

Using World problems and design theory as connectors for learning.

Background (from the New Yorker 01/4/2016) page 38):

“The urge to change the world is normally thwarted by a near-insurmountable barricade of obstacles: failure of imagination, failure of courage, bad governments, bad planning, incompetence, corruption, fecklessness, the laws of nations, the laws of physics, the weight of history, inertia of all sorts, psychological unsuitability on the part of the would-be changer, the resistance of people who would lose from the change, the resistance of people who would benefit from it, the seduction of activities other than world-changing, lack of practical knowledge, lack of political skill, and lack of money.”

“Ford had recently decided, in fact, that inequality was the problem of the times—more than climate change, for instance, or extremism. The foundation had been accused for years of spreading itself too thin. (The budget for 2015 was five hundred and eighteen million, but it was amazing how fast you could run through half a billion dollars with a world to fix.) So now it was going to do something dramatic: it was going to work on inequality and nothing else.”

The crucial task, everyone agreed, was to “disrupt the drivers of inequality.” In order to do that, it was necessary to ascertain what those drivers were, so program officers all around the world had been instructed to write reports identifying the chief drivers of inequality in their regions.

What can we eliminate from the list above and how can we do better than the Ford Foundation in solving problems in the World, City, Town, and Village?

“The Bigger the Problem the Bigger the Opportunities” ... Vino Khosla

Engineering design and thinking skills provides the glue (engagement, ownership, fun, innovation & collaboration) that connects Mathematics, Language Arts, Science, Social Studies and Soft-Skills for learning that enhances the school year.

Benefits of the program as a student:

- Fun and exciting
- Lots of ways I can participate (roles)
- I can see why I need to know all disciplines(math and science, language arts, social studies, art, and sports)
- It’s exciting creating new things and processes.(feel & touch)
- I’m part of making the rules

Projects	Areas of discussion
<ul style="list-style-type: none"> ● Feed the World ● Heal the World ● Clean the World ● Power the World ● Respect the World ● Connect the World ● Entertain the World ● Sports of the World ● Music of the World ● History of the World 	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; border-radius: 50%; padding: 10px; text-align: center;"> <p>The World's Opportunity Description</p> </div> <div style="font-size: 2em;">➔</div> <div style="text-align: left;"> <ul style="list-style-type: none"> • People • Places • Engineering • Art / History • Consumers • Math. / Science • Language Arts • Suppliers • Design • Technology • Business Processes </div> </div> <div style="margin-top: 10px; text-align: center;"> <div style="border: 1px solid black; padding: 2px 10px;">Time</div> </div>

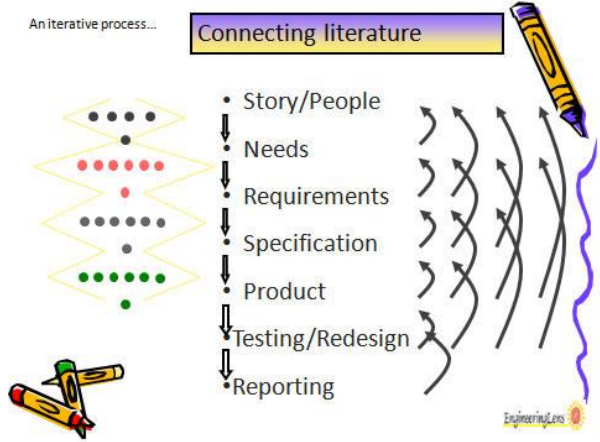
How are we going to organize ourselves?

Setting the environment for the students:

- •Imagination
- •Have doubt and wonderment
- •Testing / failure
- •Consultation / collaboration
- •Extensions, refinements and elaboration
- •Synthesis
- •Thinking skills development (creative, critical, questions and meta-cognitive reflection)
- Guidelines for working together
- Children are viewed as **active authors** of their own development

Which problem will we work on?

What is the problem we are going to solve?

<p>Frame the problem and write it down</p>	<p>Your frame is how you narrow and pinpoint what you choose to solve. Better framing leads to better solutions.</p>
<p>What facts do we know? <i>How do we integrate social skills, emotional skills and thinking skills into this project?</i></p>	<ul style="list-style-type: none"> • What are the constraints / requirements and drivers? • Areas of discussion and inclusion
<p>What do we need to know more of?</p>	
<p>Finding lots of options</p>	<p>Reflection. Creative thinking</p>
<p>An iterative process...</p>  <p>created by Mark Somerville ... Olin College</p>	<p>On the left side, we see the divergent and convergent thinking happening as many ideas are created and the reduced base on what will work and meet the “needs”.</p> <p>This is creative and critical thinking.</p> <p>On the right side we see the iterative nature of the process as things are tried, found to need a change and then repeated until it is correct.</p>
<p><i>A problem is nothing more than an opportunity in work clothes. A successful business person pays</i></p>	<p><i>'We are continually faced with a series of great opportunities brilliantly disguised as in insoluble problems...</i></p>

<i>attention to problems, converting the problems into opportunities and deciding which opportunities are worth pursuing.</i> Thinkertoys, Michael Michalko p22	John W Gardner
Narrowing the choices	<ul style="list-style-type: none"> • Critical thinking • How are we going to test our approach? • What requirements do we have to achieve?
Decision Matrix	
Blue Sky (shaping) <ul style="list-style-type: none"> • Mundane • Stretch • Magical 	<ul style="list-style-type: none"> • Mundane→Magical; pre-writing activity • Encourages “magical thinking” • Helps make a new & innovative solution
How do we know we are successful?	<ul style="list-style-type: none"> • Develop rubrics and review requirements
Add in one items from each group to how it will facilitate the discussion or solution	<ul style="list-style-type: none"> • Thinking skills • Character/Strength’s • Social skills
Sketch and Map the best fits	Test
Update the possible solution	Review other approaches, Test and reflect
Report	Reflection

Integration into the Project:

Item	Description
Fun/Joy	What goals and milestones do we need?
Assessment Team	Act like a venture fund and provide forcing function to assess schedule and goals
Learning Disciplines	How are we going to assess and incorporate within the team the learning needed disciplines for life goals?
Connections to the community	How are we going to connect for: <ul style="list-style-type: none"> • Grants

	<ul style="list-style-type: none"> • Businesses support • Community organizations • Educational schools
Customer Support	Development of a customer service strategy statement/Plan
Documentation Strategy	Plans, drawing, sketches to capture design

Darren Walker President of the Ford Foundation

“One day when he was in third grade, something happened at school and he got very upset, and was crying and careening around, and his teacher told him to sit down and he didn’t. After class, the teacher, Mrs. Majors, called him over. He remembered what she said to him all his life. “She said, ‘Darren, you are going to have to come to grips with what you want to be. Because if you continue acting out the way you are acting out, you are not going to amount to anything. You’re getting in trouble too much, and little black boys like you who get in trouble a lot are not going to do well in this society. But there is a different road for you, because you are smart, you read well, you have a thirst for learning.’ And I had never heard this term, but she told me, **‘You need to understand self-control.’** And I realized then that I needed an internal mechanism to discipline my natural instincts.” He started telling himself inside his head that he had to have self-control, he had to have self-control, and when he felt like talking non-stop in class, or raising his hand for the fourth time, or getting up out of his seat when he wasn’t supposed to, he didn’t. And as he got older he saw that he was the only black boy in the advanced track at school, and that the black boys who did not get hold of themselves, and did not have self-control, were banished from the school’s mainstream and put in special ed and never came back.”

Oscar Wilde once suggested, "Be yourself. Everyone else is taken." Roth takes a Wilde a step further, suggesting, "Be your best self and then become a better you each day."

BY TREVOR SHAW December 28th, 2015 eschoolnews

8 things every teacher can do to create an innovative classroom

- 1. Give students a problem that is both interesting and authentic.** There is no such thing as a problem that is going to be interesting to every kid. This means that a project has to be flexible enough for students to tailor it to their own interests. It also means that teachers need to take the time to learn about their students' interests. Authenticity comes from using real tools to tackle problems that don't have their answers printed at the back of the book. Ideal projects dictate some general parameters and tools, but leave the specific problem definition up to the student. Some examples of interesting, authentic projects with built-in flexibility include:
 - Design a musical instrument that you can play without using your mouth or hands.
 - Choose a challenging terrain and design a vehicle that can conquer it.
 - Create a sculpture that incorporates both light and motion.
- 2. Give students the basics, but keep it short.** Students will always need some basic knowledge to get some traction on their projects, but the amount of information that the entire class will need is probably less than you would expect. Chunk this general information into organized blocks of 5-10 minutes tops, and deliver these in a mini-lesson at the start of class. If you find that you need more time, ask yourself if they really *need* the information you are delivering. If they do, ask yourself if the project they are working on is indeed an authentic problem and not your own learning objective disguised as a problem that the students really own.
- 3. Model great research skills.** **If I have done a good job with the project design,** students will get the vast majority of the information they need from their own independent research. For this to work, however, I need to coach them in good research skills, and I sometimes invite the librarians in to help. This research, which often draws from internet message boards, programming language documentation, sample code, and Wikipedia, is a slightly different skillset than the research that students might do for a history research paper.
- 4. Scaffold complex skills.** Tools like Makey Makey, Little Bits, Scratch, Tickle, and Tynker make it easier than ever for novice students to create authentic products that solve real problems. If you teach CompSci or electronics and you aren't familiar with any of these tools, stop reading right now and Google them. My personal favorite is an Arduino compatible board called the Light Blue Bean, which can be programmed from an iPad using the block-based language Tickle.
- 5. Check for understanding always.** In a classroom focused on highly individualized projects, it's critical that the teacher monitor what students are struggling with. Optimal learning occurs when students struggle with a problem that they believe they can find the solution to. If they crossover into frustration and confusion, they are at risk of giving up. Teachers should keep careful track of what students know and what they need to learn in order to successfully complete their projects. Using strategies such as "fisttofive" or "thumbsup" to check the understanding of the entire group after a mini-lesson is also helpful.
- 6. Favor found and recycled objects.** In [his TED talk](#), Daniel Pink talks about the connection between creativity and what is known as Functional Fixedness—or people's tendency to see only a single use for an object. Requiring students to fashion electric switches out of clothes pins, or building a robot torso out of a

soda bottle, will help students to flex their creative muscles and think beyond the standard uses for everyday objects.

7. **Model mental inventory taking.** Innovation and problem solving depends on having a great understanding of what you know and what you still need to learn. Build in components of your projects that require students to list the things they understand about their project and also to articulate as specifically as possible the things they still need to understand better.
8. **Whatever you do, don't try to grade creativity and innovation.** Grades work really well when there is a correct answer you want students to work toward. If you want them to own a problem and to produce a genuinely original solution to it, you cannot motivate that with a grade. In fact, when you assign a grade to something like creativity, students will often perform for the grade and not for the best possible solution. Thus, a grade for creativity, will often become an unintended disincentive.

Innovation isn't a standard that you can teach to directly and then test for. Innovation is more like a habit of mind that is fostered through consistent attention to classroom culture and expectations. With practice, the eight guidelines above can help teachers cultivate such a culture in any classroom.

11 of 12 people found the following review helpful
I Like Structured Approaches, and This Provides One!

By [Loyd Eskildson](#) HALL OF FAME on June 15, 2013

Format: Hardcover

The authors have found that CEOs rate the importance of innovation very high - usually a 9 or 10. Without fail, however, most give a low rating to their level of satisfaction with innovation in their firm. The traditional view of creativity is that it is unstructured and doesn't follow rules or patterns. Thus, you need to brainstorm, think outside the box, make wild analogies, and stray far afield to come up with a breakthrough idea. These authors take the opposite perspective, derived from studying hundreds of successful products.

The majority of new, inventive, and successful products result from following five templates - subtraction, division, multiplication, task unification, and attribute dependency. These templates comprise an innovative method called 'Systematic Inventive Thinking' (SIT) that makes creativity accessible to anyone. The bulk of the authors' book is devoted to explaining these methods, along with helpful examples.

The 'Subtraction' method usually have had something removed that was previously thought to be essential. Hence, discount airlines, 'ear buds' instead of traditional headphones, and Philips Electronics using the 'Subtraction' technique to simplify DVD controls and displays. Remove a bicycle's rear wheels and you get an exercise bike. The original Sony Walkman was a cassette recorder that had the recording function subtracted.

'Division' utilizes taking a component out of an earlier version and placing it somewhere else. Examples include remote controls, separating the ink cartridge from computer printers to allow easy replacement,

allowing travelers to print their boarding pass at home.

'Multiplication' involves copying a component, while changing it in some way. Examples include training wheels on children's bicycles, picture-in-picture TVs, Gillette's 'Twin Blade Shaving System,' and double-sided tape.

'Task Unification' brings certain tasks together. Samsonite used the 'Task Unification' technique to expand into the college backpack market, creating new strap shapes and location to provide a soothing massage sensation instead of back and neck strain. Odor-Eater socks keep one warm and also deodorize, and facial moisturizers now have the added task of providing sunscreen protection.

'Attribute Dependency' correlates two or more attributes, such as windshield wipers that change speed as the amount of rain changes, headlights that automatically dim for oncoming cars, eyewear with lenses that change from light to dark in sunlight, and smartphones provide information dependent on location (eg. restaurants, nearby friends).

Bottom-Line: 'Inside the Box' is an extraordinary and valuable offering.

The 5 Steps of Design Thinking

Design Thinking involves 5 steps that begin with learning from customers and ends through iterations of product design and prototyping, producing a product that solves the customers' problem in a valuable way – a solution they love.

1. **Empathy:** Start by learning about the audience you are designing for – interview, observe people, take pictures. Be curious instead of leading the conversation to a conclusion you already formed.
2. **Definition:** Construct a point of view organized by needs and insights, based on your results from step 1.
3. **Ideation:** Group brainstorming to generate ideas using the “yes and...” technique to build upon each others' ideas and create as many ideas as possible in short sprints. Another tool is to ask “how might we...” focused on specific constraints. A sprint is a few minutes of individual ideation followed by sharing of ideas, then using “yes and” to build on ideas. Additional sprints are conducted on other needs and insights and to further explore specific ideas.
4. **Prototype:** Build a representation of one of your ideas to show others. When you build something you discover more about the problem and potential solutions. Keep it simple – use common materials like playdough, clay, tape, etc.
5. **Testing:** Show the prototype to potential users and customers to get their feedback. The goal is to continue learning about the customers' core problem and solutions that provide them value.

- See more at: <http://www.innovationexcellence.com/blog/2015/05/21/apply-the-5-steps-of-design-thinking-to-solve-customer-problems/#sthash.TLNfAVyx.dpuf>