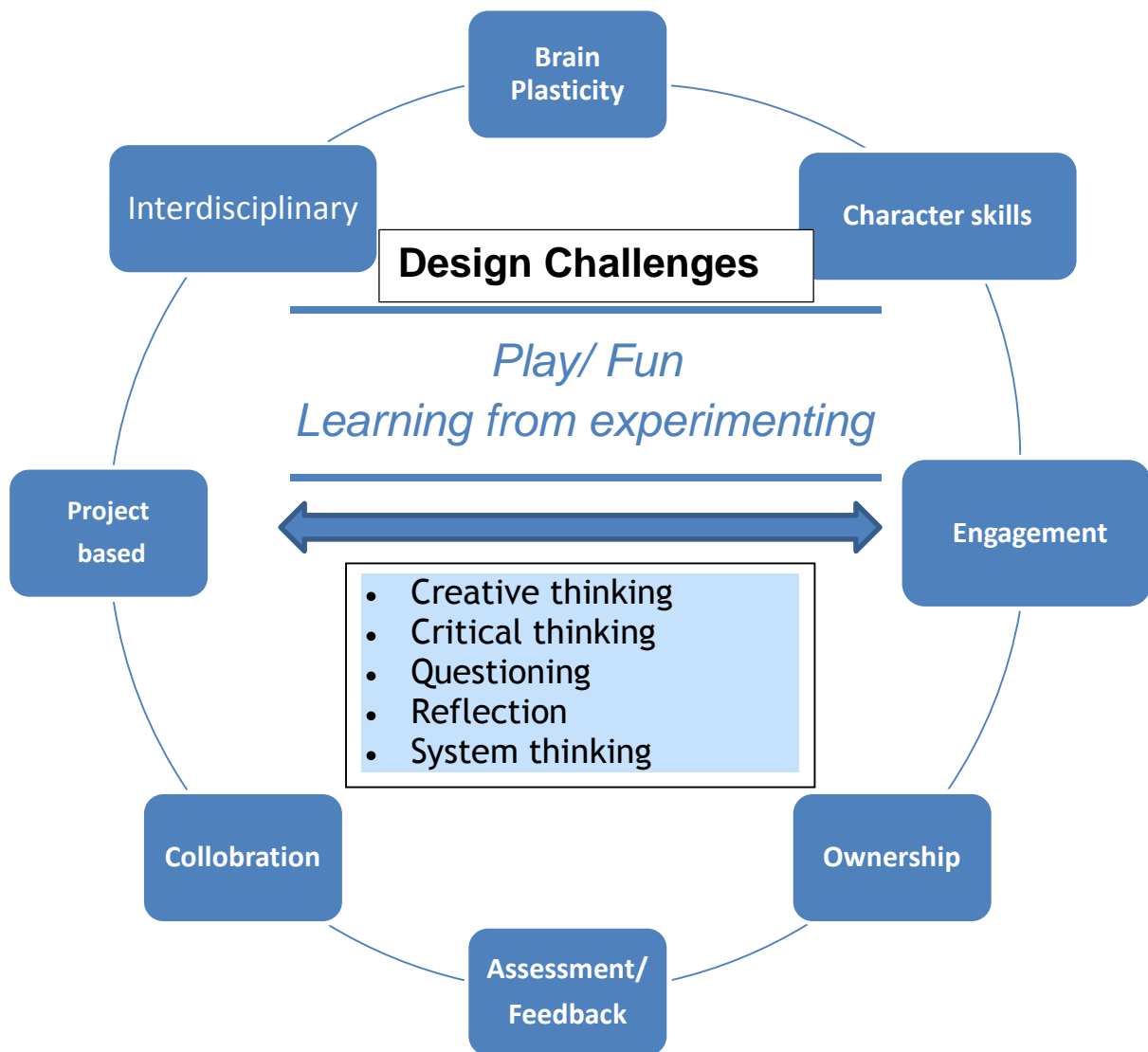


Pre-K Glue for learning:

“Seeds of STEM” (Design Engineering) provides the glue (engagement, ownership, fun, innovation & collaboration) that connects all learning that enhances the school year.



Let children be active authors of their own development, strongly influenced by natural, dynamic, self-righting forces within themselves, opening the way toward growth and learning.

On a given morning, children doing a design challenge might do such things as sing songs, paint with watercolors, hear a story told with puppets, go on a nature walk, work in the garden, build with wooden blocks, or make a dramatic play area using play stands and cloth.

Through these activities, they become deeply engaged and develop powers of concentration and motivation. A significant portion of the school morning is devoted to uninterrupted imaginary play.

Using the concept of “designing a solution” for a problem (Constructivist), the child using their soft-skills like curiosity and questioning to work collaboratively with others to find a solution.

Brain Plastics

Scientists have historically believed that once a person reaches adulthood, their cognitive abilities are immutable. But beginning in the early twentieth century, that theory has been contested by evidence suggesting that the brain’s abilities are in fact malleable and plastic. According to this principle of neuroplasticity, the brain is constantly changing in response to various experiences. New behaviors, new learnings, and even environmental changes or physical injuries may all stimulate the brain to create new neural pathways or reorganize existing ones, fundamentally altering how information is processed

Blackwell split her kids into two groups for an eight-session workshop. The control group was taught study skills, and the others got study skills and a special module on how intelligence is not innate. These students took turns reading aloud an essay on how the brain grows new neurons when challenged.

Effort: The only difference between the control group and the test group were two lessons, a total of 50 minutes spent teaching not math but a single idea: that the brain is a muscle. Giving it a harder workout makes you smarter. That alone improved their math scores.

Design and Tinkering:

Tinkering is a playful style of design by making constant experiments and exploring new ideas in the design process.

It is celebrating the iterative and divergent/ convergent process that is part of the design process.

Projects used as vehicles for learning: "World Issues"

Note: Rather than "the World", you can substitute "Home", "Classroom", "Village", ETC.

- 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
- Educate the World

from WPI/Nobel Skills

Possible tools: Elements used in the projects can vary:



- People
- Places
- Engineering
- Art / History
- Consumers
- Math. / Science
- Language Arts
- Suppliers
- Design
- Technology
- Business Processes

[Example of this process\(PDF\)](#)

How are we going to organize ourselves?

Setting the environment for the students:

- Children are viewed as **active authors** of their own development
- 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

Which problem will we work on?

What is the problem we are going to solve?

Frame the problem and write it down	Your frame is how you narrow and pinpoint what you choose to solve. Better framing leads to better solutions.
What facts do we know?	<ul style="list-style-type: none">● What are the constraints / requirements?● Areas of discussion and inclusion● How do we integrate social skills, emotional skills and thinking skills into this project?
What do we need to know more of?	
Finding lots of options	Reflection. Creative thinking
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?

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

Guidelines for working together:

Truces exist between different groups in organizations. Truces are only durable when they create real justice. Each side must give up an equal part for the truce not to be unbalanced. There is one leader for decision making. The organization must feel empowered to make changes and risk taking.

“The power of habits; pg 165

A *constructivist*, is eager for knowledge and prepared to learn, seeking perfection through reality, play, and work. Where age 3 to 6 is the time of the "conscious absorbent mind" (Montessori & Chattin-McNichols, 1995).

Learning

- Fairy tales
- Picture books
- Historical fiction/NF
- Science fiction/NF
- Survival books
- Fiction, Non-Fiction
- Informational text

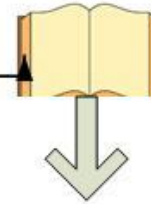
What are the learning outcomes desired?

Literature/Social Studies Story Maps ... problems

Rev	Description	Approval	Date
05			06/17/2013

Find a Design Challenge in the story that the team can use the engineering design process

Teams select design project based on brain-storming, & decision process.



- Thinking Skills:**
- Creative Thinking
 - Critical Thinking
 - Questioning
 - Reflection



- Guidelines for Teams**
- Decide on role for team members
 - Develop program plan
 - Questioning process
 - Engineering journal
 - Decide on team culture & operating guidelines
 - Learn to listen

Team



Supports ...Habits of Mind

Inquiry-based learning

- Presentation Outline:**
- What did we know?
 - How did we approach this design challenge?
 - What did we learn?
 - What would we do differently the next time and why?

Presentation to Class/Teacher/Community



- Establish Need
- Research
- Development
- Select solution
- Construct Prototype
- Test & Evaluate
- Communicate
- Redesign

Feedback

Design Process

Create Extensions:

Title:	Design process Flow	
Doc. #		Rev.
Author	Bill Wolfson	

Formative assessment ... How do we have students involved and why.

Assessment is learning:

When students know about the goals of instruction, they can give the teacher evidence about their own understanding in relation to those goals. The more students can take on the role of self-assessment, the more they can move toward being able to decide their own next steps.

Path to Self-assessment

Year	Tasks
K-2 grade	Understanding vocabulary; tasks, goals, reviews, test, evidence
3	Role play using the words; feedback, gathering, observing. Ask them “What you learned from your mistakes”.
4	Teacher build simple Assessments and rubrics with the students
5	Student is setting simple goals and self-assessments.

Student Self-Assessment

“Student participation is a key component of successful assessment strategies at every step.

If students are to participate effectively in the process, they need to be clear about the target and the criteria for good work, to assess their own efforts in light of the criteria, and to share responsibility in taking action in light of the feedback.”

National Research Council. *Classroom Assessment and the National Science Education Standards*. (Washington, DC.: National Academy Press, 2000) p. 1