Design Thinking Workshop

October 4, 2012
Our Approach

• 1:30 – 1:40 Context
• 1:40 – 2:20 Deep Dive
• 2:20 – 2:35 Classroom Work
• 2:35 – 2:45 Q & A
Pat Basset’s Four Questions for 21st Century Schools (Posed in 2008)

• What do we teach?

• How do we teach?

• How do we assess our teaching?

• How do we transform our schools given our historic success?
Uplift

Colorado Academy

21st Century Curriculum

Inclusive Community

Global Education and Service Learning

High Tuition

Complacency

Worst Economy Since the 1930s

Incremental Strategic Shifts

Overcome Challenges

Uplift
Agents of Change or Victims of Change?
“That which changes or tends to change the state of motion or rest of a particular body.”

Force
21st Century Skills

- Critical Thinking
- Creativity
- Collaboration
- Communication
- Cultural Competency
- Character
What is Design Thinking and Why Learn About it?
Design Thinking

1. Powerful Set of Problem-Solving Strategies
2. Opportunity to Encourage Creativity
3. Tool for reshaping Schools & Curriculum
Educational Shifts:
1970 to 2012

1. Writing
2. Computational Skills
3. Reading Skills
4. Oral Communication
5. Listening Skills
6. Personal Career Development
7. Creative Thinking
8. Leadership
9. Goal Setting/Motivation
10. Teamwork
11. Organizational Effectiveness
12. Problem Solving
13. Interpersonal Skills

1. Teamwork
2. Problem Solving
   - Interpersonal Skills
   - Oral Communication
   - Listening Skills
   - Personal Career Development
   - Creative Thinking
   - Goal Setting/Motivation
   - Writing
   - Organizational Effectiveness
   - Computational Skills
   - Reading Skills
Teacher as Innovator
Innovator’s Mindset

- **ACT!** – we are problem solvers, doers, creators.
- **Learn from Mistakes** – we fail fast and fearlessly, learning from each try
- **Work Together** – we collaborate, creating better solutions
- **Contribute to the Greater Good** – we improve our community and world
- **Be Resilient** – we don’t give up
- **Grow** – we are life-long learners
Deep Dive
Design is a Process
Design Thinking in Schools
WHY?

Engagement

Achievement

Success after school

Businesses want it
Design Thinking Provides a Road Map

Theory → Practice
CONNECTIONS

Communication
Critical Thinking
Creativity
Collaboration
Problem Solving
MY REQUESTS OF YOU FOR THE MORNING:

1. Step in to the shoes of students → You are learning to be a design thinker

2. Defer judgment: You may end up just using components of this process or overall mindsets

3. Have fun!
Familiarize with the Process
LET'S GET STARTED

Redesign the Wallet for your “User” using the design process.
EMPATHIZE

UNDERSTAND
Or
EMPATHIZE

Expose. Observe.

Engage.

Have a good conversation…
Always

- seek **STORIES**
- talk about **FEELINGS**
- follow-up with ‘**WHY**?’
Design Something Useful

Your Mission: Design something **USEFUL & MEANINGFUL** for your partner. Start by **GAINING EMPATHY:**

2) Interview

Ask your partner to introduce themselves to you by walking you through the contents of their purse or wallet. Ask questions.

NOTES/SKETCHES:

00:05 per person

What stood out to you? What are you curious about?

INSIGHTS:

00:01 per person

Switch roles and repeat interview 1
FOR THE NEXT MINUTE

Ask Why 5 times

interview
Point of view

Articulate your current **POINT OF VIEW:**

3) **Inventory possible NEEDS:**

   name

   things they are trying to do (**needs**):

4) **DEFINE a Problem Statement:**

   name

   **NEEDS A WAY TO**

   user's need

   in a way that makes them **FEEL**

   insight/meaning

   [my problem statement]

   to bring to the next page!
IDEATION

Generate alternatives to test:

5) Sketch 3-7 RADICAL ways to meet your user’s needs:

[put problem statement here]

00:05

6) SHARE your solutions + CAPTURE feedback.

Switch roles and repeat sharing
FOR THE NEXT MINUTE EVERY IDEA MUST COST OVER 1 MILLION DOLLARS TO IMPLEMENT
EVERY IDEA MUST REQUIRE MAGIC
Prototype:
FAIL early and often

Cost of failure vs. project timeline

Prototype, fail & learn here

Too late
Let Go of Ideas
Test (or, OBSERVE again!)
Rapid Prototyping + Feedback

7) **BUILD** your solution.

Make something your partner can interact with!

[not here]

8) **SHARE** your solution + **CAPTURE** feedback.

+ [What worked...]

- [What could be improved...]

? [Questions...]

! [Ideas...]

00:08

00:05 per person

Switch roles & repeat sharing.

Switch roles and repeat sharing.
Outcomes

Intentional Process

Better Outcomes
25 – 30 Projects in the Pilot or 2nd Year Phase

- Multiple projects at each grade level
- Middle School layers in Performance Tasks and 8th grade Design Thinking Capstone Projects
- Upper School continues skill development
THE BOOT CHALLENGE:

**EMPATHY**: Interviewed each other about why boots are all over the place in the winter.

**PROTOTYPE**: Created new systems and ideas for how to organize boots.

**TEST**: Tried a different idea each week and got feedback.
3rd Grade - Playground

- EMPATHY: Interviewed students about what they liked and disliked on school playground. Observed kids playing – what did they like? Where did they bump into each other?

- PROTOTYPE: Created scale model of ideal playground and built simple machine to represent one of the structures.

- TEST: Tested ideas with other students for feedback. Showed ideas to Facilities department for feasibility feedback.
Design Characters in a book:

Empathy: What is important to a character?
~Reading comprehension

Prototype: Ideas to meet the characters’ needs

Test/present: Ideas to classmates and teacher for feedback
Oral practice
Learning Subject Vocabulary:

**Empathize:** Students interview one another about effective learning experiences.

**Prototype:** Students build game/presentation etc. to teach complex vocab skills.

**Test:** Ideas are tested in class as a platform to learn vocabulary.
Partner with the Denver Children’s Museum to create prototypes that visitors can make in the Museum’s Construction Exhibit
9th Grade

Dedicated 9th grade trimester course in Design Thinking –
A cross-disciplinary problem-solving intensive
Key Benefits

Student:
- Encourages INNOVATOR’S MINDSET
- Provides a set of PROBLEM SOLVING STRATEGIES
- Creates the opportunity to PRACTICE

School:
- Orients the curriculum toward COMPLEX PROBLEM SOLVING
- Provides COMMON LANGUAGE for teachers and students
- Creates context for COLLABORATIVE and COMMUNICATION Skill development
From Here to There

- Choose your **TARGETS** and **Tools** wisely
- **INVOLVE** the faculty
- Provide **PROFESSIONAL DEVELOPMENT**
- Make time for **CURRICULUM DEVELOPMENT**
- Have **CLEAR EXPECTATIONS**
- Make room for **MISTAKES**
Questions

1. Domain: $(0, \infty)$

2. $x$-inter: $y = 0 \cdot \ln \frac{1}{x}$

   $\frac{1}{2}x = 1$

   $x = 2$

3. $\ln \ln \frac{1}{x} = -x$

   $x = -\infty$

4. Compress

   $x \to \infty \cdot \ln \frac{1}{x} = -\infty$

5. $y = 0$ (vertical)

   $y = \frac{2}{3}$

6. $\ln \frac{3}{x} = \frac{2}{x}$

   $x = \frac{2}{3}$

7. $x \to \frac{2}{3} \ln \frac{3}{x} = \frac{2}{x}$

   $x = \frac{2}{3}$

8. $y$-inter: $x = 0$

9. Always $y = 0$
Design Thinking
Clear Goal Definition

Essential Skills for Critical Thinking

- Identify and Understand The Problem
  - State problem/issue clearly and succinctly
  - Identify knowns and unknowns
  - Examine the problem from different perspectives
  - Ask questions

- Gather Information
  - Research using a variety of media sources and technology devices
  - Determine accuracy, reliability, and timelines of source material

- Analyze and Evaluate Evidence
  - Read for meaning and nuance
  - Identify assumptions and bias
  - Determine quality and reliability
  - Determine cause and effect/correlation
  - Identify fact vs. opinion
  - Identify logical argument, fallacy and persuasion
  - Identify irrelevant or superfluous information
  - Categorize, classify, and find patterns
  - Interpret data in various formats (e.g., charts, graphs)

- Make a Decision – Decide Among Positions
  - Determine pros and cons; weigh evidence
  - Draw logical conclusions

- Support Decision with Evidence
  - Support decision with evidence; cite specific examples

- Communicate the Decision
  - Explain the decision/process clearly
  - Target a particular audience
  - Use appropriate, engaging presentation technology/medium

- Invite Feedback and Revision

Understand the Issue
Gather Information
Make a Decision
Communicate a Decision
Support Decision with Evidence
Analyze and Evaluate Evidence
Feedback And Revision

Support Decision with Evidence
Make a Decision
**Design Thinking**
Process intended to encourage creative thinking involving:
- Empathy
- Definition
- Ideation
- Prototyping
- Feedback

**Performance Tasks**
- Complex Task
- Student in Role
- Data Evaluation
- Product of Some Sort
- Direct Evaluation of Critical Thinking Development
- CWRA - Like

*ThinkingLAB*
D Quadrant
Critical and Creative Thinking LAB

✓ Critical and Creative Thinking Skill Development should be a full partner with other reading, writing and math in all grades

✓ Critical and Creative Thinking Skills can be taught, practiced and improved over time

✓ Lower and Middle School Children are NOT too young to begin practicing
Lower School Thinking LAB

✓ 20 Design Thinking Projects Piloted so far
✓ At Least Two at Every Grade Level Next Fall
✓ Huge Faculty Buy-In
✓ Consistent Skill Development
✓ In Many Cases - Highlight of the Curriculum for Kids
Middle School ThinkingLAB

- Two ThinkingLAB projects in each class
- 7th Grade Outside the Box program in place
- Critical Thinking Focus – Performance Task Practice & Design Thinking Projects in ALL Grade Levels
- Capstone Projects for 8th Graders
- Consistent Skill Development and Assessment Across Grade Levels
Upper School

- Continue to integrate the 5C’s in all curriculums
- Integrate Real World Problem Solving, Design Thinking and CLA-type performance tasks as appropriate in all curricula
- Launch Design Thinking freshman trimester course in fall 2012
- Provide consistent feedback on student progress
D Quadrant

- Students demonstrate their ability to think in complex ways and to apply their knowledge and skills.
- Even when confronted with perplexing unknowns, students are able to use extensive knowledge and skill to create solutions and take action that further develops their skills and knowledge.
Rigor/Relevance Framework

Knowledge Taxonomy

1. Knowledge
   - A: Students gather and store bits of knowledge and information. Students are primarily expected to remember or understand this knowledge.
   - B: Students use acquired knowledge to solve problems, design solutions, and complete work. The highest level of application is to apply knowledge to new and unpredictable situations.
   - C: Students extend and refine their acquired knowledge to be able to use that knowledge automatically and routinely to analyze and solve problems and create solutions.
   - D: Students have the competence to think in complex ways and to apply their knowledge and skills. Even when confronted with perplexing unknowns, students are able to use extensive knowledge and skill to create solutions and take action that further develops their skills and knowledge.

Application Model

1. Apply in one discipline
2. Apply in discipline
3. Apply across disciplines
4. Apply to real-world predictable situations
5. Apply to real-world unpredictable situations

Assimilation

Adaptation
### Critical Thinking Rubric

<table>
<thead>
<tr>
<th>Evaluation of Evidence - Analytical Reasoning and Evaluation</th>
<th>Emerging</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpreting, analyzing and evaluating the quality of information. This entails identifying information that is relevant to a problem, highlighting connected and conflicting information, deducting flaws in logic and questionable assumptions and explaining why information is valid, invalid or limited.</td>
<td>Minimal evidence that the student has analyzed and evaluated information effectively.</td>
<td>Acceptable, but incomplete evidence that the student has analyzed and evaluated information effectively.</td>
<td>Good evidence that the student has analyzed and evaluated the information effectively.</td>
</tr>
</tbody>
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<thead>
<tr>
<th>Problem Solving - Making a Decision or Taking a Stand</th>
<th>Emerging</th>
<th>Developing</th>
<th>Mastering</th>
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<tr>
<td>Considering and weighing information from diverse sources to make decisions (draw a conclusion and/or propose a course of action) that logically follow from valid arguments, evidence, and examples. Considering the implications of decisions and suggesting additional research when appropriate.</td>
<td>Minimal evidence that the student has considered and weighed information to draw a well-reasoned conclusion or make a valid decision.</td>
<td>Acceptable, but incomplete evidence that the student has considered and weighed information to draw a well-reasoned conclusion or make a valid decision.</td>
<td>Good evidence that the student has considered and weighed information to draw a well-reasoned conclusion or make a valid decision.</td>
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<tr>
<th>Use of Evidence to Support Your Decision/Argument</th>
<th>Emerging</th>
<th>Developing</th>
<th>Mastering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constructing organized and logically cohesive arguments which are supported by evidence.</td>
<td>Minimal evidence that the student has effectively supported his/her decision or action with evidence.</td>
<td>Acceptable, but incomplete evidence that the student has effectively supported his/her decision or action with evidence.</td>
<td>Good evidence that the student has effectively supported his/her decision or action with evidence.</td>
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<th>Writing Effectiveness and Mechanics</th>
<th>Emerging</th>
<th>Developing</th>
<th>Mastering</th>
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<td>Expressing your arguments effectively using the six plus and writing principles</td>
<td>Minimal evidence that the student has written an effective essay using the six plus and writing principles.</td>
<td>Acceptable, but incomplete evidence that the student has written an effective essay using the six plus and writing principles.</td>
<td>Good evidence that the student has written an effective essay using the six plus and writing principles.</td>
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### CWRA

- **Critical Thinking Rubric**
- **CWRA**
Mix and Match
Tools
Design Thinking in Schools
Problem Statement: Create a game that teaches a concept

Teach addition and subtraction with cards

Prototype: Try the game as a team

Iterate: Refine the game and add rules until it works.

Give it to the 1st graders so they can learn
STUDENT-CENTERED LEARNING

Redesigning School for the summer school students:

**Empathy:** Asking students how they feel about school and how they learn best

**Prototype:** Developing new structures for summer school based on responses

**Test/present:** Testing structures with students and asking for feedback