



Showing the wonders of learning

Project Academy



'To be a teacher you must be a prophet –

because you are trying to prepare people for a world thirty to fifty years into the future.'

Gordon Brown MIT

The core idea of the approach is that learning life skills will provide you with the tools to survive in today's and the future economy .



AI

Robots

Why are *we* doing this?

- We need to move from a culture of memorization to a culture of thinking, creating and understanding.
- Our students will change careers many times and need to learn how to be life-long learners and questioners.
- The students should see the fun/excitement of learning which includes engineering design, mathematics and science.
- Life skills provides a connector for interdisciplinary learning to support your engagement of the students.

What are some of the road block to you in the future ?

- Need to be a lifelong learner
- AI will be everywhere
- Learning to deal with customers
- Working in a team environment

Discuss an approach that creates an interdisciplinary learning environment that adds life skills to innovation and fun.

How can we do this? *Class Discussion*



Our Objectives

- Get young adults excited about learning
- Get our students excited about Customer, Engineering Mindsets
- Show how a thinking mindset can provide value to an organization
- Explain how you can use AI to add value
- Show why you are creative

**Tell me and I'll forget.
Show me and I'll remember.
Involve me and I'll understand**

- Confucius

Inquire-based learning using Design Challenges




Begin with a positive attitude

An open mind is playful and willing to be silly because the best ideas are often hidden within our minds away from our watchful judgmental selves.


The free flow of conflicting ideas is essential for creative thinking.



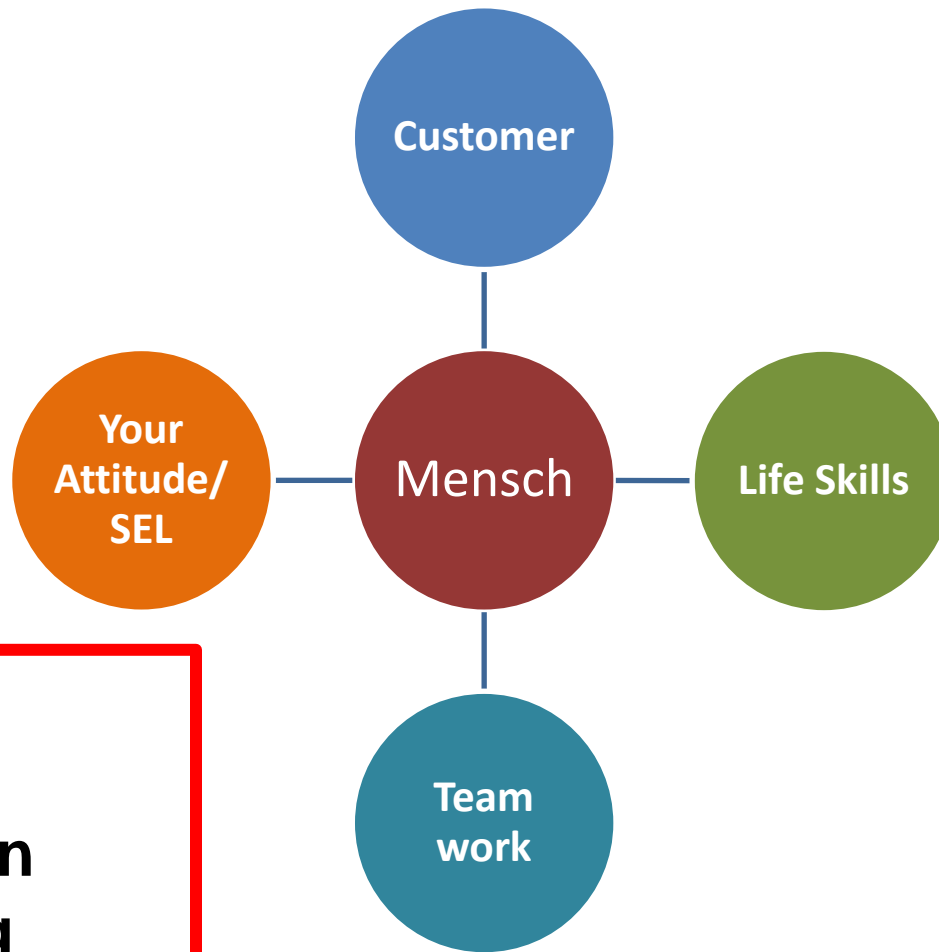
Learning to Question, to wonder, to learn ... Jamie McKenzie,
Ed.D

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Who are
you?

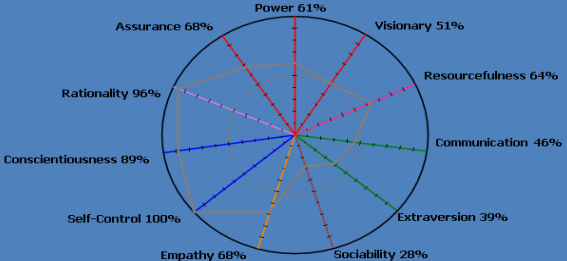
- About You, Goals in life, Your strengths
 - Building your Brand Statement
 - Time management
 - Inter-personal Skills
- 
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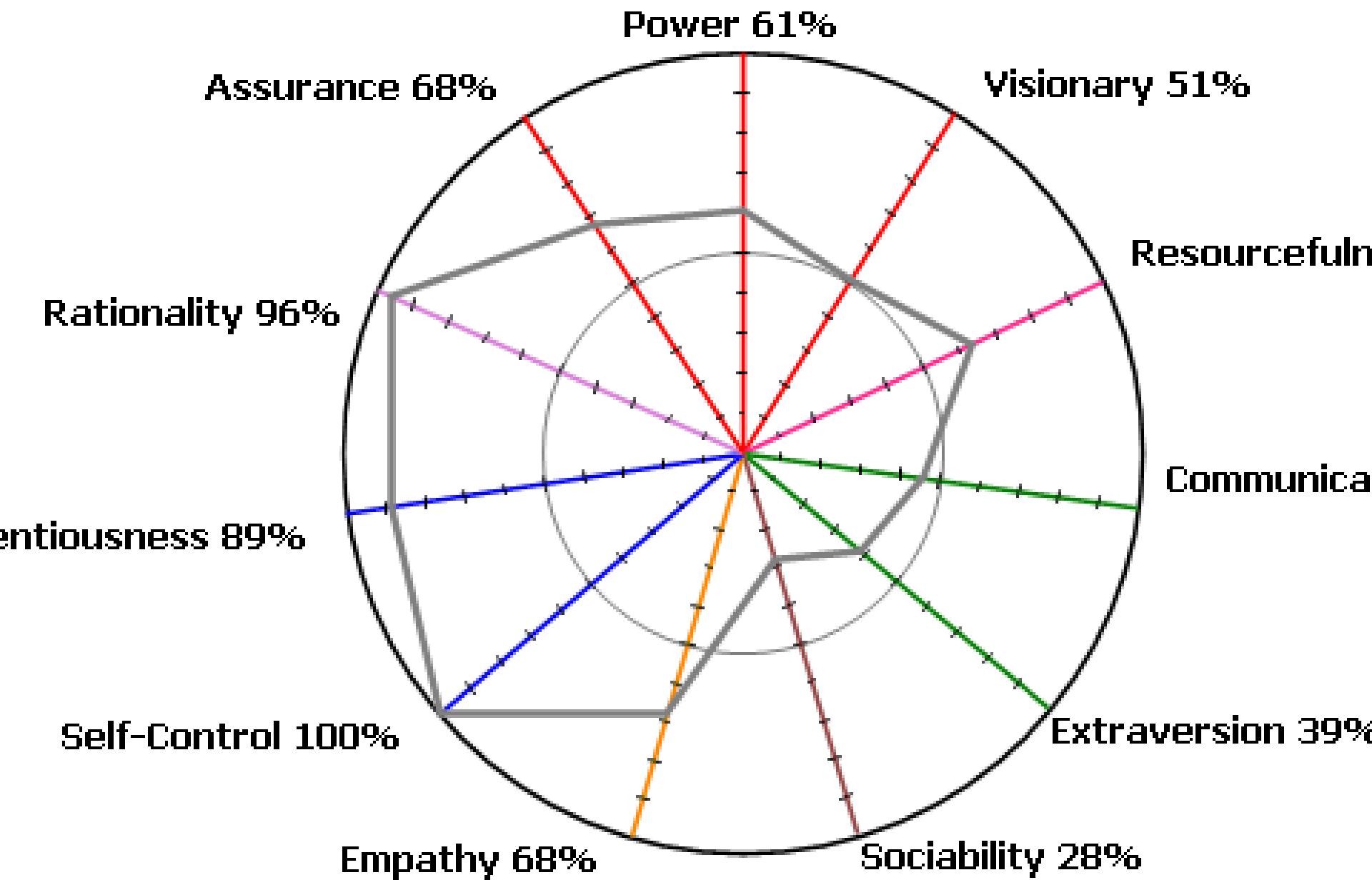
Learning areas/ Being a Good Person



- **Problem-Solving**
- **Evaluation**
- **Reporting**

Example Course Details:

Session	Major area	Theme
1	Introduction / Creating a learning collaborative in the classroom / pre-Assessment of their knowledge and thinking skill awareness	Attributes, Values, Teacher Skills and the relation to excellence in academics and the larger world of work. Developing the outcome goals for the class.
2	Self-Assessment Quality focus Understand why you did certain things, What can you learn from your actions to improve How can you use data to improve?	
2	Work in teams	Part of Team Project ...Collaboration, decision making, brain writing (brainstorming)
3	Problem framing and solving Empathy	Part of Hands on Learning ... understanding what is the true problem and tinkering with ways to solve the problem
4	Creative and critical thinking skills around the design process	Learn the tools of brainstorming, brain-writing, and decision making for divergent and convergent processing skills
	Project Planning, Execution and Measurement	



<p>Brain Plasticity</p> <ul style="list-style-type: none"> • Carol Dweck, Ph.D • Claude M. Steele Ph.D <p>Mindfulness</p>	<p>... we continuously are able to learn new things</p> <p>Two 30 minutes discussions spent on a single idea: that the brain is a muscle. Giving it a harder workout makes you smarter.</p>
<p>Habits of Mind</p>	<p>Built into projects and continuous discussion</p>
<p>Infusion of thinking skills</p>	<p>Create an appreciation for life-long learning by providing opportunities to develop creative and critical thinking skills</p>
<p>Dialogue</p>	<p>... 6 Hats How to create dialogue and not shouting matches.</p> <p>Using dialogue question</p>
<p>Professionalism</p>	<p>Respectful dealing with others</p>
<p>Entrepreneurships / Innovation</p>	<p>Business processes... Persistence, problems as opportunities, finding humor, accuracy in your work, remain open to continuous learning</p>
<p>Community support Job training</p> <ul style="list-style-type: none"> • Internships • Technicians • Apprenticeship 	<ul style="list-style-type: none"> • Get a partnership with industry that provides career opportunity if we provide a person with good soft-skills. Retail stores, Warehouses, etc. • Relationship with non-profits that focus on this area.
<p>On-Going Follow up</p> <p>Provide the student Scaffolding tools to continuously improve and collaborate with others</p>	<ul style="list-style-type: none"> • Scaffolding tools • On-line Collaboration <p>Engineering Lens</p>



A team is a group of people with a commitment to one another, to the team, to a high level of achievement, to a common goal, and to a common vision. They understand that team success depends on the work of every member. A good team functions as a single organism.

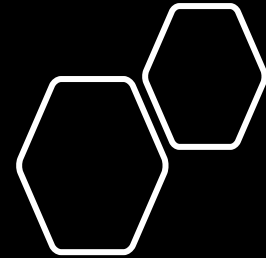
Not only do members work together toward a common goal, but they complement and support one another so that their work seems effortless. Compare that soccer team of six-year-olds and their individual agendas with the Brazilian national team in its heyday. Everyone seemed to know not only what all his teammates were doing, but what they were going to do.

Team Work

The ability to work as part of a team **is one of the most important skills in today's job market.**

Employers are

- looking for workers who can contribute their own ideas,
- but also want people who can work with others to create and develop projects and plans.
- Who understand a customer mindset



11 Commandments for Teamwork

1. Work to build trust.
2. Help everyone win!
3. Show everyone respect.
4. Make decisions based on consensus.
5. Be engaged.
6. Confront issues right away.
7. Get to know each other.
8. Keep expectations visible and clear.
9. Eliminate Toxic Teammates
10. Work hard and have fun
11. Believe in yourself

Community Attributes:

Thoughts	Life-Skills / Actions
Wisdom: good decisions and taking the path that provides value to all (society)	Thinking skills (creative, critical, system), SEL learning, Decision making, Reflection, Innovation
Community: People and relationships count	Listening skills, communication skills, teamwork, Interpersonal skills, Relationship, Measurements, Trust, Honesty, Empathy
Social justice: leaving the world a better place than you found it	Problem solving skills, positive outlook, Curiosity, Process skills, Executive functions
Purpose: Sense of direction that you achieve, the goals you set	Put first things first, Pro-active outlook, Begin with the ends in mind, and Win-Win for all, Time-management, Project planning,

Engineering ...

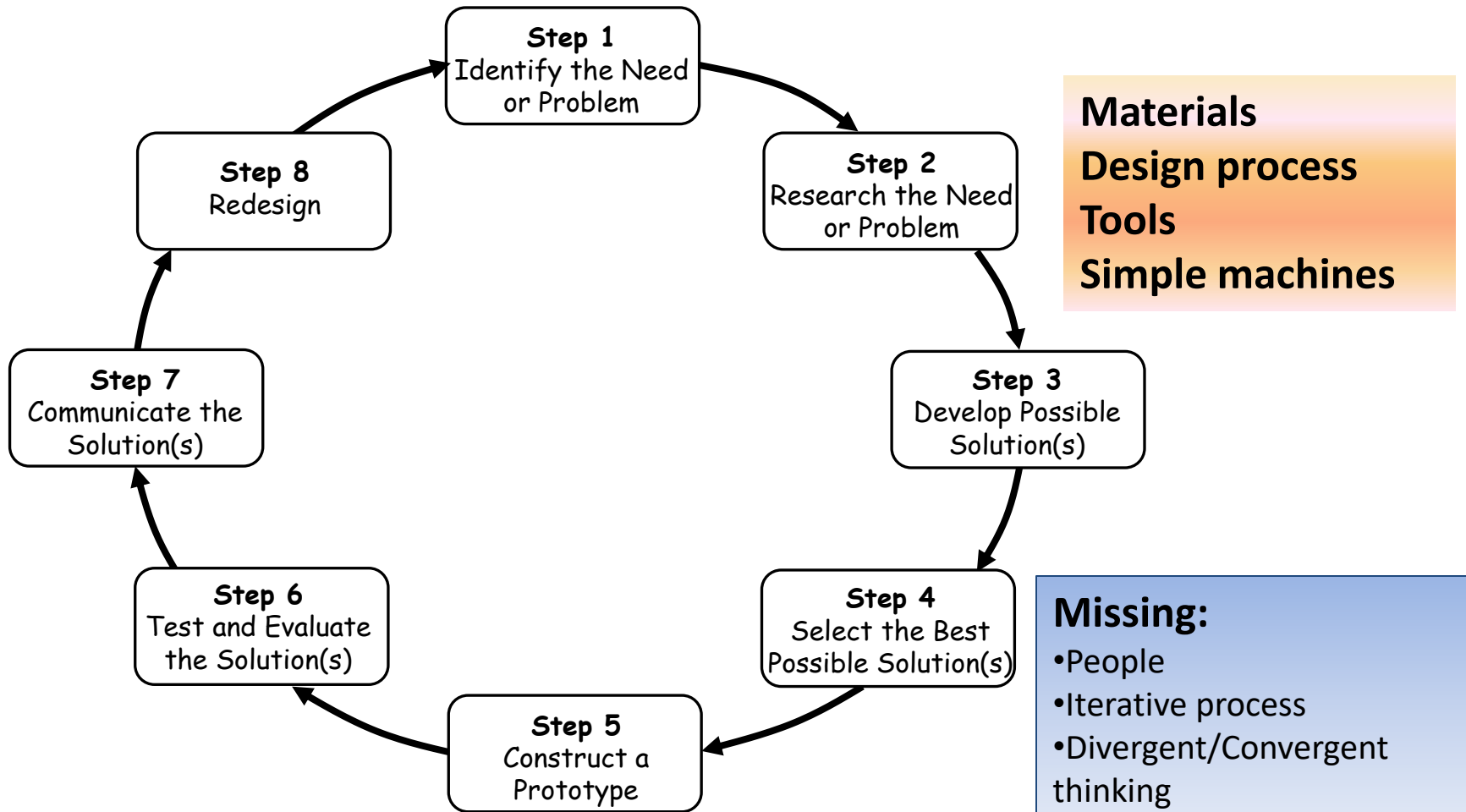
- Why do I need to know about engineering as an educator?
- Draw a [picture](#) of an engineer and describe what the engineer is doing in the picture.
- **Classroom discussion:** What are some stereotypes around engineers? What causes society to have stereotypes?
- Working as teams, generate [definitions](#) of what Engineers, Scientists, Entrepreneurs, Artists and Mathematicians do.

Draw a picture of an engineer

What are the stereotypes about engineers?



MA Framework: Strand 4 Engineering & Technology



What do engineers do?

- Work around the design process of creating, maintaining products (& systems) and process development.
- They specialize in various science disciplines like civil, electrical, mechanical, aerospace, bio, material.
- They specialize in purchasing, project materials, process, quality, production.



STANFORD
TECHNOLOGY
VENTURES PROGRAM

Tina Seelig

Executive Director,
Stanford Technology Ventures Program

May 27, 2009

Why did I show you this video?

Design a classroom

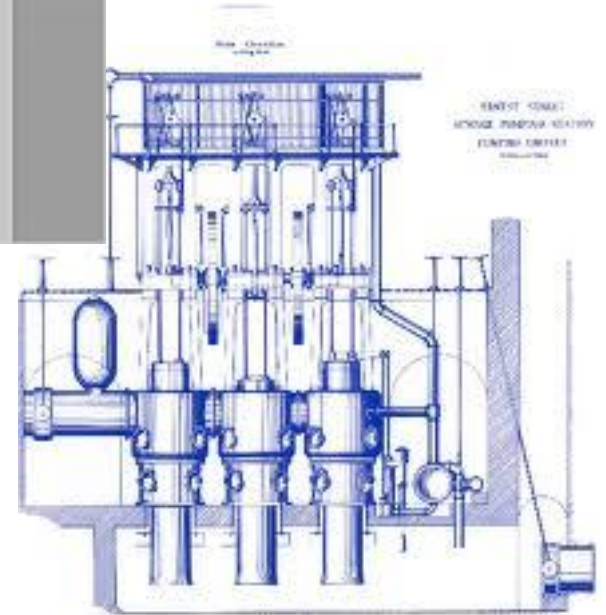
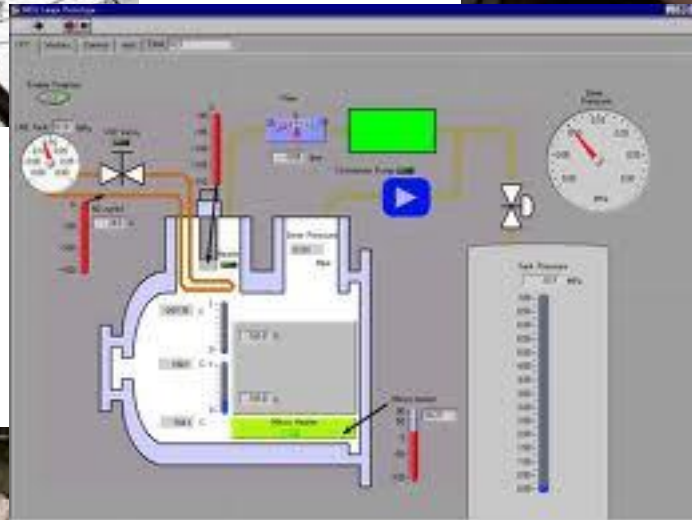
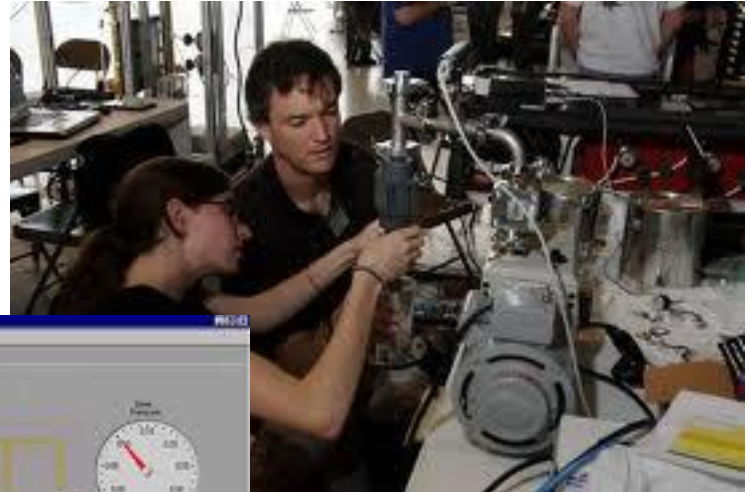
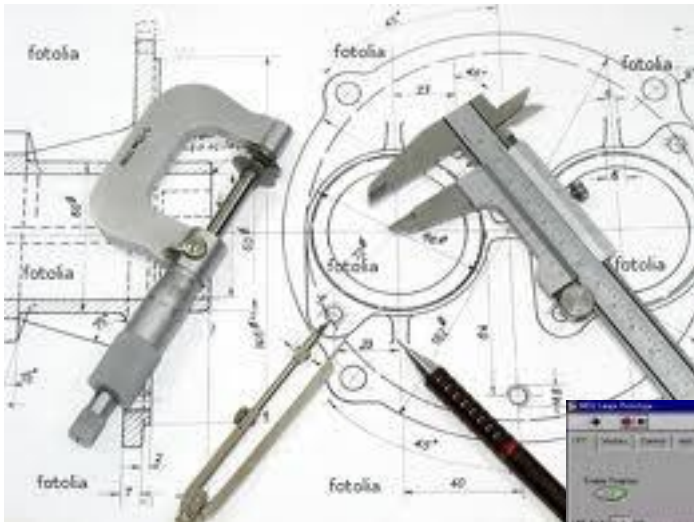


what tasks (process steps) would you need to design and build it?

Take 10 minutes at your table and discuss and create the tasks.

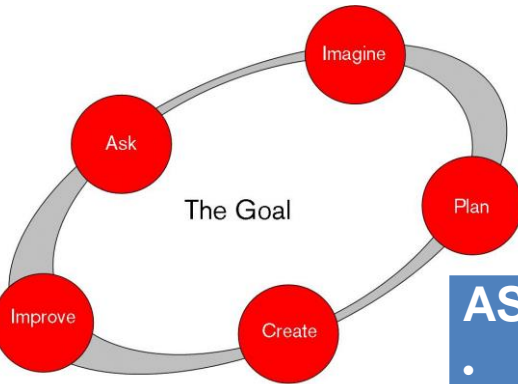
Lets keep it simple
No more than 8 tasks







The Museum of Science



ASK

- What is the problem?
- What have others done?
- What are the constraints?

IMAGINE

- What are some solutions?
- Brainstorm ideas.
- Choose the best one.

PLAN

- Draw a diagram.
- Make lists of materials you will need.

CREATE

- Follow your plan and create it.
- Test it out!

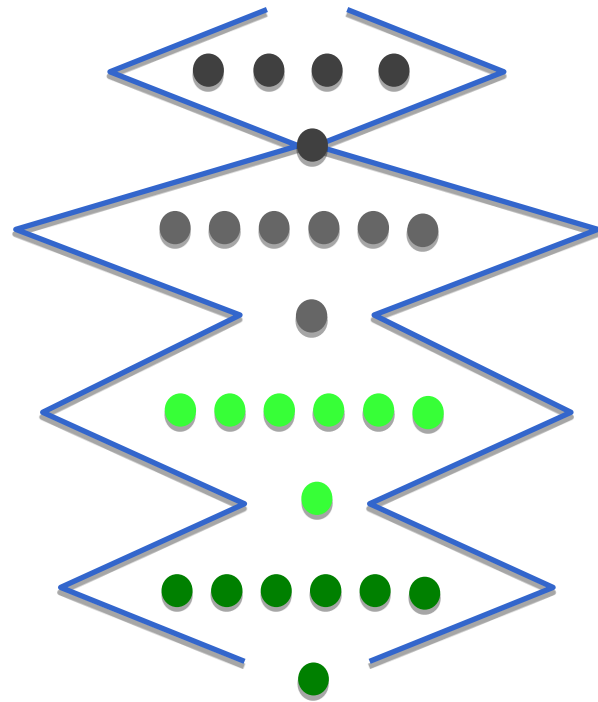
IMPROVE

- Talk about what works, what doesn't, and what could work better.
- Modify your design to make it better.
- Test it out!

Design Squad



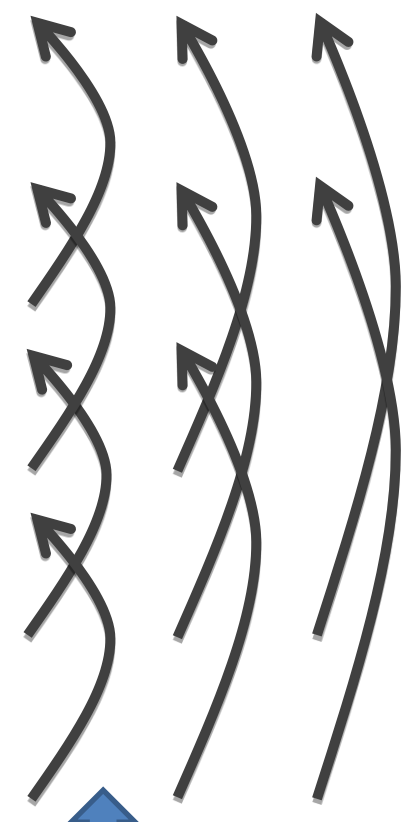
Connecting literature or Social Studies/History



- Story/Characters
- Design Challenge
- Specification
- Designs
- Product
- Testing/ Feedback

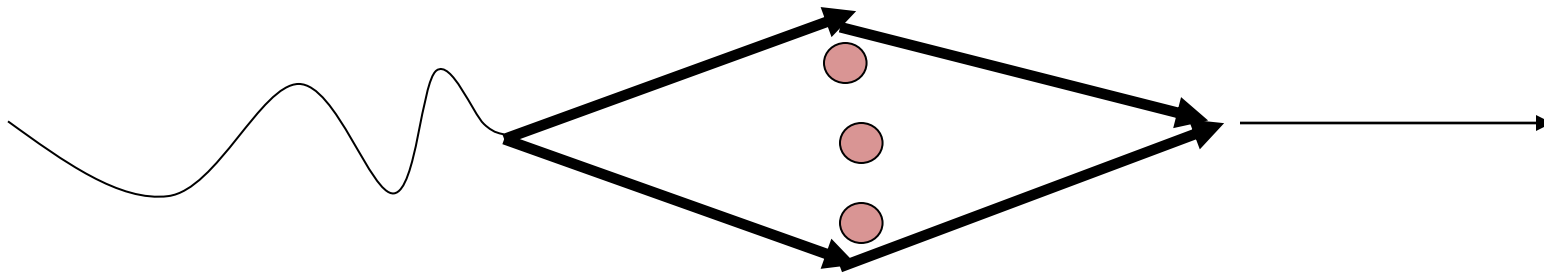
Reporting

Iterative process



Divergent/Convergent thinking

Summary Process



Priming	Generative	Convergent	Defining
Story Mapping	Brain Writing	Discussion of Pro/Con	Gallery Sketches
Needs	Morphological Analysis	Shaping	Modeling/Building
Problem Framing	Shaping	Requirements	Posters
Values	Brain Storming	Decision Matrix	Presentation
OTHERS (science constraint)			



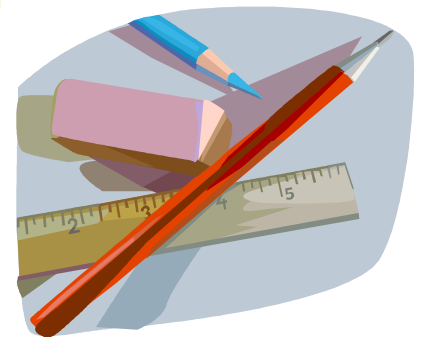
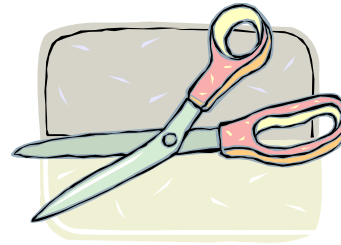
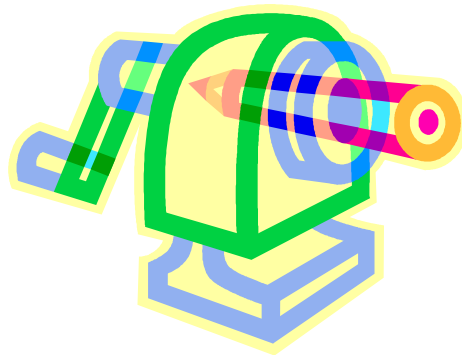
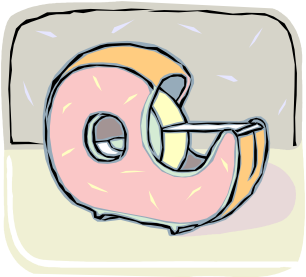
Listen to the needs and values of the customers



- **Generate raw ideas for a given challenge**
- **Select an idea that is particularly interesting**
- **Identify the requirements for that concept**
- **Come up with multiple solutions that meet the requirements**
- **Select a solution, based on the requirements**

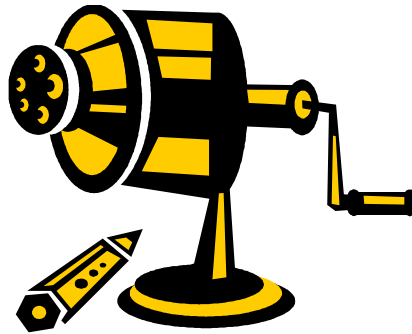
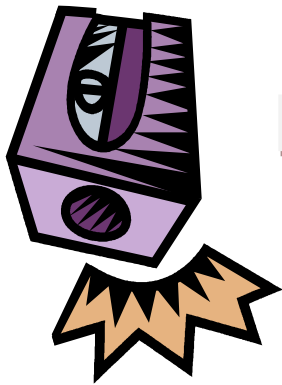
Engineering Analysis of Products

- Engineering is all around us.
- Let's look at some products to see some examples



Innovation

Taking a product and making it better or different to satisfy a need.



Goal: *Have students understand about innovation in products*

Going from turning one pencil around a fixed blade to having a set of blades turning around a fixed pencil.
Get better point and less breakage.

Engineering Artifacts

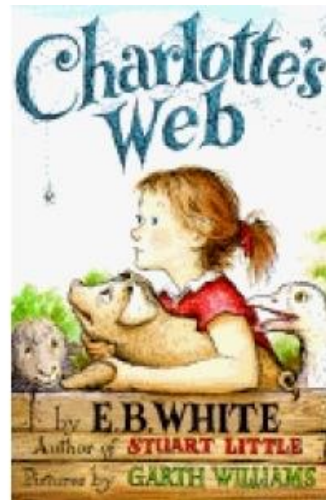
... Engineering is all around us.



What science & math is used?
What function do they perform?
How would you rate their value?
How would you pick the best one?

Goldilocks

3- Pigs



Esperanza Rising by Pam Muñoz Ryan

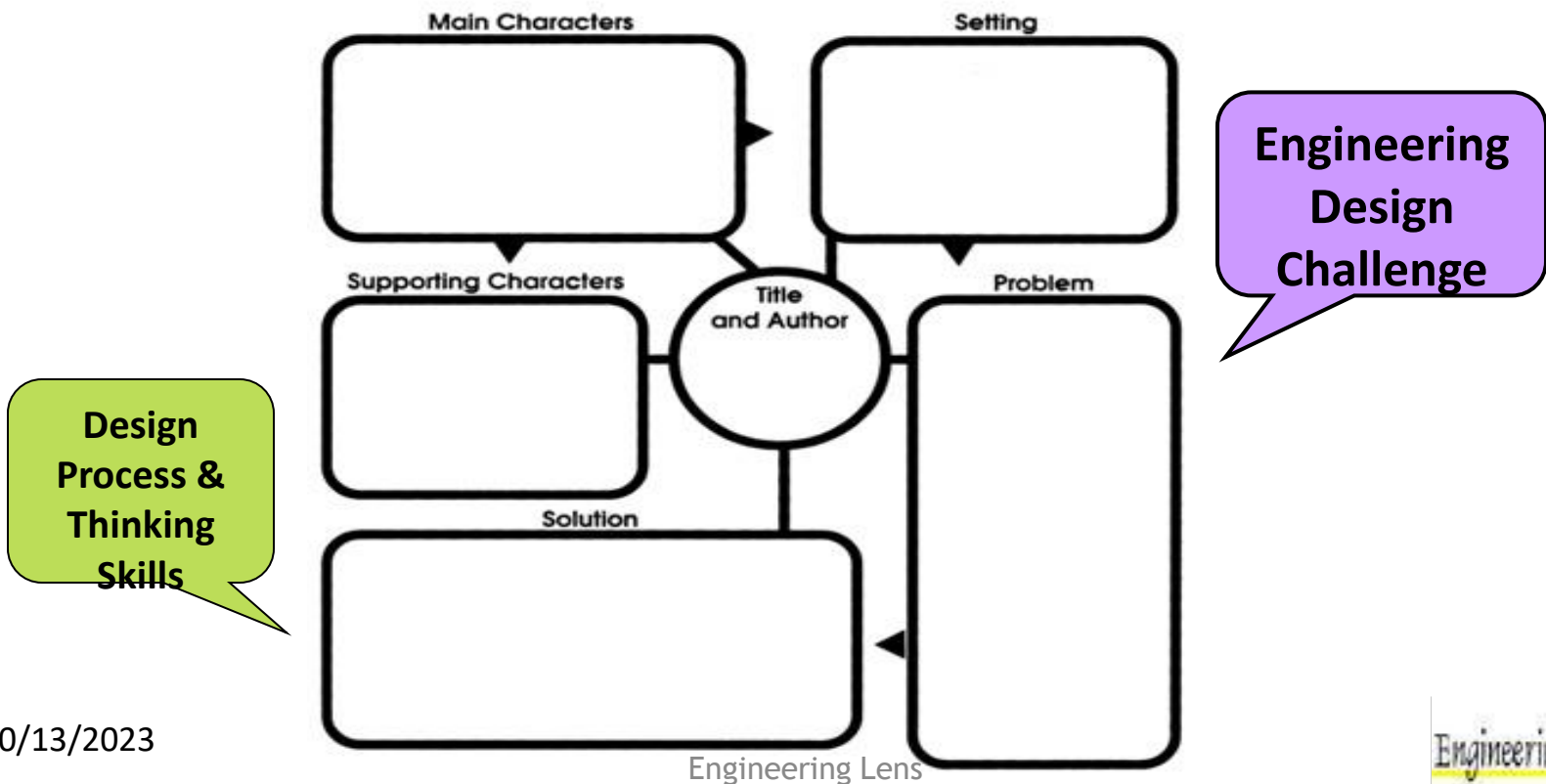


Owl Moon by Jane Yolen

Find design challenges in Stories

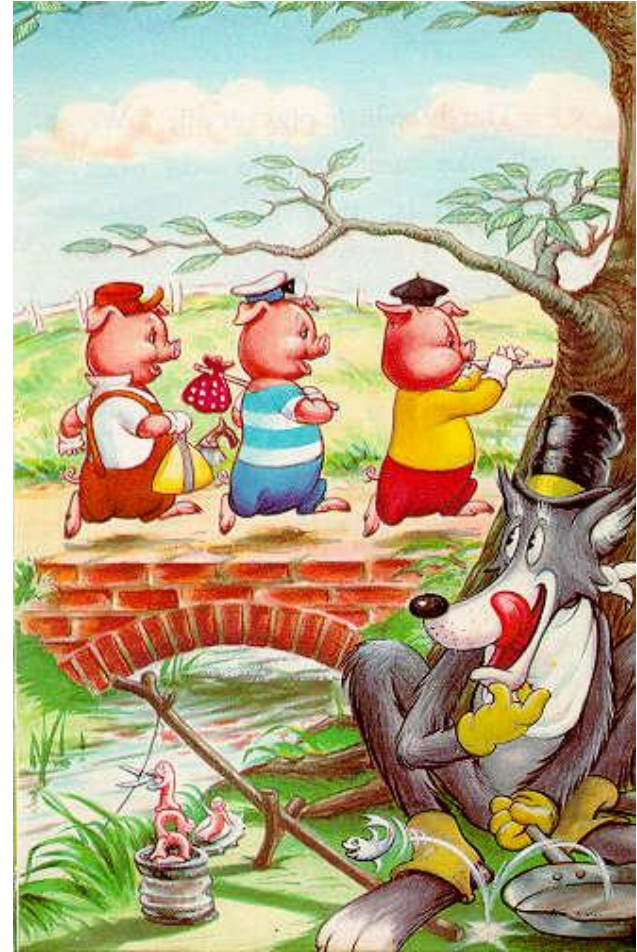
'We are continually faced with a series of great opportunities brilliantly disguised as insoluble problems". John W Gardner

Story Map



3 pigs

- Discuss the story and the characters.
- What are some of the problems/ design challenges?
- Who do you want to work for?
- What science are you going to use to solve the design challenge?
- How is the team going to approach this design?



3-Pigs Variation

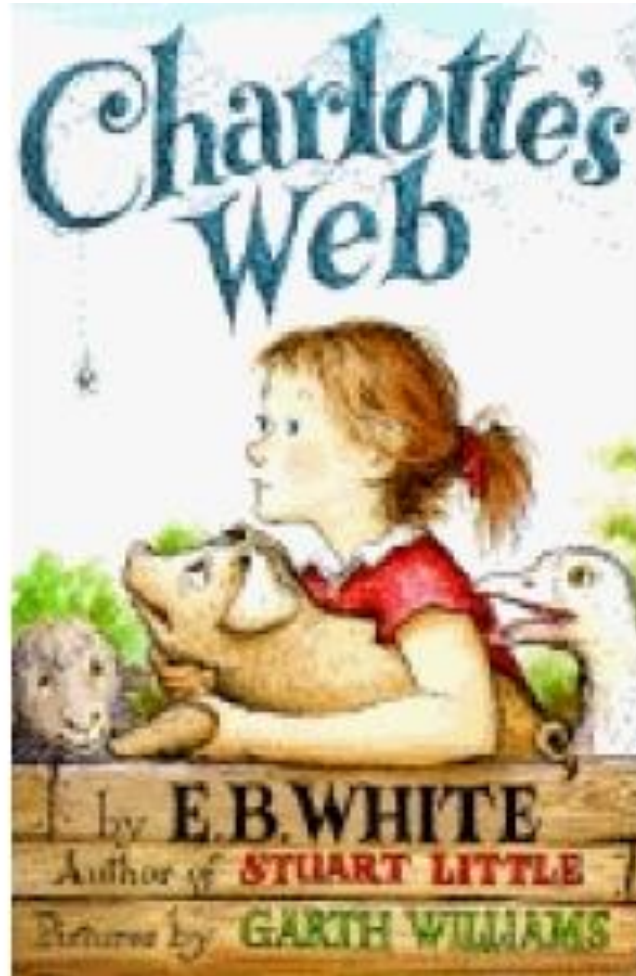
- How do we design a house to also protect against the weather?
- The pigs move to an earthquake zone, build a house to protect them from earthquakes as well
- The pigs live in Outer Mongolia , What type of house would they build?
- You work for the wolf, design a suite that can protect the wolf when it goes down the chimney ; design a machine that can be used to create air pressure to blow the houses down.
- You live in a community that wants to provide a nice living space for its Pig population, what would you design and why? What would you do with the wolf population? Can you apply this to humans?
- Build house on hill and use rollers to knot down the wolf

Extra activities:

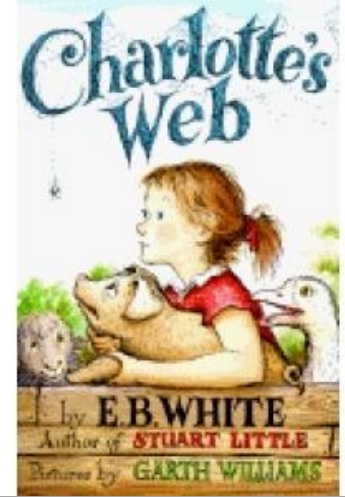
- Invite a parent who works in the construction industry to talk about materials and building a structure
- Draw pictures of the scenes and do role plays around the story with the engineering.
- Create a game around the story.

Charlotte's Web by E.B. White

Fern
Wilbur
Charlotte
Templeton
Mr. Zuckerman



Charlotte's Web by E.B. White




Design Challenges:

- Killing of the runt P1
- Keeping warm at night in the yard. P9
- Mr. Zuckerman knew that a manure pile is a good place to keep a young pig P14
- Wilber was lonely, he wanted love P27
- Have you ever tried to sleep while sitting on eight eggs asked the goose. P33
- “I happen to be a trapper”, says Charlotte P39

Note: just thru pg 39 out of 184

Charlottes Web

	Math	Life	Earth & Space	Physics & Chemistry	Simple Machines	????
 Challenge						
Keeping warm at night		Use manure	Build a house	Use a fire	Use a ramp to lift him off the ground	
		Give him more food to eat		Use temp. probe		

Skills

Trust, Respect, Empathy, Listening,
Independence, Collaboration,
Planning Kindness, Taking Risks,
Boldness, Creativity, Learning
attitude, Work ethics,
Communications skills, Decision
making, Time management

Connection between Literature and Engineering

Engineering	Writing	Reading
ID problem	Genre of writing topic	Protagonist's problem
Research	Personal com. Research	Evidence
Generate ideas	Story mapping, pic- writing	Make pre-dictions
Converge/ plan	Outline	Inferences & connections
Create	Rough draft	Disc (plan for) questions
Test	Per conf. – read aloud to self	Respond, challenge
Redesign	Revise	
Share	Publish- Author's chair	Character's changes

Adding the Right Brain

LEFT BRAIN

- Rational, logical, linear
- Sequential analytic processing
- Language, grammar, verbal
- Literal
- Objective
- Time-sensitive
- Accuracy

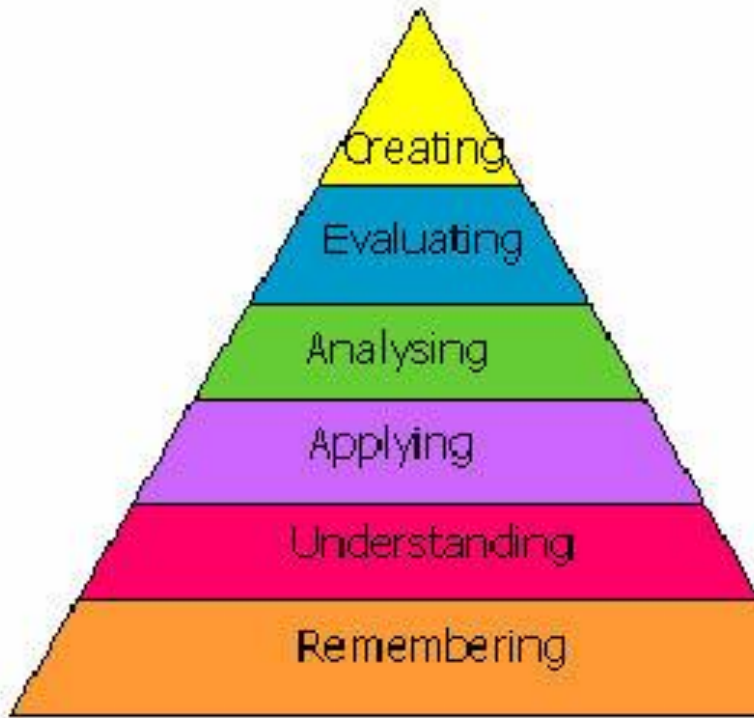
RIGHT BRAIN

- Imaginative, intuitive, whimsical
- Holistic framing, pattern synthesis
- Visualization, pictures, gestures
- Perceptual, metaphorical
- Subjective
- Time-free
- Ambiguity, paradox

How to support different age groups

Year	Tasks
K-1grade Modeling	Vocabulary; Design, Engineer, teacher walks thru the process, do some decisions. Talk about what engineers do. Brainstorm Dramatic Play areas with engr., science, math themes. practice Observation & Classification skills
2-3 Modeling	Teacher and students do the process Do simple brainstorming, decision analysis. Write to engineers, scientists, mathematicians
4 Scaffolding	Working with the teacher to do full process, Split process, part class part teams. Interview engineers
5 Transfer	Take more ownership

Revised Bloom Taxonomy



How can we design a product or process that creates value for society or the character?
What elements are important to solving the problem?
Which design challenge best fits our needs?
How can we connect these design challenges (problems) to science and math
Can you find any problems or issues that some of the characters are having?
What happens in the story?

Let's Generate some ideas for Design Solutions!

Design challenges	Sciences	Filters	Results						
	Earth & Space	<table border="1"> <tr><td>Energy in the Earth System</td></tr> <tr><td>Materials and Energy Resources</td></tr> <tr><td>Earth process and Cycles</td></tr> <tr><td>Structure of the Earth</td></tr> <tr><td>Earth in the Solar System</td></tr> <tr><td> </td></tr> </table>	Energy in the Earth System	Materials and Energy Resources	Earth process and Cycles	Structure of the Earth	Earth in the Solar System		→
Energy in the Earth System									
Materials and Energy Resources									
Earth process and Cycles									
Structure of the Earth									
Earth in the Solar System									
	Life science	<table border="1"> <tr><td>Characteristics of Living Things</td></tr> <tr><td>Systems in living Things</td></tr> <tr><td>Heredity</td></tr> <tr><td>Evolution and Biodiversity</td></tr> <tr><td>Living things and their environment</td></tr> <tr><td> </td></tr> </table>	Characteristics of Living Things	Systems in living Things	Heredity	Evolution and Biodiversity	Living things and their environment		→
Characteristics of Living Things									
Systems in living Things									
Heredity									
Evolution and Biodiversity									
Living things and their environment									
	Physic & Chemistry	<table border="1"> <tr><td>State of Matter</td></tr> <tr><td>Position and motion of objects</td></tr> <tr><td> </td></tr> </table>	State of Matter	Position and motion of objects		→			
State of Matter									
Position and motion of objects									
	Engineering	<table border="1"> <tr><td>Tools</td></tr> <tr><td>Materials</td></tr> <tr><td>Engineering Design</td></tr> </table>	Tools	Materials	Engineering Design	→			
Tools									
Materials									
Engineering Design									

Our method; Uniqueness

- Not another Silo.; Interdisciplinary
- Uses design to support learning.
- Students make decisions versus learning through highly scripted program.
- Integrates the learning of thinking skills, system thinking and self assessment.
- Open source for educators.

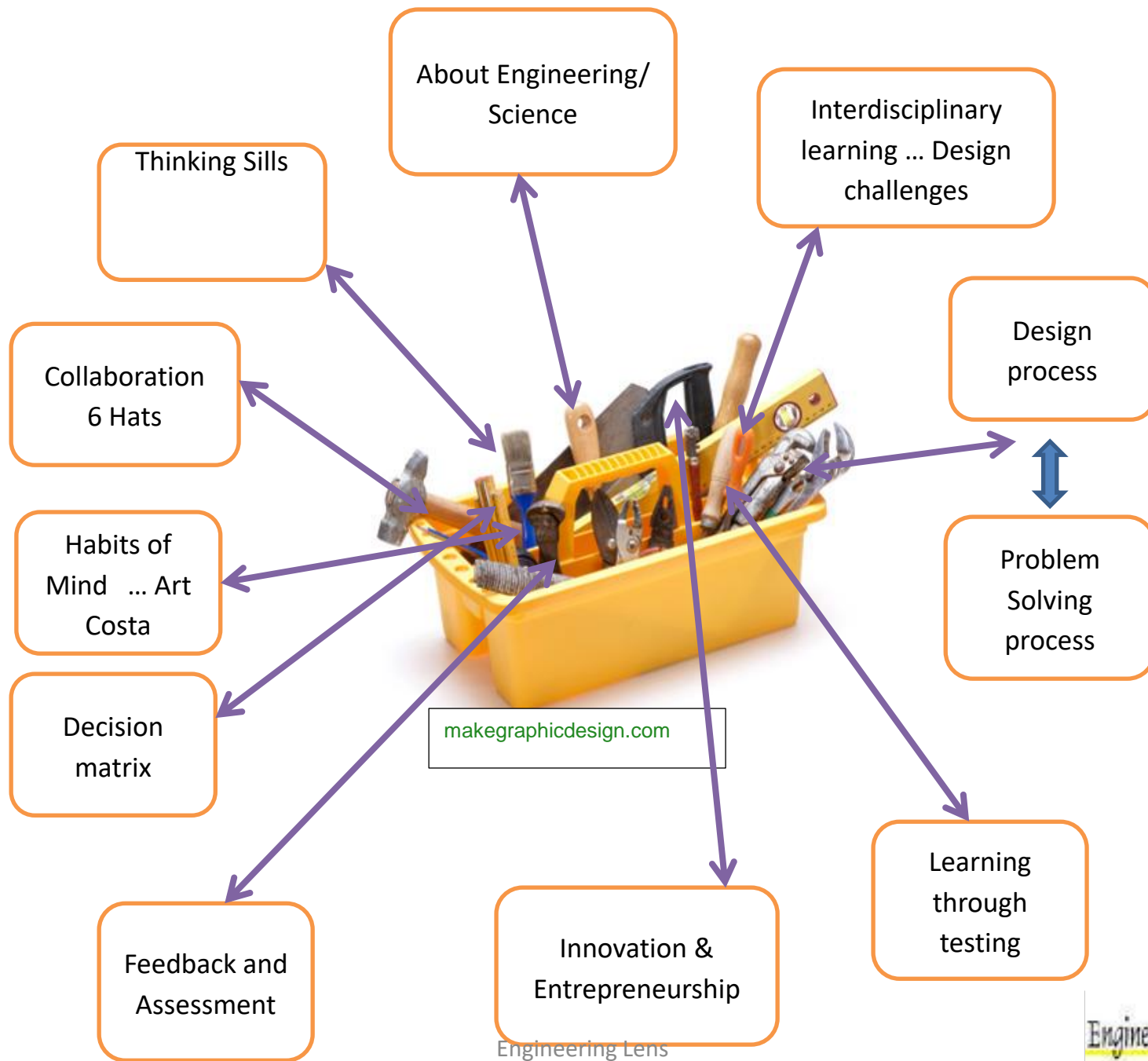
Benefits

- Meets all the learning principles of the Massachusetts Science Framework
- Promotes higher-order thinking skills using design learning.
- Invites the incorporation of instructional technology into the curriculum.
- Engineering is **differentiated**: offers an "in" for learners of all types.
- Rich cross-curricular possibilities.
- Integration with math is an important way to show students how and why math is relevant and useful in the world.
- Directly connected with improvement of living conditions/safety/health and welfare of people.
- Engages both students and teachers in an exciting learning process.

Diana Mason, Missy Taft,

Reflection:

- Questions about what was said?
- What's missing?
- How would you get this into the school system?
- What are your thoughts?



- Addition Information Slides:

<http://www.projectacademy.org/>

Thanks

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