. Fortunately, I see it now."

## Valuing Empathy

"Understanding the people impacted by the design helps a teacher understand how to create a successful product. As I interviewed my class my students waved their hands in the air enthusiastically wanting their voice to be heard. In the past, I would turn to my mentor teacher for advice. In the empathize phase I learned the importance of the student or user voice...What I thought my class was thinking was not necessarily what they were actually thinking."

## Seeing Teaching as Design

"I no longer see myself only as a teacher, but as a designer. After taking this class I realized misconceptions I had about design. I had always thought a design was based on an idea that popped into your head. I always thought people that came up with excellent design ideas were the people that just naturally had great ideas. This work has taught me that everyone can be a designer and that there is a process. Teaching is design... I was a designer without even realizing it."

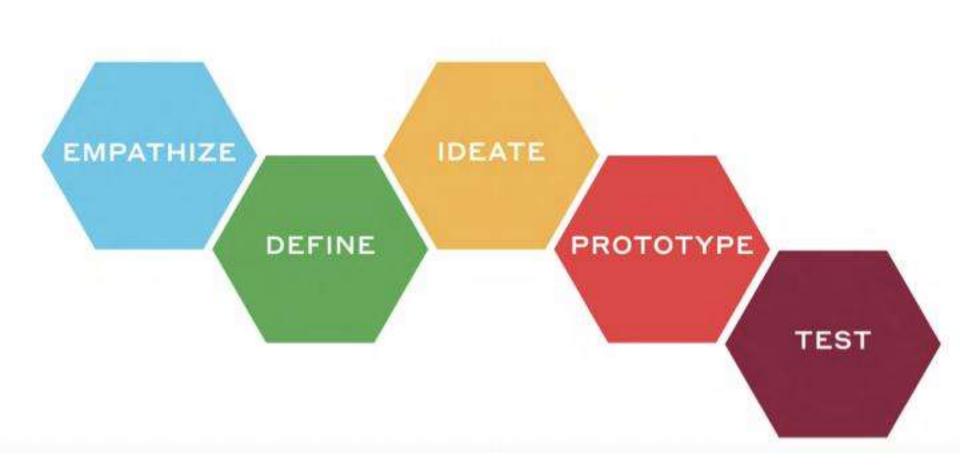


To sum up...



**Every aspect of education is designed** 





**Everyone designs** who devises courses of action aimed at changing existing situations into preferred ones ~ Herb Simon

# Teachers & Students

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