

TEACHING ENGINEERING WITH BEEBOTS AND DUPLOS

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CHECK IN

- Where are we at?
- What questions and concerns do you have?

TAP CREATIVE PLAY

- Are we tapping into the so important creative play of children in school, especially the kind associated with building?

TAP CREATIVE PLAY

It's more fun to actually be building something. If you took a class in robots and just learned about things, if the teacher just drilled information into your head, it would not be as fun as building and experiencing it to learn.

Grade 6 Girl 2

TAP CREATIVE PLAY



- Who is tapping into creative play? Are we?



GOOD FOR BOYS

- We have found robotics especially good for boys with ADD and LD issues who do Legos at home and tech oriented boys that need challenges
- What other activities in elementary schools especially cater to boy's interests?

GOOD FOR BOYS

- It was very interesting that we got to build a real, live robot. I never imagined I would build a robot. It was really cool. *Grade 5 Boy 1*
- It's fun because it allows you to challenge yourself in a different way than just your mind, because you have to be able to figure out how things go together because that's physical memory. *Grade 6 Boy 1*

GOOD FOR GIRLS



- Girls don't always get to use Lego at home
- Need to be exposed to engineering before cultural constraints become strong

STEM PIPELINE

STEM occupations are projected to grow by 17.0 percent from 2008 to 2018, compared to 9.8 percent growth for non-STEM occupations

STEM workers command higher wages, earning 26 percent more than their non-STEM counterparts

We need creators of technology, not just consumers

Will we be STEM competitive in the new global economy?

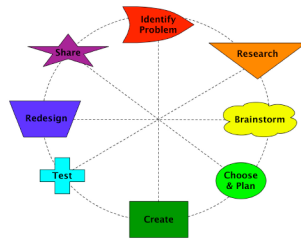
ENGINEERING

Not all kids should or need to be engineers but:

We have created a lot of problems with our technology and will need ethical engineers and scientists to solve them

Practices a way of thinking based on reflection, fact based research, iterative and revision, collaboration, and sharing out

Engineering Design Process



Courtesy - Dr Merridith Portsmore, Tufts CEEO

GRAPPLING



GRAPPLING 2



ENGINEERING DESIGN





YEAR 1 CLEVER SOLUTION



Open Ended Challenges



FUN



It was hard so it made us jump up and down when it finally worked. *Grade 5 Girls Team 1*

BEEBOTS - PK-K


Simple Bee Robot (left, right, up, down, clear, pause, go)

PK- Free explore, counting on a number line, trace letters

K - Trace letters, adding and subtracting on a number line, estimation and measurement, route planning challenge, traffic jam

NAME: CARTER


DATE	STEPS
✓	6
✓	7
✓	6
✓	3
✓	4
✓	6




BEFORE MAP SAMPLE

NAME: AICI

Draw the path the Beelet took to the flower.



EXAMPLE OF ROUTE PLANNING WITH RULERS



LESSONS LEARNED

- Don't solve problems for them
- Build up slowly
- Computer are dumb, they do what you tell them to do, not what you want them to do

COOPERATIVE LEARNING

- Number of students in a team
- Roles
- When problems arise
- Managing space
- Managing technical difficulties

BEEBOTS TASKS

- Estimation and measurement
- Make some letters
- Add 2 numbers
- Subtract 2 numbers
- Traffic jam
- Bees and Honey
- Dice games - make 10, race

EXTENSIONS

- Design your own activity to use with BeeBots
- Closed or open ended
- Try it
- Document it including adjustments

DUPLO FREE PLAY

- What can you make?
- What is it like?
- Why is it important?
 - How does free play fit in with more structured activities?

DUPLO ENGINEERING I

- Make a tower as high as possible
- Chair for Mr Bear using DUPLOs
- Make a car
- Make a house
- <http://childhood101.com/2014/03/duplo-block-activities/>

DUPLO ENGINEERING II

- <http://www.mummymummymum.com/2013/02/17/duplo-ideas/>
- Measure your foot in DUPLOs
- Make letters
- Mix DUPLOs and craft materials
- Race DUPLO cars down a ramp(s)

DUPLO ENGINEERING III

- Make your name (or initials) with DUPLOs
- <http://video.legoeducation.us/default.aspx?viD=176&glD=19>
- <http://tongal.com/work/6xb5f3>

DUPLO ENGINEERING

- Create your own idea
- Share
- Reflections

RESOURCES

- jheffernan@hr-k12.org
- Elementary Robotics: Sustaining the Natural Engineering Instincts of Children - amazon.com
- <http://www.kidsengineer.com/>
- Lesson plans (session 1)
- Worksheets (session 1)

SUPPLIES

- BeeBots - in crate
- Batteries - check crate
- Number lines - check crate
- BeeBot rulers - check crate
- Masking tape - check crate
- Video adapter
- Power cord
- Laptop
- K Worksheets
- PK and K Lesson Plans
- Handouts
- Post handouts
- Book (home) - for standards
