3

In this session:

1. Consider some loose parts children use to tinker
2. Examine technologies children have designed tinkering with loose parts
3. Identify sets of loose parts for tinkering that deepen children's understanding of phenomena or how the world works
4. Elevate the status of tinkering as a bridge to engineering
5. Explore ways of asking questions that support and deepen children's work in tinkering

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4

5

6

Loose Parts

- Buckets
- Spoons
- Cast iron garden critters
- Garden gnomes
- Construction vehicles
- Sticks cut to similar lengths
- Stones
- Fresh water clam shells
- Leaves
- Bark
- Flowers

7

How can I make a house out of leaves and sticks?

I'm having a hard time getting the leaves to stay on the sticks.

8

If I poke the tops of the sticks through the leaves, the leaves stay up.

9

If I lay a loose leaf across, I can make a roof.

Not sure I like it.

What else could I do?

10

How might this bark work?

11

If I lay it gently on top of the sticks, it might balance.

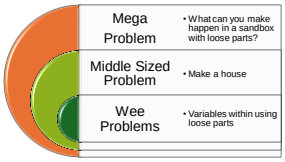
12

It balances!
It works!

13

Charlie engineered a shade structure for a meditative gnome.

14



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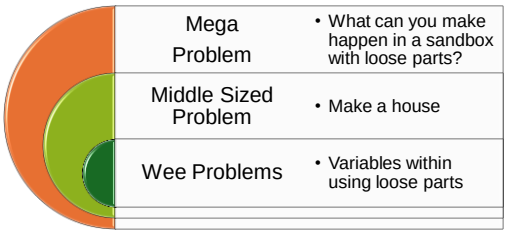

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In any environment, both the degree of inventiveness and creativity, and the possibility of discovery are directly proportional to the number and kind of variables in it.

Simon Nicholson (1971, p. 30)

17

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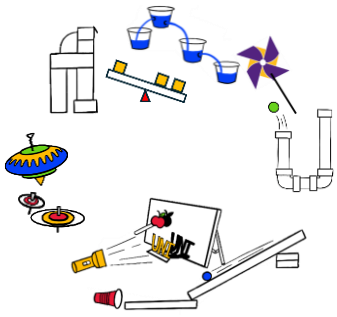
Habits of Mind that Move Tinkering into Engineering

- Systems Thinking
- Creativity
- Optimism
- Collaboration
- Communication
- Attention to Ethical Considerations

19



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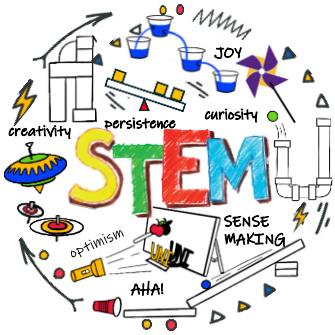
Four Criteria for Tinkering

- Produce
- Immediate
- Observable
- Variable

20



Tinkering with Loose Parts

21

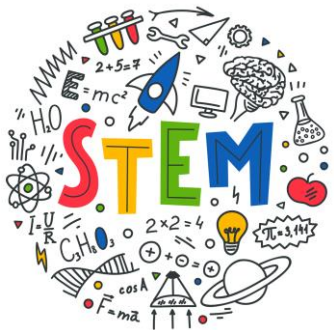
SCIENCE
- Noticing details in leaves, flowers, stems (life science)
- Predicting how something may move (physical science)

TECHNOLOGY
- Anything designed by a **human** to serve a human's needs or wants
- Anything designed by a **child** to serve a child's needs or wants

ENGINEERING
- Using parts to design technology that makes something happen

MATHEMATICS
- The number of parts used
- The spatial arrangement of parts
- The sequence of these parts

22



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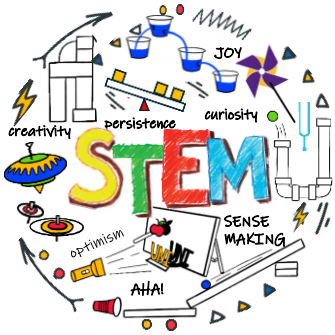


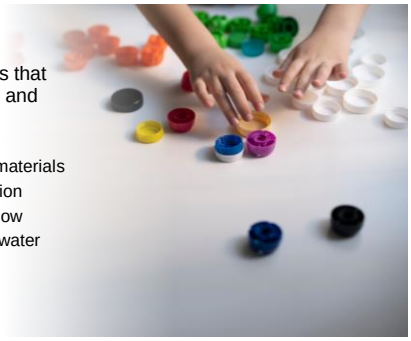
Tinkering with Loose Parts to:

- move marbles in an interesting way
- cast unique images on a screen
- move water and air and things in water and air
- put things into a stable state of balance, or in a kinetic state of balance.

24

Sets of materials that inspire tinkering and sensemaking:

- properties of materials
- force and motion
- light and shadow
- movement of water
- balance



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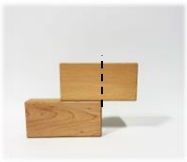
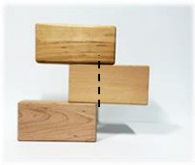
Tinkering with Unit Blocks

26

Balance, Friction, and Tension





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Tinkering with Tracks:

- Unit blocks
- Tracks
- Objects that roll, slide, tumble . . .
- Catchers

28

29


Photo by Peggy Ashbrook

30

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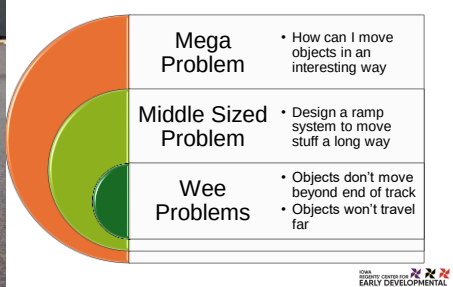
Mega Problem
• How can I move objects in an interesting way
Middle Sized Problem
• Design a ramp system to move stuff a long way
Wee Problems
• Objects don't move beyond end of track
• Objects won't travel far
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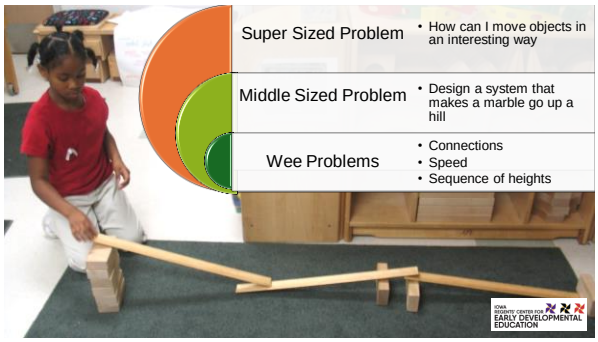
Mega Problem	• How can I move objects in an interesting way
Middle Sized Problem	• Design a ramp system with a drop
Wee Problems	• Misses lower track • Bounces off track

33

Mega Problem	• How can I move objects in an interesting way
Middle Sized Problem	• Design a ramp system with **2 drops**
Wee Problems	• Misses lower track • Bounces off track

34



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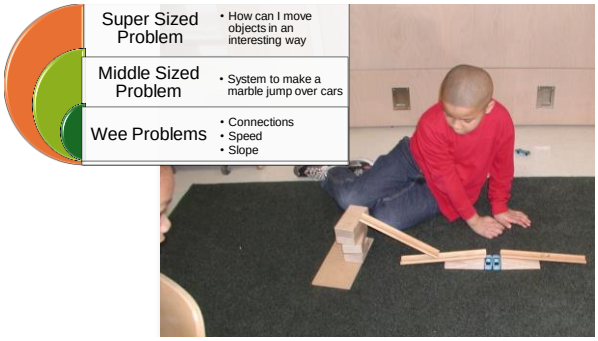
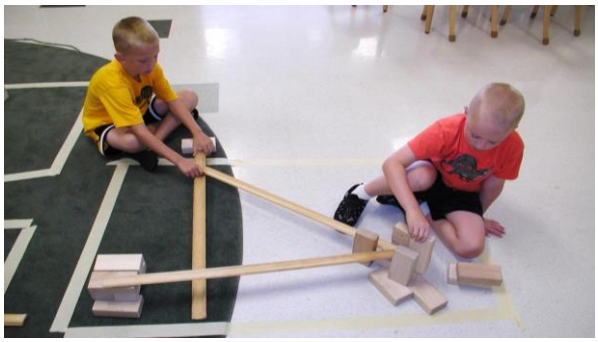

Super Sized Problem
• How can I move objects in an interesting way
Middle Sized Problem
• System to make a marble jump over cars
Wee Problems
• Connections
• Speed
• Slope

37



38

39

40

41

42

39 feet in a
3' x 3' space.

Took two days and
- Systems thinking
- Perseverance
- Optimism
- Creativity

43

"an opportunity for children to express creativity through use of materials that can be manipulated, transformed, and created through self-guided play"

-Gull et al. p. 37

Gull, C., Bogunovich, J., Goldstein, S. L., & Rosengarten, T. (2019). Definitions of loose parts in early childhood outdoor classrooms: A scoping review. International Journal of Early Childhood Environmental Education, 6(3), 37-52.

44

Tinkering with
Loose Parts

45

Tinkering with
Light Sources

46

47

48

49

Students in the afternoon discovered that the circle touch lights and large cylinder light are magnetic. They went under the table where it was darker and stuck them up.

50

51

52

53

54

55

56

Tinkering with Tea Lights

57

Katie Lyons

58

59

Tinkering with lighting effects in Ramps & Pathways

60

61

62

Preschool

Crystal Potras Riniker

I have several kids in the morning who like to write in their science journals.

63

Preschool

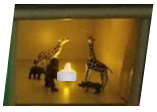
Crystal Potras Riniker

A.R. drawing the little candle lights that are lined up

Drawing the candle lights in her science journal.

64

Tea Lights & Figures



65

66

Tea Lights & Fabric

I had a student use different fabrics to cover the lights. She loved how the gold sparkle material made the light look.

- Amber May

67

68

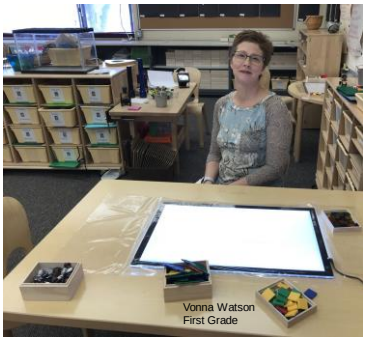
69

Light Pads & 3D Building



70

Light Pads &
Loose Parts
with
Different Variables

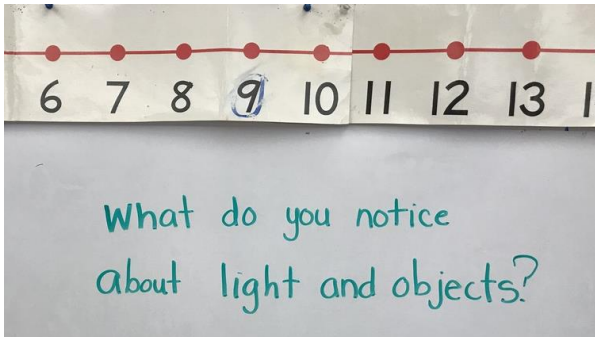


71

Four Different Types of Loose Parts

Plastic Squares | Stained Glass Squares | Plastic Polydrons | Glass Jewels

72



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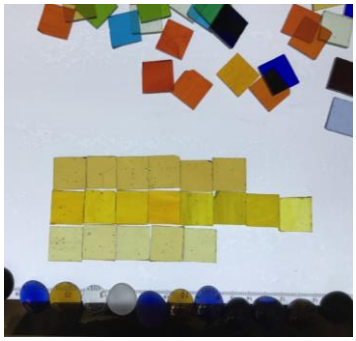

76

Young learners ponder how to describe frost glass:

These are fuzzy.
No, not fuzzy.
Soft?

77

78

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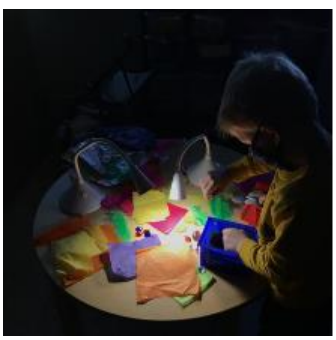

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81

Work Light & Screen

82

83

Engineer an image on the screen.

What can you make happen?

84

System

- Light source behind screen
- Translucent tower behind screen in front of light source
- Screen
- Translucent tower in front of screen

85

System

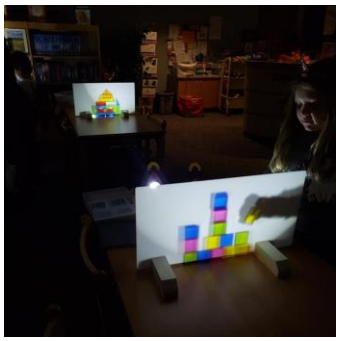
- Light source
- Pumpkin and pine cone in front light source on top of blocks
- Screen – fuzzy shadow

86

Children posing their own engineering design problems

This child was trying to figure out how close she needed to have the block to the light to get it the size she wanted to make her house! She spent a lot of time, but finally got it to where she wanted it.

87



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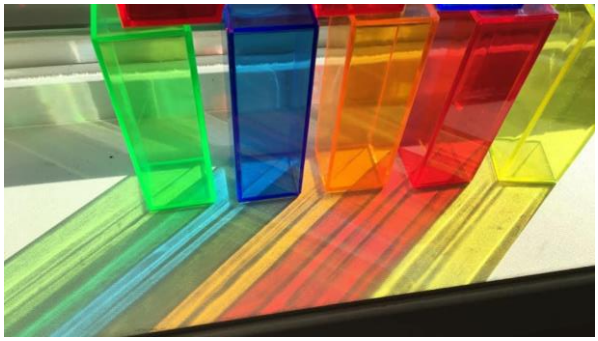
Tinkering with Natural Light & Loose Parts

91

92

93



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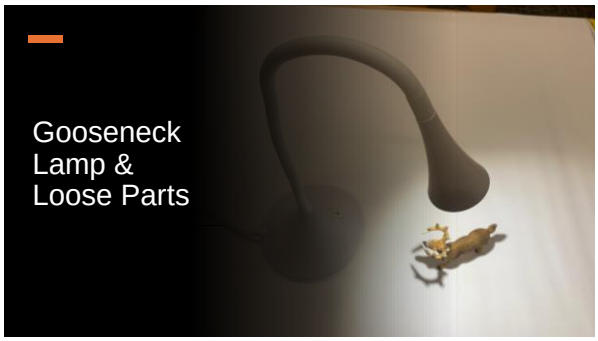

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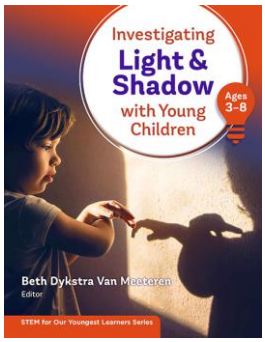


Tinkering with Loose Parts and Light

101

Loose Parts and Water

102

Tinkering with Loose Parts and Water

103

Loose Parts - Lids

104

We explored with same sized cups last week.

One friend figured out he could fit a cup inside of another one with water in it and the water wouldn't spill!

105

Here is the container that we used for same size/shape activity to introduce the waterworks with our preschoolers (purchased at dollar tree).

106

I did not get great action photos in class, as I was ***too busy writing down all the vocabulary I was hearing as they observed what they were doing****.*

107

They commented on the lids and how they would float until water was on top of them.

108

Caroline Erickson, Preschool
Central Community Schools, Elkader

109

Jennifer Naig, Preschool
VanMeter Elementary, VanMeter

110

Amy Smith 1st grade
St. Patrick's, Perry

111

Loose Parts - Lids

112

Inquiry Teaching Model

Same Size/Shape Containers

113

114

The children in my class began making observational drawings of the same size cylinder containers.

115

Each child then made their observational drawings in small groups before exploring the containers in water.

116

They looked through the containers…

Dawn Johnson, Preschool
Kids World, Centerville

117

Dawn Johnson, PK
Kids World, Centerville

118

Teachers Observe

The children experimented with what they could do with the same size cylinder containers in water. These are my observations of their play…

Dawn Johnson, Preschool
Kids World, Centerville

119

Teachers Observe

First, they were intrigued by the color of the water.

The red table made it appear purple.

120

Teachers Observe

They noticed that water in the gold lid appeared to be green.

121

Teachers Observe

Second, they used various methods to fill the containers.

Some of the children scooped up the water in the container…

122

123

Teachers Observe

…some poured water from one container into another…

124

Teachers Observe

…and some filled the container using the lid.

125

Teachers Observe

Third, the children noticed that the containers without water floated.

One boy commented, "Water is heavy. The jars with water don't float."

Teachers Observe

Fourth, the children were curious about the lids.

Could they make water come out of the jars when the lids were on?

126

Teachers Observe

They discovered that they could.

127

Teachers Observe

Fifth, the children in my class are used to playing with loose parts.

Each pair of children experimented with stacking the containers with and without water.

128

Loose Parts: Cups with Holes

Producible	Children can immerse a cup into the water and pull it out
Immediate	The water immediately begins to exit
Observable	Children can see and hear the water exiting
Variable	Children can vary: • The cup used • The amount of water put into the cup • How high and low the cup is held above the water in the water table • How many cups to use (nesting or one in each hand) • How to position the cups as they empty
Mental Relationships	• The larger the hole, the faster it empties • The smaller the hole, the slower it empties • The higher up the hole on the side of the cup, the less useful it is as it stops draining quickly • The lower the hole in the cup, the longer it takes for the cup to empty • The smaller the hole, the farther out the stream of water shoots • The more the cup empties, the less far the stream of water shoots • One cup can empty into another that empties into another…

129

Loose Parts: Cups with Holes

130

131

132

133

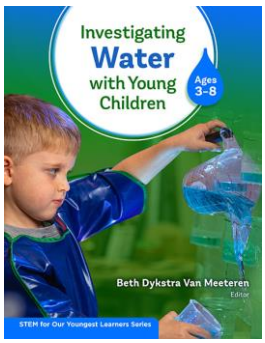
Loose Parts: Pipes & Fittings

Producible	Children can produce structures of piping to pour water into
Immediate	The movement of the water (or lack of) is immediate
Observable	**Children can observe:** • The direction of the flow of water • The levels of water in the tubes • Where water is leaking • Bubbles inside of tubing • Pony beads moving (or not) through a system
Variable	**Children can vary:** • The configuration of the pipes • How much water goes into the tubes • The stopping and starting of the flow using the valves • What they move through the tubes
Mental Relationships	• Between the looseness in the fittings and pipes and leaking of water • When two vertical pipes are connected by a horizontal pipe filled with water, the water level in each vertical pipe will be the same • Air bubbles in a pipe can be moved out by tipping the pipe • The sinking of pony beads moves them vertically down a pipe, but a forced flow of water is needed to move them horizontally or up a pipe • When a squeeze bottle full of water is turned upside down on top of a pipe, the water will not come out until you squeeze the bottle

134

135

136



Tinkering with Loose Parts and Water

137

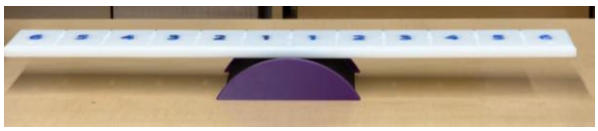
Tinkering with Balance

138

Does it meet the criteria?

1. Producible
2. Immediate
3. Observable
4. Variable

What happens when you place a cube on the balance bar?



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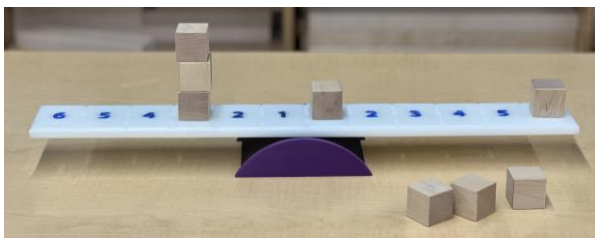

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Balance to Compare

148

Balance to Compare

149

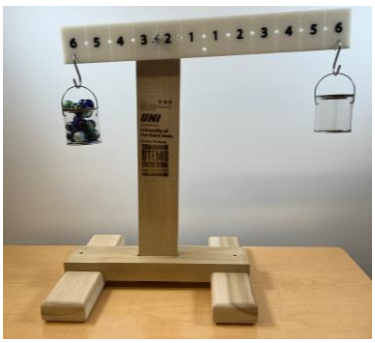
Balance to Compare

150

Balance to Compare

151

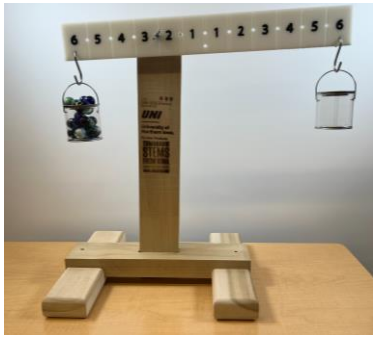
How can this be?



152

Does it meet the criteria?

1. Producible
2. Immediate
3. Observable
4. Variable



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153

Does it meet the criteria?

1. Producible
2. Immediate
3. Observable
4. Variable

IOWA EARLY DEVELOPMENTAL EDUCATION

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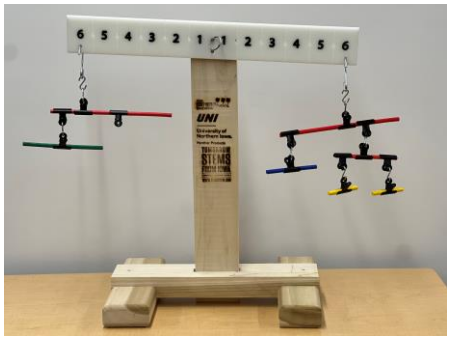
158

Does it meet the criteria?

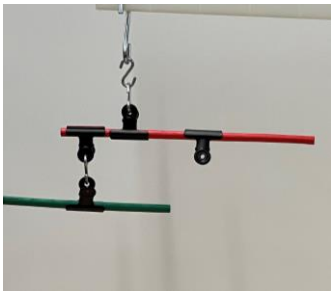
1. Producible
2. Immediate
3. Observable
4. Variable



159

Does it meet the criteria?

1. Producible
2. Immediate
3. Observable
4. Variable



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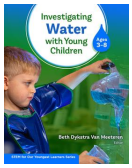
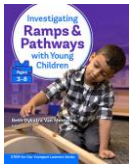
Teachers College Press





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