



# An Educator's Guide to Design Thinking



# TEACHER FACEBOOK



Doree Tschudy  
Teacher  
Ohlone Elementary  
Palo Alto, CA



Mrs Shirley Teo,  
Head of Department (English)  
Teck Whye Secondary School  
Singapore



Alwin Njoo  
Head of Department (Science)  
Teck Whye Secondary School  
Singapore



Gina Rocca  
Dalton  
Kindergarten  
New York City, New York



Fred White  
English and Art Dept-  
Santa Catalina School  
Monterrey, CA



Sue Penchina  
Author  
Los Altos Hills, CA



Zach KongHong Ong  
Principal  
Teck Whye Secondary  
School Singapore



Hank Gallina  
District Leadership Team  
Lompoc Unified School  
District  
Lompoc, CA



Christian Reilly  
Science Teacher  
Santa Catalina High School  
Monterrey, CA



Rober Pronovost  
2nd Grade Teacher  
Belle Haven Elementary  
East Menlo Park



Cindy Duim  
Math Teacher  
Somona Academy  
Santa Rosa, CA



Jared Vanscoder  
Engineering Teacher  
Irving High School  
Irving Texas



Caitlin Sweeney  
First Grade Teacher  
Springside School  
Philadelphia, PA



Judy Callas  
Middle School Art  
Springside School  
Philadelphia, PA



Bronia Whipp  
Middle School Teacher  
Burlingame Inter.  
Burlingame, CA



Katie Uppman  
Teacher (Grades 3-5)  
Katherine Michiels  
School  
San Francisco, CA



David Bill  
Administrator  
New Tech Network  
Napa, CA



Irina Zadov  
Director of Experience  
and Programs  
Zeum  
San Francisco, CA

# TEACHER FACEBOOK



Carrie Diel  
Art Teacher  
Colorado Academy  
Denver, CO



Ryan Silva  
Administration  
Toronto, Canada



Susan Kendall  
Teacher  
Santa Catalina School  
Monterey, CA



Mohan Nadarajah  
CEO  
Play Lab Inc.  
Toronto, Canada



Harvey Scribner  
High School Teacher  
University City HS  
Philadelphia, PA



Ellen Kruger  
Physics Teacher  
Springside School  
Philadelphia, PA



Allison McFall  
Middle School Teacher  
Springside School  
Philadelphia, PA



Kevin Kirchner  
Math and Science Teacher  
Pacifica Christian High  
Santa Monica, CA



Warren Yu  
Chief Learning Officer  
Cebrowski Institute  
Monterey, CA



Katheryn McDonald  
English Teacher  
Cate School  
Carpinteria, CA



Isabel Ochoa  
Spanish Teacher  
Philips Brooks School  
Menlo Park, CA



Diana Sanchez  
Teacher  
High Tech High  
San Diego, CA



Deborah Tan  
Head of Dept for  
Pupil Development  
Teck Whye School  
Singapore



Sean Jalleh  
Design and Technology  
Teck Whye School  
Singapore



Dana Hart-Stone  
Visual Arts Chair  
Santa Catalina School  
Monterey, CA



Amanda Frey  
Enrichment Teacher  
South School  
Hillsborough, CA



Pamela Meuser  
Grades 3-5  
West Hillsborough  
elementary  
Milbrae, CA



Donna Emerson  
3rd Grade  
Marshall Lane  
Saratoga, CA

## Group Emails:

Alison McFall	amcfall@springside.org
ALWIN NJOO KIAT GUAN	njoo_kiat_guan_alwin@moe.edu.sg
Amanda Frey	afrey@hcsd.k12.ca.us
Bronia Whipp	bwhipp@bsd.k12.ca.us
Caitlin Sweeney	csweeney@springside.org
carrie diehl	carriediehl@hotmail.com
Christian Reilly	christian_reilly@santacatalina.org
Cindy Duim	caduim@sbcglobal.net
Dana Hart-Stone	Dana_Hart-Stone@sbcglobal.net
David Bill	david.bill.iv@gmail.com
Deborah Tan	tan_hui_min_deborah@moe.edu.sg
Diana Sanchez	dsanchez@hightechhigh.org
Donna Emerson	donnaemerson2010@comcast.net
Doree Tschudy	doree.day@gmail.com
Ellen Kruger	ekruger@springside.org
Fred White	Fred_White@santacatalina.org
gina hanono	gina.hanono@gmail.com
Harvey Scribner	hscribner@philasd.org
Henry "Hank" Gallina	hgallina@aol.com
Irina Zadov	izadov@zeum.org
Isabel Ochoa	issavel8a@gmail.com
Jared Vanscoder	jared@jaredvanscoder.com
Jenny Maehara	jmaehara@gmail.com
Judy Callas	jcallas@springside.org
Katheryn McDonald Park	katheryn_Park@cate.org
Katie Uppman	Katie@Uppman.com
Kevin Kirchner	kkirchner@pacificchristian.org
Mohan Nadarajah	mohan.nadarajah@google.com
Mrs Shirley Teo	steo.twss@teckwhysec.org
Pamela Meuser	pmeuser@hcsd.k12.ca.us
Robert Pronovost	robert.pronovost@gmail.com
Ryan Silva	ryansilva79@yahoo.ca
Sean Jalleh	sean.jalleh@gmail.com
Sue Penchina	spenchina@yahoo.com
Susan Kendall	susan_kendall@santacatalina.org
Warren Yu	wyu@nps.edu
Zach KongHong Ong	ong_kong_hong@moe.edu.sg

# Wiki



## Everything you need

- Handouts
- Materials
- Videos
- Powerpoints
- And more!

### Day 2

#### Prototyping Materials

TW 2010 Prototype.pptx

Prototyping Video Round 1 <http://www.vimeo.com/11510439>  
 Prototyping Video Round 2 <http://www.vimeo.com/11511693>

#### Testing Materials

TW 2010 Test.pptx

Testing Video <http://www.vimeo.com/11499707>

#### Story Telling

TW 2010 Storytelling.pptx

monologue\_example.mov

skit\_with\_narrator\_example.mov

#### Project Debrief

Debrief Questions.doc

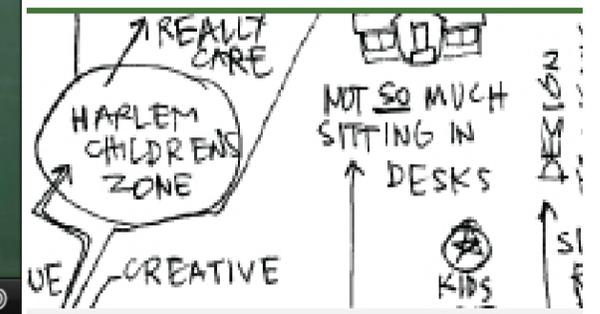
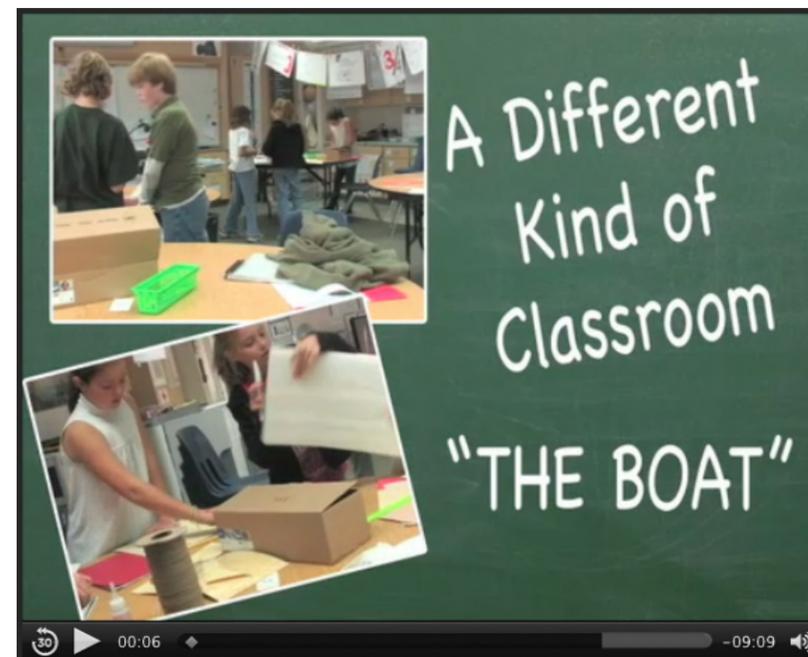
[http://www.pvsd.net/Technology/MacBook\\_Pilot/Movies/TheBoatV3.mov](http://www.pvsd.net/Technology/MacBook_Pilot/Movies/TheBoatV3.mov)

#### Take Home Reflection

TW Reflection 2010.ai

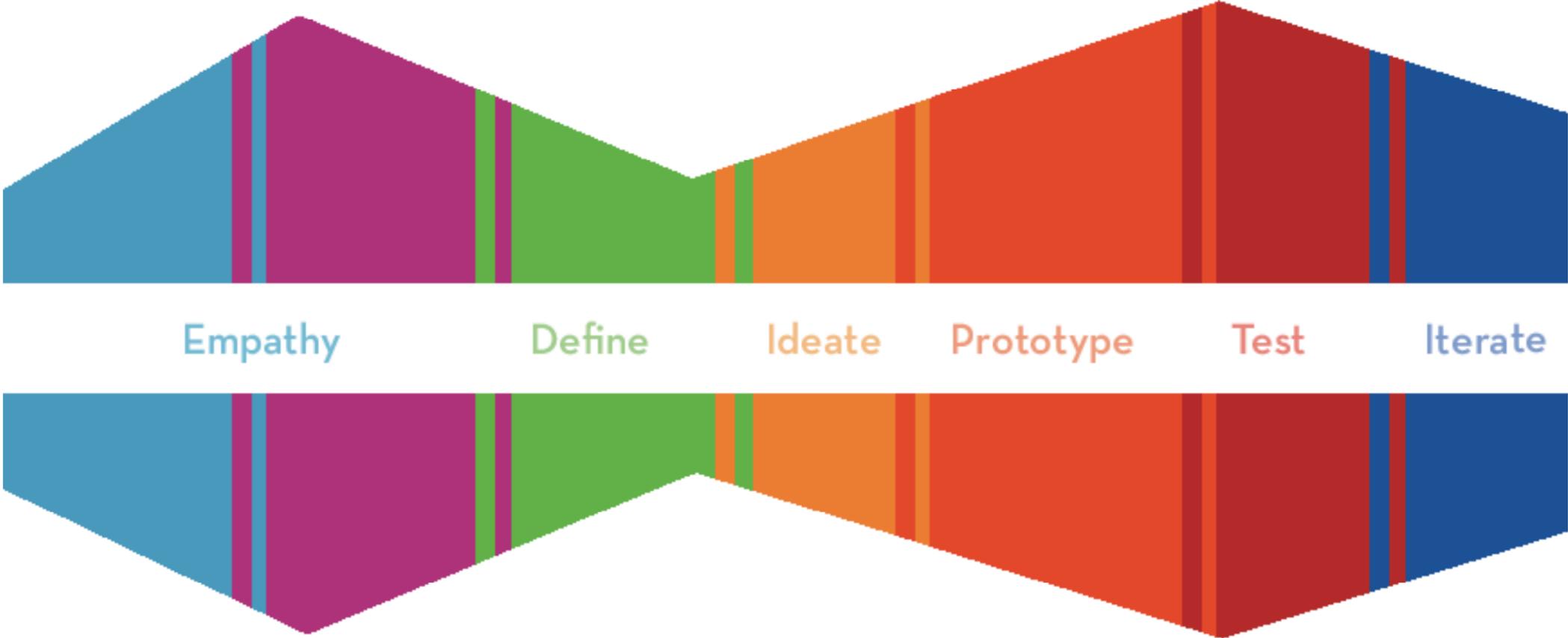
### Day 3

Latest version of Mindsets Prompt



# The k12 Lab Wiki

# DESIGN THINKING TEACHING GUIDE



Ideas and Strategies for Implementing  
Design Thinking in Schools

# CREATING A DESIGN CHALLENGE

(IN 5 MINUTES BY USING THE DESIGN PROCESS)

The framing of a Design Challenge sets the stage for student teams to explore characters and problems within a situation. The best framing does not constrain them to one problem to solve nor leave it too broad that they have trouble finding tangible problems.

**Step 1  
Plan Empathy ->**  
List Settings that are both interesting to your students and have the potential to embed curricular content. Each setting should have between 3 and 6 potential Characters and at least 4 Potential Problems. It is common during the course of the Design Challenge for students to discover unanticipated problems.

**Step 2  
Develop Define/Ideate ->**  
Chose a setting and write 3 versions of a statement that captures the situation. Use the scaffolds to the right to help. If you get stuck, try a new setting.

**Step 3  
Prototype and Test ->**  
Pick one of the statements you generated and test it to make sure that it is properly scoped for a rich design challenge. The questions on the right are helpful in testing that a challenge is properly scoped.

Settings	Characters	Potential Problems
Ex. A local park	Kids who play there Parents Animals	Litter Habitat disruption Park financial viability

Redesign the \_\_\_(situation)\_\_\_ experience .  
Design a way for \_\_\_(specific group of people)\_\_\_ to better \_\_\_(situation)\_\_\_ .  
How might we help \_\_\_(achieve some goal)\_\_\_?  
Ex. How might we keep the park clean? Design a way for people at the park to better support native animal life.

By working with the statement above will students have the opportunity to address multiple characters, problems and character needs?  
If not, make the statement more broad.

By working with the above statement will students be able to find similarities between characters, problems, and needs?  
If not, make the statement more narrow.

**When you feel you have a Design Challenge, write it down and begin.**

# EMPATHY

## Description of Phase

Design thinking is a user-centered design process, and the empathy that comes from observing users enables design thinkers to uncover deep and meaningful needs (both overt & latent). Empathy, by definition, is the intellectual identification with or vicarious experiencing of the feelings, thoughts or attitudes of another. Three main techniques are used to gain empathy: interviewing, observation, immersion. The goal of the empathy mode is to discover gaps in between what people do and what people say they do. These gaps are the design opportunities.

## Student Outcomes

- The value of building empathy to discover deeper needs
- Skills needed to understand user

## Strategies

<b>LEVEL 1</b> 1. Open-ended Questions 2. Video observation	<b>LEVEL 2</b> 1. Interview Techniques 2. Obs. vs interpretation 3. Field notes
<b>LEVEL 3</b> 1. How/Why Laddering 2. Walk in the Moccasins 3. Day in the life	<b>LEVEL 4</b> 1. Powers of 10 2. Community map 3. Surveys

## Suggested connections to academic content

- **History:** Research techniques - approach a research paper like an empathy experience
- **Science:** Observation and the scientific method
- **English:** Write a paper that will be interesting to a particular target group (complete empathy build to understand that group)

## Meta Moments

- \*Having students brainstorm before empathy is a great way to illustrate the value of the empathy stage.
- \*Students find real people facing real problems compelling.
- \*Students may need to be coached on staying objective and refraining from jumping to solutions too early in the process.
- \* Empathy experiences such as interviews and other open-ended approaches lead to unexpected outcomes and discovery of unique problems.

## Make Sure...

**Before** – to provide a range of empathy experiences (varying perspectives as well as activities – allow for stories, feelings, problems etc...)

**During** – Students use follow-up questions. Students diligently record (notes, video etc) peoples’ responses.

**After** – Students have collected diverse empathy artifacts (stories, pictures etc...)

## Prompts

Who should we talk to?  
Who can we learn from?  
What is the experience of our user?

# DEFINE

## Description of Phase

The Define mode is seen as a ‘narrowing’ part of the process. After collecting volumes of user information, it is time to distill down to one specific user group, their need and the insight behind that need so as to unify and inspire a team. The goal of this mode is to come up with at least one actionable problem statement (often referred to as Point of View (POV)) that focuses on the insights that you uncovered from real users.

### Student Outcomes

The process of determining a unique human centered problem from a large, unorganized set of information.

### Strategies

LEVEL 1 1. Madlibs	LEVEL 2 1. Empathy Map 2. Other mapping techniques
LEVEL 3 1. Want Ad 2. 2X2s	LEVEL 4 1. Metaphor

### Suggested connections to academic content

- English:** Developing a metaphor or want ad to describe project problem statement.
- History:** connect to the concept of a thesis statement for a term paper
- English:** Character description

## Meta Moments

- \* Defining a problem statement is one of the most challenging steps in the design process. Giving students more structure (see strategies) can be very helpful
- \* Be sure to allow plenty of time for this stage. It will set students up for the rest of the design challenge.
- \* The more rich the information, the more options students have when narrowing to a specific problem.
- \* There is no right way to do it, but multiple approaches and some time lead to rich insights. It's more of an art -- decision making and inference.

## Make Sure...

**Before:** Students have a range of information including: quotes, pictures/drawings, descriptions of users' feelings. Students have a space to share findings i.e. whiteboard, table top, floor

**During:** Students should seek patterns in the information, form user profiles, detect implicit and explicit needs, capture surprising behaviors and feelings

**After:** Capture a unique user, need, and insight from all the data that describe a certain problem that a person or group is facing. Take that description and generate “how might we” statements that each deal with an aspect of your description.

## Prompts

- What type of information do we have?
- What patterns are there?
- What needs and insights can we find?

# IDEATE

## Description of Phase

Ideation is the process of idea generation. Mentally it represents a process of “going broad” in terms of concepts and outcomes. Ideation provides the fuel for building prototypes and driving innovative solutions.

### Student Outcomes

The value and benefit of following the brainstorming rules: being visual, building on other's ideas, deferring judgment on ideas.

### Strategies

LEVEL 1 1. Simple Brainstorming	LEVEL 2 1. Brainstorming rules
LEVEL 3 1. Visual Brainstorming 2. Bodystorming	LEVEL 4 1. Brainstorming

### Suggested connections to academic content

- **History:** Look at a decision that was made in history and brainstorm different potential solutions
- **Social Studies:** Look at current event, create “how might we’s” and brainstorm possible solutions
- **Science:** Brainstorming hypotheses for an experiment
- **English:** Brainstorm characters, problems, etc for creative writing

## Meta Moments

- \* Space matters - playing fun music, setting up a space that allows for students to stand or move around as they are generating ideas adds to this experience.
- \* Scope and definition of brainstorming prompts will influence how long the brainstorm has steam.
- \* One brainstorming skill is knowing when to navigate to the next brainstorming prompt (when energy has died on a given topic).
- \* Think about selecting a facilitator for each group who will enforce the rules and maintain a positive brainstorming atmosphere.
- \* This is about not owning ideas but encouraging teammates to generate.

## Make Sure...

**Before:** Students have a defined problem: user, need and insight. They have multiple brainstorming prompts “how might we’s” to brainstorm off of. You might want to combine groups to have 6-8 students brainstorming in a group.

**During:** Students have high energy, are following the brainstorming rules (especially being visual and deferring judgment), and are listening to each other and building on each other's ideas. When student group energy gets low, encourage the group to move on to a new prompt or to do a warm-up improv activity to get energy up.

**After:** Students (as a group) have selected around 3 ideas to move forward by voting. See prompts on the prototyping page.

## Prompts

What new ideas do we have that will meet the needs of our user?

# PROTOTYPE

## Description of Phase

Prototyping is the iterative development of artifacts – digital, physical, or experiential – intended to elicit qualitative or quantitative feedback. The act of prototyping implies “building”, testing, and iterating and is, itself, both a flaring and a narrowing process. The flaring represents the proliferation of low-resolution prototypes developed as different aspects of the prototype are evaluated. The narrowing represents the refinement of the lower resolution models into increasingly complex and resolved models based on feedback, that leads to an even better understanding of the users needs.

### Student Outcomes

- The value of building to think (Bias towards action)
- The importance of rapid prototyping

### Strategies

<b>LEVEL 1</b> 1. Paper Prototype	<b>LEVEL 2</b> 1. Physical Prototype 2. looks like/works like
<b>LEVEL 3</b> 1. Role Playing 2. Prototype to decide 3. Identify a variable	<b>LEVEL 4</b> 1. Prototype intangibles

### Suggested connections to academic content

- **English/History** - Multiple drafts of papers
- **Math** - Identification of a variable
- **Social Studies** - Prototype to decide, decision making skills
- **Art** - Sketching

## Meta Moments

- \* We give students relatively little time to prototype so that they don't get attached to ideas and are open to feedback and iteration
- \* Failing early leads to much better final products. This is not obvious to children as traditional education rarely promotes this.
- \* Building to think get students in the mind set of “doing” rather than thinking.

## Make Sure...

**Before** – Students have a variety of ideas to select from and move forward on.

**During**– Students have access to prototyping materials. Students build prototypes rapidly so they are easy to change

**After** – Students have multiple prototypes that they are ready to test and a clear idea of what they are testing, how will they record and incorporate feedback?

## Prompts

- How to select an idea (voting) (Most feasible, ground breaking, exciting, functional, the darling, long shot and the safe choice)
- What variables do you want to better understand?
- What questions to we have about our idea?
- How can we make our idea tangible and in a way that gives us the feedback we need?

# TEST

## Description of Phase

The test mode is another iterative mode in which we place our low-resolution artifacts in the appropriate context of the user's life. In regards to a team's solution, we should always prototype as if we know we're right, but test as if we know we're wrong— testing is the chance to refine our solutions and make them better.

### Student Outcomes

- Show don't tell – the value of having a clear prototype in testing an idea
- How to incorporate feedback and iterate

### Strategies

<b>LEVEL 1</b> 1. Basic Presentation	<b>LEVEL 2</b> 1. 4 quadrant test
<b>LEVEL 3</b> 1. Testing Scenarios 2. Evolution of a prototype	<b>LEVEL 4</b> 1. Surveys 2. Real-World Testing

### Suggested connections to academic content

- History/English:** Effective oral presentations
- Science:** Designing an experiment to test a hypothesis
- English:** Story telling

## Meta Moments

- \*The more authentic the audience for the test phase the better (ie the user group or a good representative), however if you don't have direct access to the user group use class members to fill in.
- \*If you are using class members to give feedback be sure to coach them on effective an ineffective ways to give feedback. Peers are often reticent to give feedback to one another.
- \*Coach teams on recognizing that feedback will only make their final solution better
- \* Presentations should be set up to show the idea and tell the story of the prototype.

## Make Sure...

**Before** – Students have multiple prototypes that they are ready to test and a clear idea of what they are testing, how will they record and incorporate feedback.

**During**– Students take good notes and ask follow up questions on feedback received from user. Students set up testing presentations with lots of room for feedback from users.

**After** – Students have a number of ideas of how to move forward and create a new prototype.

## Prompts

- What variables are you testing and how can you present your prototype to better test those ideas?
- How will you record feedback?
- Based on the feedback you received what would you do next?

# Applying Design Thinking Mindsets in Your School

This is a tool to help you think about different ways to incorporate design thinking into your school or classroom. Some teachers and administrators may be completely new to these concepts and can think of these brainstorming prompts as a platform to launch new processes. Other teachers and administrators may have been using these mindsets for years and can use these prompts as a way to build on existing practices.

## Focus on Human Values



- HMW get people considering others?
- HMW build empathy for others daily?
- HMW create a culture of interpersonal engagement at all levels of the school (administration, teachers, students, parents, staff)?
- HMW incorporate empathy building activities into the standard curriculum?

## Bias Towards Action



- HMW embody quick turnarounds?
- HMW do more talk less?
- HMW get people out of their seats (teachers, parents, administrators, students)?
- HMW help students move forward when they feel stuck?
- HMW encourage student initiative?

## Be Mindful Of Process



- HMW instill the importance of the design process?
- HMW encourage reflection on and improvement of process?
- HMW encourage use of design process in everyday work?
- HMW encourage iteration of process?
- HMW be more transparent about where we are in process?

## Culture of Prototyping



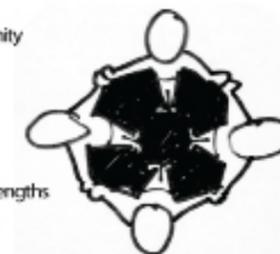
- HMW keep ideas fresh and open to outside input?
- HMW engage people with ongoing projects and solicit feedback?
- HMW decrease fear of failure?
- HMW encourage iteration?
- HMW get more experimental with curriculum?
- HMW get more experiential with curriculum?
- HMW create a "Failure is good" culture?

## Show Don't Tell



- HMW encourage the showing of unfinished work for feedback?
- HMW encourage use of visuals in the curriculum?
- HMW encourage visual thinking?
- HMW encourage storytelling?
- HMW create a culture that encourages storytelling?

## Radical Collaboration



- HMW create diverse working groups?
- HMW involve all community members in projects?
- HMW understand personal strengths and how to leverage our own and the strengths of others?
- HMW leverage outside experts at our school?
- HMW take advantage of different learning styles?

# 7 things you can do tomorrow to incorporate design thinking

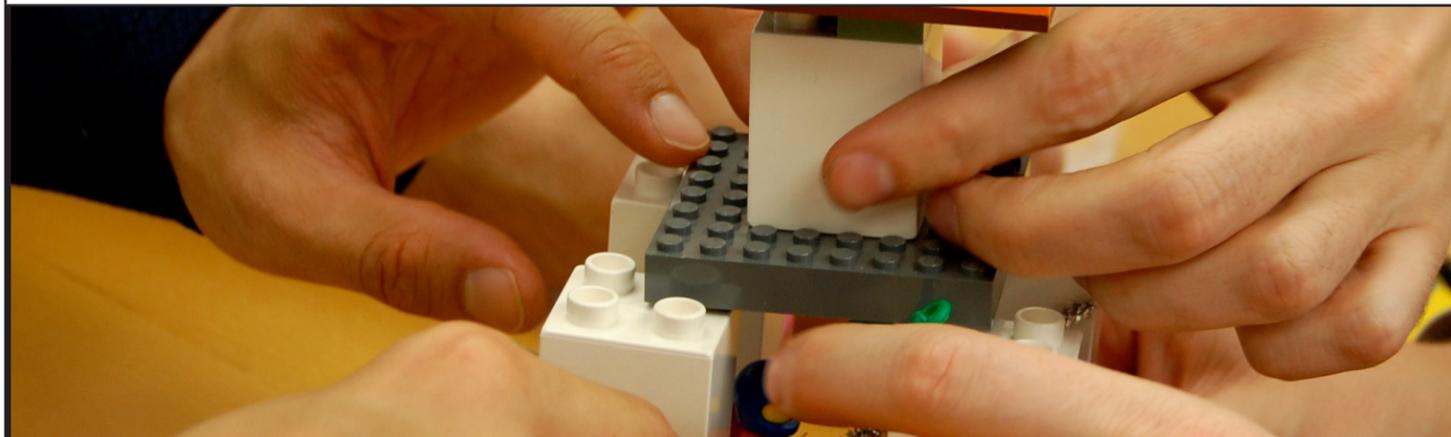


## Brainstorm

Brainstorming is a fast, self-contained way to practice some of the core principles of design thinking. Having students or teachers run 5, 10, or 20 minute brainstorming sessions is a great way to teach the value of being generative. Conveniently, it can be used to help create solutions for virtually any type of problem, making it one of design thinking's most versatile tools.

## More Vertical Writing Space

Space is a fantastic way to support and teach design thinking. The d.school is an example of a building dedicated to support our way of working. But most of what our space enables can be recreated cheaply by adding more vertical writing space. Here teachers at East Palo Alto Phoenix Academy gave butcher paper to students who created their own dynamic team studio.



## Don't Yuck My Yum

Creating a positive, supportive atmosphere is essential to sustained design thinking. The most common way this is violated is by giving unconstructive feedback. Students at the Aspire School in East Palo Alto while practicing brainstorming came up with the phrase "don't yuck my yum" to remind each other to give only positive feedback. Designing similar reminders forms a safe space for student creativity.



## Prototype to Decide

The design thinking process often stalls when teams begin to over-discuss their next steps. The adage “prototype to decide” reminds us that instead of arguing about what the next idea when a team hits an impasse, create some quick prototypes and test each idea. Let the users decide what course of action you should take.

## Build to Think

Prototyping is not just a way to test an idea, it is a process that helps people think. Constantly surrounding students and teachers with low resolution materials encourages kinesthetic learning and communication. Objects like scrap paper, pipe cleaner, zip ties, tape, glue, old magazines, etc can be acquired quite cheaply and are amazingly versatile.



## Think Visually

Communication is an essential ingredient of design thinking’s collaborative working style. By biasing towards drawing and capturing ideas on Post-Its students and teachers can communicate their thoughts in a more accessible way. Furthermore, visual thinking creates artifacts that are easily accessible and malleable to an entire group.

## Search for Human Needs

At the core of design thinking is solving problems for people. Promoting this human centered approach means framing problems by describing them as human needs. Likewise, the success of ideas depends on how accurately and deeply they address the problems that others face.

