Investigations:

ILLUSTRATIONS FROM A CHILD-CENTERED INQUIRY ON WHEELS

Agenda

- Introductions
- What is Investigations Curriculum?
- Phases of Investigation
  - Topic selection
  - Research and planning
  - Initiation/Awareness
  - Inquiry across contexts
- Assessment
- Discussion and Reflection

Introduction

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A Brief History of a Curriculum

- Child and Family Development Resources Center opened in 2007 as a "model" program.
- CFDRC staff resisted the idea that a curriculum must be purchased and packaged.
- Began a two-year development process involving all staff, faculty, families, even students:
  - Reviewed previous research and practice
  - Examined state and national standards and key components of a curriculum.
  - Discussed, debated, sought consensus on every element.
  - Implemented the curriculum two years ago; are analyzing fidelity and outcomes.

Who Inspired Us?

- **Lillian Katz, Judith Harris Helm: The Project Approach**

- **Lella Gandini: Reggio Emilia-Inspired Practice**

- **Elena Bodrova , Debbie Leong: Play Scaffolding and Tools of the Mind**

- **David Weikart, Lawrence Schweinhart: Child Planning and Reflection**

- **George Forman: Constructive Play and Video Revisiting**

- **Rheta DeVries and Constance Kamii, Games and Sociomoral Classrooms**

- **Doris Fromberg, James Johnson, Doris Bergen, Stuart Reifel: Play**

- **Jean Piaget: All Things Child Development**

- **Lev Vygotsky: Sociocultural Theory**

Jeffrey Trawick-Smith, Sudha Swaminathan, Niloufar Rezai, Jamie Klein

Teachers, families, and children of the CFDRC

Our Quest

Integrate the ideas of these disparate and wonderful thinkers into a single, coherent, and powerful curriculum.

What is the *Investigations Curriculum*?

- A project-based curriculum for children aged 18 months to 5 years

- Reflects constructivist and socio-cultural theories

- Designed to meet state and national learning standards, as well as family-valued competencies.
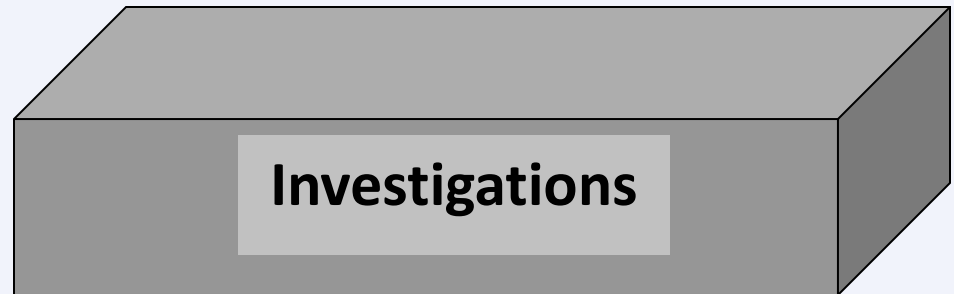
We use a "carpentry metaphor" because children actively **construct** knowledge and abilities.

We begin with a **foundation** of constructivist theory

We integrate five **pillars** of learning and teaching . . .

. . . that support five **platforms** of daily experience

What is the *Investigations Curriculum*?

Investigations

Five Pillars

1. Scaffolding children's social participation, thinking, and language in play

2. Purposeful balance in daily scheduling

3. Evidence-based classroom arrangement

4. Portfolio assessment

5. Integrated Planning Webs

The pillars underlie learning and teaching at group times, play times, transitions, and even lunch and snack.

Scaffolding Play

Balanced Schedule

Evidence Based Classroom Environments

Portfolio Assessment

Integrated Planning Webs

Investigations
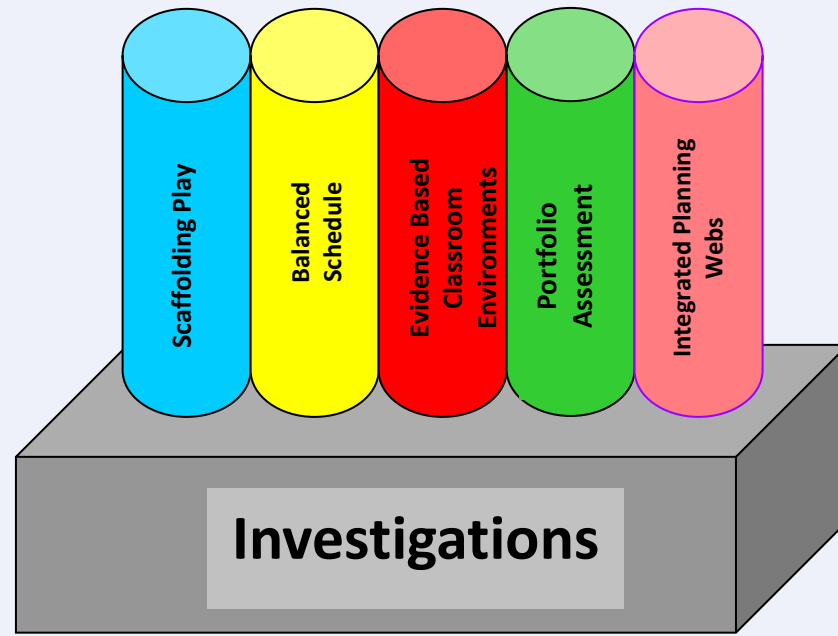
Pillar One: Scaffolding Play

Teachers follow the ***OREO*** method of play interactions (Trawick-Smith & Dziurgot, 2010 a; 2010b):

O = ?

Observe

R = ?

Respond

E = ?

Exit

O = ?

Observe

Balanced Schedule

Active-quiet-active pattern

Child-guided-Teacher-guided Balance (50/50 rule--EPPE Study)

Strategic Placement of Outdoor Play (Pellegrini's research)

A schedule that, "children themselves can understand" (Prescott's research)

Portfolio Assessment

Electronic Portfolio

- A collection of evidence supporting child's development.
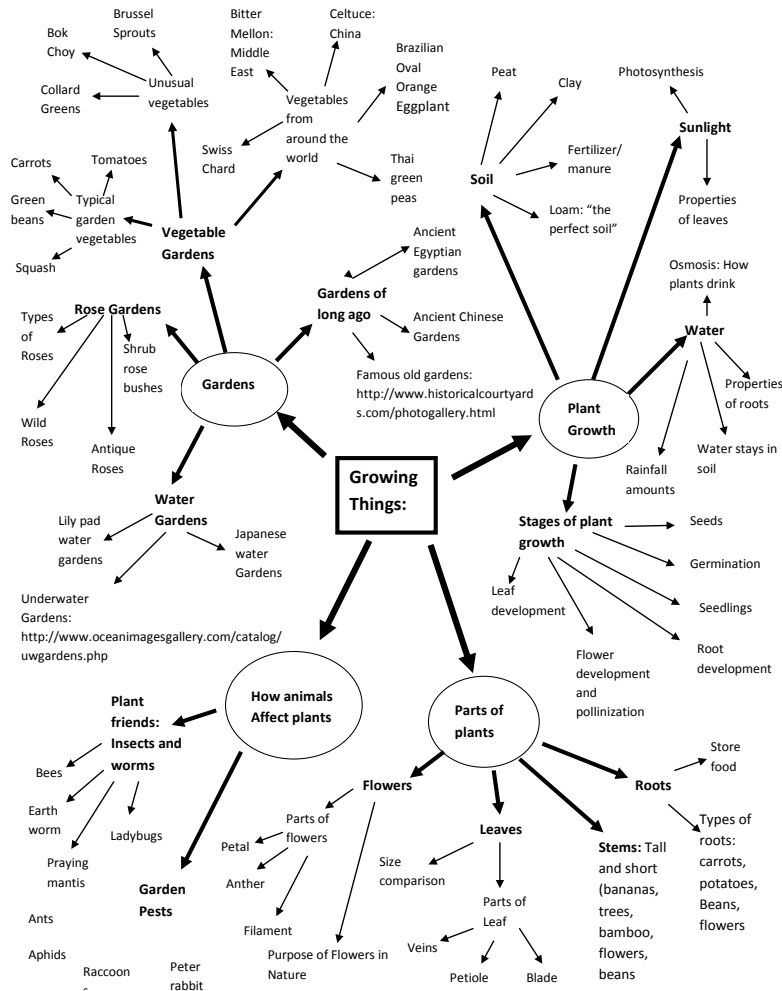
Child-centered Portfolio

- Child participating in own portfolio.
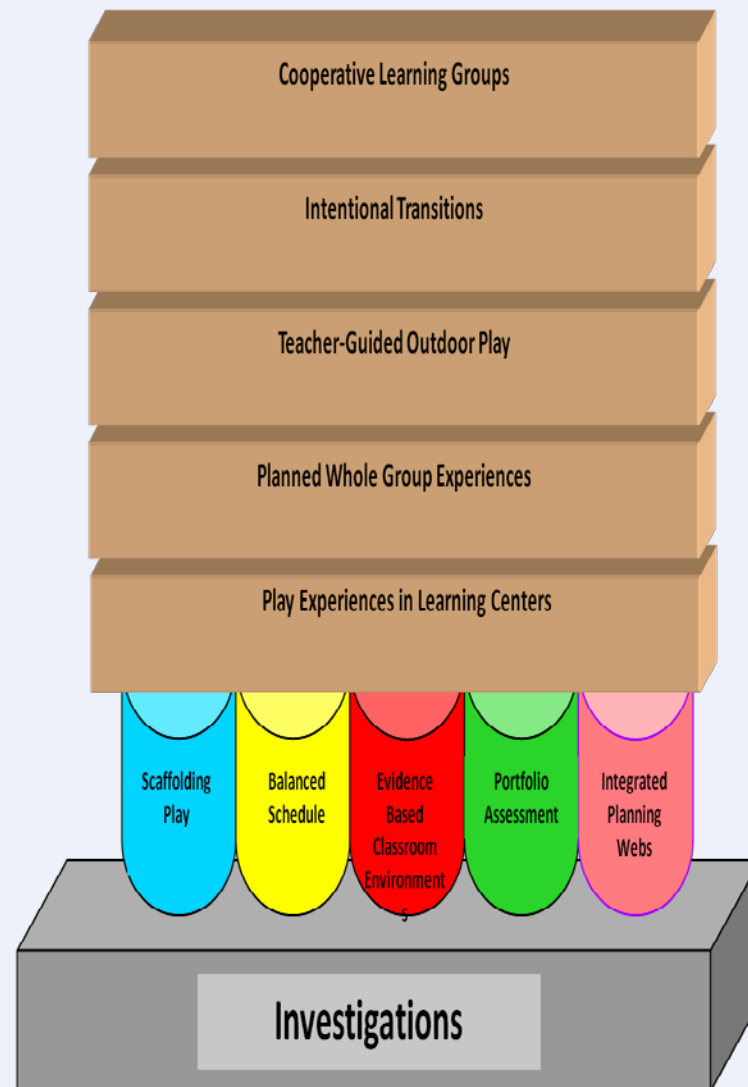
Reflection and goal-setting.

Integrated Planning Webs

Five Platforms

Supported by these pillars, are five *platforms*—

1. Play experiences in learning centers.

2. Planned whole group experiences

3. Teacher-guided outdoor play

4. Intentional transitions

5. Cooperative learning groups

Unique Features of Platforms

- Scaffolding outdoor play with a focus on MVPA and self-regulation

- Snack time language interactions focused on investigations

- Interactions in play to foster child-to-child conversations

- Planned transitions that have a purpose

- Cooperative learning that applies all research on grouping and facilitating co-construction of knowledge

What is an Investigation? Underlying Philosophy

❖Preschool children actively make sense of the world, using **prior knowledge** and skills to **construct** an understanding of things that are of interest to them.

❖Acquiring **content knowledge** is as important for preschool children as engaging in thinking and learning processes; the two cannot be teased apart.

❖At a young age, children have a **curiosity** about and interest in the long ago, the far away, the puzzlements of nature, and other fascinating phenomena in the world.

❖Young children can come to understand **any phenomenon** they have questions about, so long it can be **assimilated into previous knowledge**.

❖Rich, **novel content** provokes questions, causes puzzlement, prompts exploration, and **stretches children's thinking**, in a way that tired, traditional topics cannot.

❖Preschool children **co-construct** knowledge with peers and teachers; they are more likely to operate within the **Zone of Proximal Development** when they interact with "expert others."

Stage 1: Topic Selection, Research, and Planning

Topic Selection:

Topics are selected based on the interest of the child, family, and/or teacher. The topic will be **meaningful, unique, and will stretch children's thinking.** We aim to select topics in which children have **some prior knowledge** to build upon yet not omit topics which children may not directly have experience. An investigations such as Bones, for instance, at first glance may seem challenging for preschoolers as bones are not visible. In *Investigations*, topics are **studied in depth**. Our Simple Machines investigation for example, continued for over 18 weeks allowing ample time for exploration.

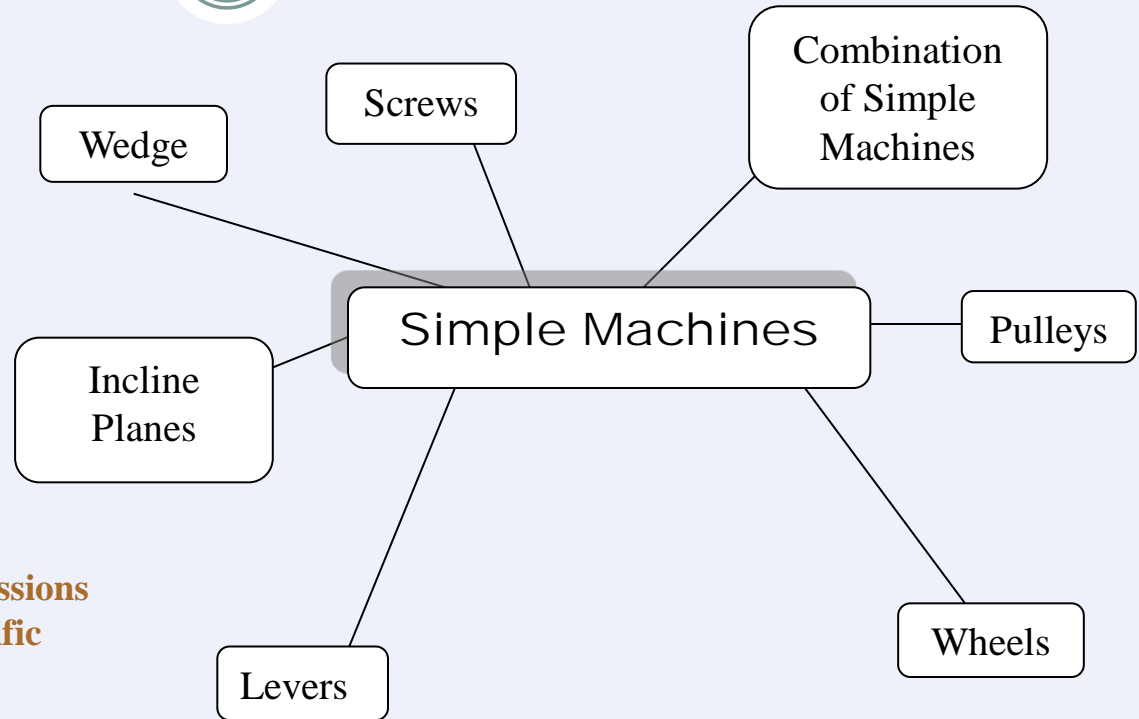# Stage 1: Topic Selection, Research, and Planning

Research:

The **research phase** of the *Investigations* Curriculum involves brainstorming ideas (adults, children, families and any combination thereof), webbing of related ideas, and what is referred to as a 'zooming in' whereby a branch of the general web takes focus. For example, a **general web** may begin with the broad concept of *Body* and be narrowed down, or 'zoomed in', to *Bones.* Teachers then engage in further research to learn about the topic.

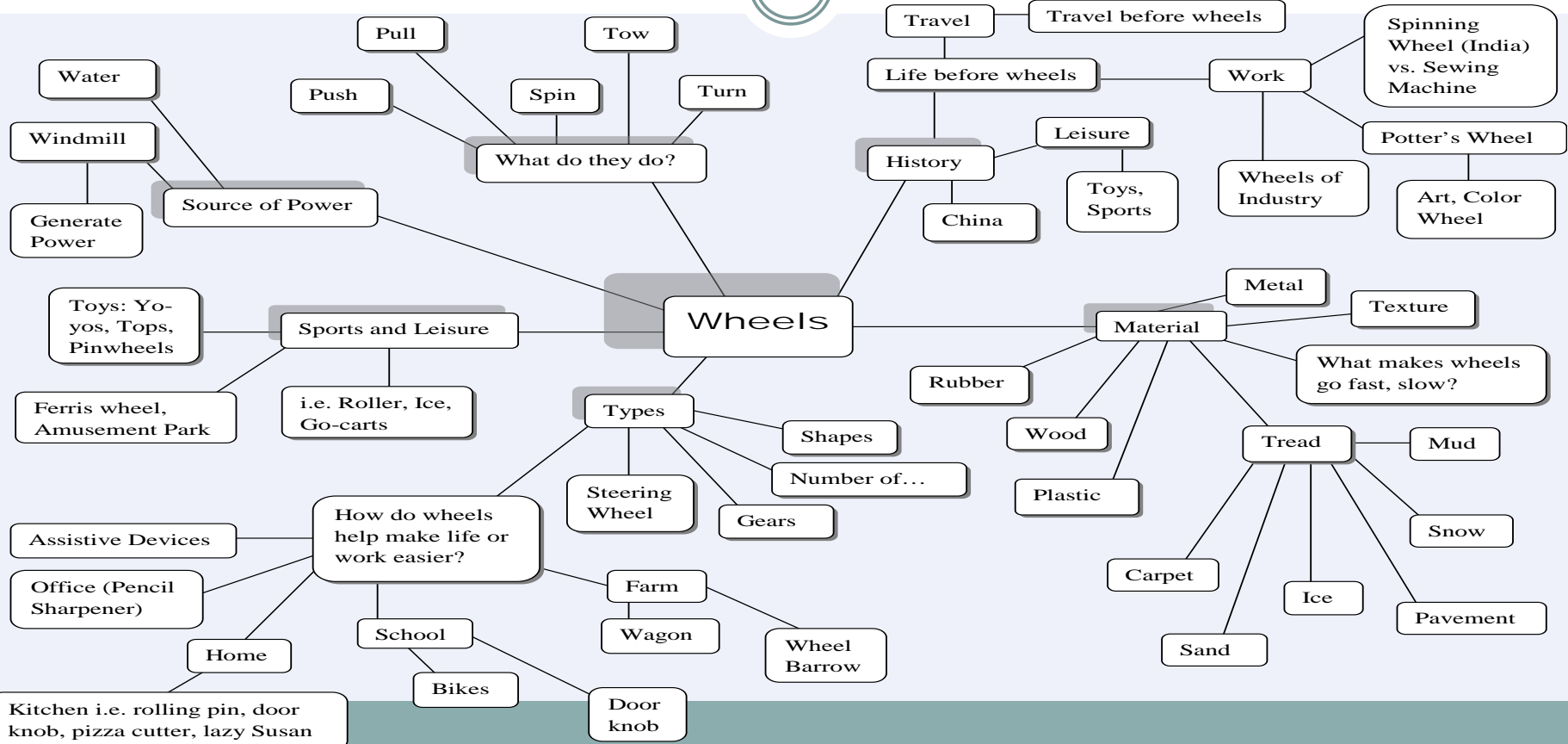# Stage 1: Topic Selection, Research, Webbing, and Planning

Webbing:

Teachers engaged in an initial webbing sessions (Bodies) before zooming into a more specific area of study (Bones).

- Wedge
- Screws
- Combination of Simple Machines
- Incline Planes
- **Simple Machines**
- Pulleys
- Levers
- Wheels

Stage 1: Topic Selection, Research, Webbing, and Planning
Webbing: Narrow or 'zoom' in

Stage 1: Topic Selection, Research, Webbing, and Planning

Planning:

✓Teachers select several **content goals** for the investigation that reflect the information included on the content web. Content goals are related to the recommended standards of national organizations for each academic discipline.

✓Teachers plan **key experiences** related to the topics, content goals, and **performance standards** they have selected. Activities and key experiences are planned for each learning center, curricular platform, and all areas of the curriculum (e.g., math, science, motor play). For each activity entered, **at least one performance standard** is listed. **Assessment methods** are also listed for each curriculum area.

Stage 2: Assessing Prior Knowledge

Prior Knowledge:

Before implementing the investigation, teachers spend time assessing children's **background knowledge** on the topic. Teachers placed a wheel item in each center such as: a rolling pin in dramatic play, a tape dispenser in art, a windmill in blocks, a hand-cranked flour sifter in the sensory bin, a pencil sharpener in the writing station, a roller paint brush in art. Teachers wanted to ascertain what children knew about these item since they all shared a similar characteristic: made of a wheel and axel.

Stage 3: Initiation/Awareness

Initiation:

During group time, planning the day, children were told there was a featured item in each center placed on a green paper plate. As children went off to centers, they began to explore the materials such as: rolling pins, egg beaters, windmills, tape dispenser. During centers, teachers interacted with children noting what they said and did with items.

The children explore items before learning that they are made of a wheel and axel.

Stage 3: Initiation/Awareness

What could be a wheel? Why? Watch as children go on a scavenger hunt during the awareness phase.

Stage 3: Initiation/Awareness

Children continue to explore wheels early on. Here, they are offered materials which make a wheel and axel. They are making the discovery on their own that the wheel requires the axle.

Stage 3: Initiation/Awareness

Skylar discovers that the parts put together create a working wheel. She now begins to have an awareness of the necessary parts of wheels.

Here, she tests out her simple machine making necessary adjustments.

Stage 4: Inquiry across Contexts

- Dramatic Play: Wheel Shop
- The Bike Project
- Cooperative Experience: How can We Make a Wheel?
- Cooperative Experience: Travois
- Cooperative Experience: Wheelbarrow
- Science Center: Can I Make it Move?
- Technology
- Creativity
- University Connection: Science Fair

Wheel Shop

During the Awareness Phase, several texts inspired interest on types of wheels. This lead to a new **dramatic play center: *Wheel Shop***. The class creates a web including items needed for the center, different roles available as part of the center, etc. The web serves as a working 'check list' as we set up the center over the course of several days. During the **process**, they continue to acquire knowledge about content while building their background knowledge surrounding the center. They do so by:

- Researching types of wheels

- Learning about roles associated with working/visiting a shop

- Reading and using language associated with the content area.
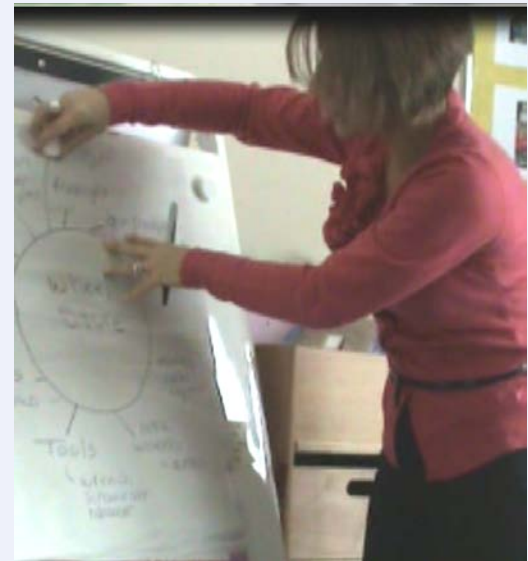
As part of developing the center, we created a web of things we might need in order to open the Wheel Shop.

Wheel Shop
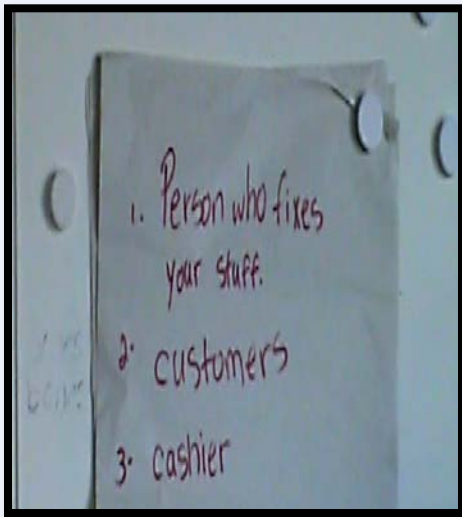
A list of roles in dramatic play: Wheel Shop

Children creating a cash register.

Over time, a list of items with wheels that the Wheel Shop will fix.

Bike Project

The investigation on wheels led to an interest in bicycles (a combination of simple machines). Before taking apart a bike, children looked at pictures and talked about some of the parts of a bike. After a faculty member brought in an old bike, they used their knowledge to label the bike before taking it apart.

Bike Project

The children took apart an old bicycle. They used real tools such as a hammer, screwdriver (flathead and Philips head), wrench, pliers, and lots of screws and nails.

Bike Project

When the bike was completely dissembled, the students experimented with the wheels and what characteristics make them roll. They eventually got the wheels, the pedals, the seat, the handlebars, and the chain off of the bike.

Cooperative Experience: Can WE make a wheel?

One of the questions we explored was what makes a wheel work? Through books and observations, we learned the importance of an axle. In this cooperative activity, children were provided with empty ribbons spools and a variety of items which could make axles. Children looked at the materials and determined (problem-solved) that the spools needed axles. From there, the process of creating a wheel and axle began.

The group above changed their mind a few times before reaching a consensus about how to put the wheel together.

## Cooperative Experience: Can WE make a wheel?

Small cooperative groups work together over time, in project fashion, to create a wheel now that they know the parts.

This group created a sketch of their ideas. After their sketch, they had discussed which sketch would work best and why. They wound up using elements from each sketch as part of the final product.

Travois: Historical and Cultural Perspective

To place things in a hist**orical and multicultural context** during our Simple machines/Wheels Investigation, we introduced children to a TRAVOIS. Native Americans used the travois frequently in their daily lives. The experience of creating a travois in a cooperative groups had several benefits. First and foremost, it provided a wonderful opportunity for children to work together during **planning, creating, and testing phases**. Children created a sketch of how they wanted their travois to look, generated a list of materials required, gathered their materials, created their travois, and in the process, made changes as necessary (**engaging in trial and error problem-solving**).
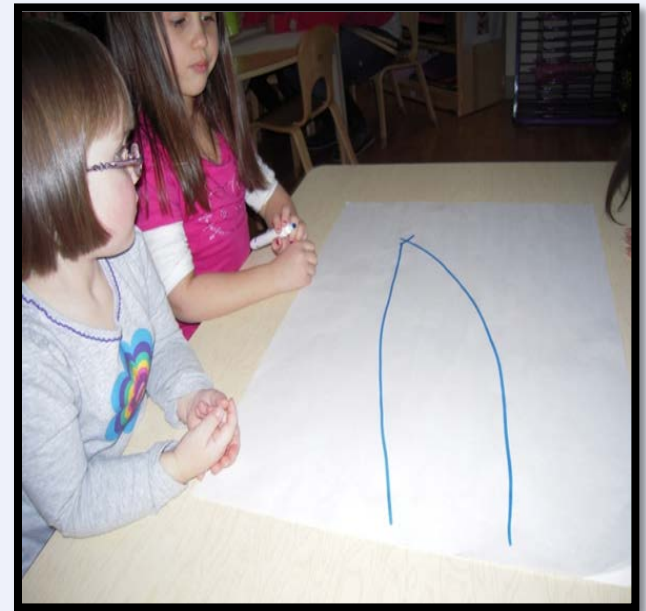
Travois: Problem solving

After making a sketch of the travois, Tatyana, Itzel, and Dominic gathered their materials. They used two sticks, pipe cleaners, tape, and a blanket. Originally, they had wanted to use glue to hold the pipe cleaners to the sticks but decided that glue was not strong enough.

Travois: Trial and Error

Dominic helped Tatyana many times by holding up the travois while she put tape on the stick. Once the pipe cleaners were all fastened, the students discussed how they wanted to attach the blanket. At first Itzel suggested glue, but Tatyana said it wouldn't be strong enough. Then, Dominic said nails, but Itzel pointed out that we did not have any. So, the students decided on tape. They taped the blanket in small pieces at first but they were finding that the small pieces were not holding the blanket steady. Dominic said, "Let's wrap one, big, long piece around and around."

Itzel held the Travois up as Dominic and Tatyana wrapped the tape around to secure the blanket.

Travois: Problem-solving

Here the group is working on putting it together. The initial idea of using elastic bands to attach the sticks did not work. Skylar tried putting it on the end and said it was too big. Then Sam chose a different sized elastic band and it was still too big. They then decided to use tape! The wrapped the tape around the sticks to make sure it was "sturdy" as Ezra said.

Travois: Testing it!

Each group presented their final product in large group. Teams took turns describing their process from beginning to end including changes they made along the way. While testing out the travois, children were asked a variety of questions such as: Is it easier to move the item with/without wheels? How are you making the travois move (push, pull, lift). **What if we added a wheel to the travois; what would happen?** This group was interested in lifting their travois first.

The whole class watched as each group of peers tested out their group's travois.

Cooperation: Planning and Creating a Wheelbarrow
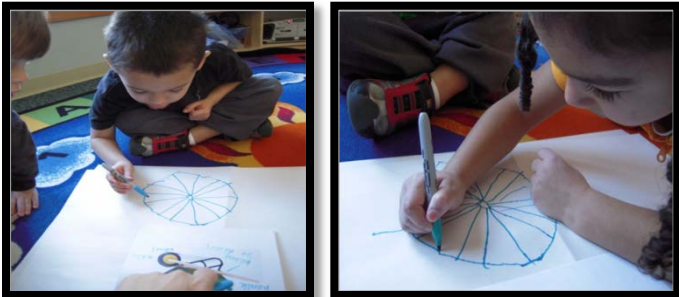
A key experience during the course of the Wheel investigation was to create a wheelbarrow. During this cooperative activity spanning over several weeks, children created sketches of wheelbarrows (after researching and looking at a variety of photos of types of wheelbarrows). Their group sketches represented how they wanted the wheelbarrow to look, materials they might need to assemble it as well as steps required to create the item. Opportunities for discovery and problem solving were facilitated by teachers as children came up with solutions and tested them out.

Cooperation: Planning and Creating a Wheelbarrow

Some of the problems they had to solve included: how to securely attach the wheel, what to use as axels, handles, etc. They engaged in a process of **trial and error** as they discovered glue would not hold the wheel, a pipe cleaner is not a secure axle, etc.

How do I make it Move?

Eternity spends quite some time using rollers (as we studied wheels in historical perspective) to create a way to move books. In trying to answer the question How do I Make it move?, she is constructing knowledge (with teacher scaffolding) about how wheels move, what is necessary for the machine to stay put, and how to solve the problem when it does not move.

How do I make it Move?

Skylar is interested in observing how much weight her newly assembled wheel contraption can hold. She tries pulling different amounts of items in the bowl. When it falls over, she tightens the axels and tries again.

Technology and Wheels

Itzel uses the ipad to sketch her idea of a wheel. She then uses her sketch from the iPad in order to build it using blocks. This transference from computer to manipulative object reflects cognitive development growth.

Creativity

Clay

In order to appeal to each child, teachers make sure they have opportunities to represent wheels in different ways and using different materials. This is critical because not all children prefer the same material (i.e. crayons, markers).

Blocks

Wire

Paint
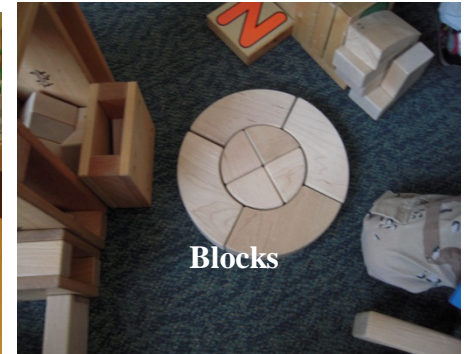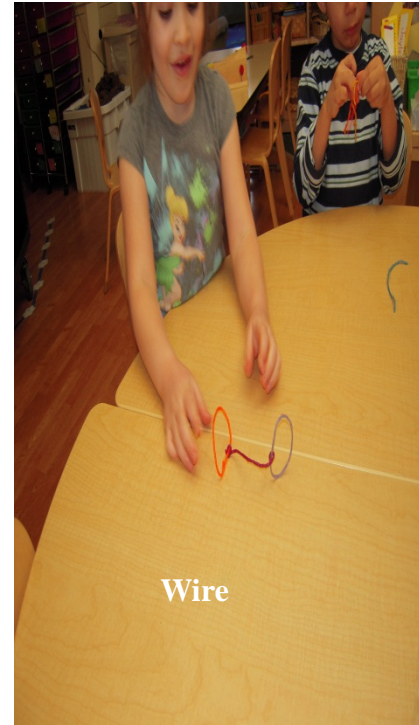
Science Fair

Early Childhood Education Department Interfaces with University Laboratory Preschool

As a **university laboratory preschool,** the CFDRC is at a great advantage. Interfacing with the early childhood education department has provided countless **opportunities for children, university students**, **faculty, and teachers.** Collaboration with faculty is so vital as the science fair demonstrates. Each semester, as part of their core requirements for early childhood teacher preparation, students, under the guidance of Dr. Sudha Swaminathan, **plan science experiences** for young children. The process begins with Dr. Swaminathan sharing our investigation with her students. Next, her students devise **lesson plans** pertaining to our investigation, share the plans with the preschool teachers, meet to discuss and modify plans, and finally, execute the science fair. Students conduct the initiation, scaffold, observe, document, and reflect over their lessons. Children benefit greatly as the centers **reinforce concepts** they are exploring in their classrooms. Here children experience inclined planes and levers: two of the five simple machines.

Assessment

Anecdotal records, photos, videos, rubrics are part of the authentic assessment and data collection model we use. Each child has an electronic portfolio whereby assessments are stored, reviewed, and shared with families. Newsletters, displays and documentation panels are ways we share children's work with families.

Ensuring Fidelity

5	4	3	2	1
All adults in the classroom regularly interact with children in play to **promote child-to-child conversation and greater peer interaction**.	Most adults in the classroom exhibit some play interaction strategies that promote child-to-child conversation and interaction.	Some adults in the classroom implement at least one strategy per day to promote child-to-child interactions and communication in play.	Only one or two such strategies are evident during an observation period, across all adults in the classroom.	There is no evidence of such strategies during an observation period, across all adults in the classroom.
All adults engage children regularly in "shared sustained thinking," as prescribed by the curriculum, during play, in which they **encourage children to think in deeper ways, solve new problems, or learn a new concept**.	Most adults engage in "shared sustained thinking;" however, some do more telling than guiding when implementing this strategy.	Some adults engage in "shared sustained thinking," although more of these interactions involve direct teaching, rather than guiding children in thinking on their own or solving their own problems.	Only one or two thinking and learning strategies are observed, across adults, during an observation; these are most often telling than guiding approaches.	There is no evidence of "shared sustained thinking" of any kind during play.
All adults regularly **help children learn new words and extend/recast their statements**, when interacting with them during play, as prescribed by the curriculum.	Most adults show they are helping children learn words and are expanding and extending their utterances.	Some adults in the class use at least two such language strategy—word learning or recasting/expanding—on each observation period.	Recasts and word learning strategies are rare in adults' play interactions with children.	There is no evidence of recasting and word teaching, across all staff during an observation period.
All adults show clearly (e.g., watching from a distance, taking notes) that they **observe the outcomes of their play interactions, after they exit** the play area.	Most adults show evidence that they observe outcomes of some adult-child play interactions after they leave the play area.	Some adults show periodic effort to observe the outcomes of their play interventions after they have left the play area.	Most adults make only momentary, cursory glances at children's on-going play after they intervene and leave the play area.	There is no evidence that adults thoughtfully study the impact of their play interventions after they have ended.

Ensuring Fidelity

| Advanced Implementation 5	4	Emerging Implementation 3	2	Poor Implementation 1
Transitions are brief and involve little or no waiting (e.g., standing in line, waiting to be served or for all children to arrive at group time); transitions are kept simple and to a minimum; no unnecessary transition steps are included.	Most transitions are brief, and minimal waiting is observed; few unnecessary transitions or transition steps are observed.	Many transitions are brief; some appear to be unnecessarily long or not to be needed at all.	Most transitions are too long or involve steps that are unnecessary; many do not seem to be necessary at all.	Transitions are too slow, require children to wait long periods, and/or have no clear purpose; too many transitions steps challenge children's abilities to maintain self-control.
All transitions are smooth; **children have a clear sense of what they are to do and show self-regulation**; disruption, conduct problems, and non-compliance are rare.	Most transitions proceed smoothly; children appear to know what they are to do; challenging behaviors are infrequent, some children need adult reminders or guidance to follow transition steps.	Many transitions are smooth; some children appear self-directed; some individuals do not and require reminders and guidance to follow transition steps.	Most transitions are rough; wandering, overly-active behavior, disruption, and conduct problems are common; many children need guidance in order to follow transition steps.	Transitions are chaotic, loud, overly-active, and involve much misbehavior and/or anxiety among children; most children do not appear to understand transition steps; adults sometimes resort to controlling and harsh behaviors to maintain control.
Children learn new concepts, language, or skills during each transition; literacy is frequently used to guide children's behavior.	Many transitions teacher children concepts, language, or skills; literacy is periodically used to guide children.	Several transitions per week teach children specific concepts, words, or abilities; literacy is rarely used as part of transitions.	Transitions rarely teach children particular content or skills; transition activities appear to be designed primarily to move children from point A to B.	Transitions do not appear to teach children any new knowledge and skills.

Ensuring Fidelity

| Advanced Implementation 5	4	Emerging Implementation 3	2	Poor Implementation 1
Each group time has **an effective introduction** that grabs children's attention and gives an advance overview of what will be discussed, **and a closure** that summarizes or synthesizes what has been learned; a highly creative, "cognitively-oriented" send-off activity has been planned that transitions children to the next activity.	An introduction and closure are planned for each group time activity; the former effectively captures children's attention and introduces the topics to be discussed; the closure summarizes what has transpired in the group; send off activities are less creative and cognitively-oriented; the same closure is repeated without variation.	Introduction and closure activities are clearly planned; the introduction is effective in capturing children's attention, but does not always "set the stage" for upcoming activities of the group time; a closure signals the end of group time, but does not always summarize the activities or learning that occurred; send off techniques are less creative and often repeated.	Introduction and closure activities are planned, though they lack the effectiveness to capture children's interest or summarize all that has been learned in group time; send-off techniques are not effective in achieving smooth transitions to the next activity.	An introduction and closure, including a send-off strategy, are not found in the plans, nor observed in the structure of each group time, itself; group time simply begins and ends, without these pre- and post-activity elements.
Teachers use **positive and effective management techniques** in group times that keep individual children involved, draw in children who "drift" or grow restless, and effectively resolve conduct problems or disruptions.	Teachers use a variety of management techniques during group time to maintain children's attention and positive behavior; many of these strategies are highly effective, though some are less so for individual children.	Teachers use several different management strategies to maintain attention and positive behavior during group time; these are moderately successful, though there are occasional challenging behaviors that interrupt group time activities.	Teachers use only a small number of strategies to engage children or address challenging behaviors at group time; varied approaches are not tried; most group times are disrupted by children's behavior or lack of attention.	Teachers use only harsh or negative management strategies to quiet or engage children in group time activities; these are relatively ineffective and/or fail to keep children engaged for even short periods of time.
Teachers always use gestures, visual displays, animated voices, and other **visual and auditory cues** to keep children in involved.	Teachers often use visual or auditory cues to engage children; they assume an animated, engaging style of presentation.	Teachers periodically use auditory and visual cues and an animate voice to keep children engaged; sometimes such cues are lacking and would increase participation and attention.	Teachers rarely provide visual or auditory cues to help children learn; teaching behaviors are somewhat flat, lack enthusiasm, or fail to excite children'	Visual displays, gestures, body language, and animated teaching are not observed.

Webbing WHEELS

Wheel Web 1

- From class
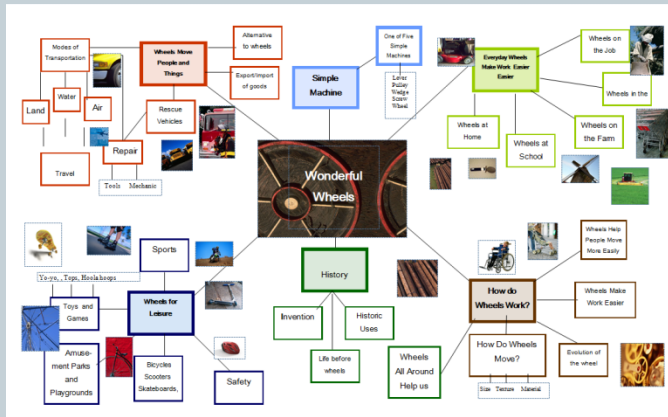
Wheel Web 2

- Center web
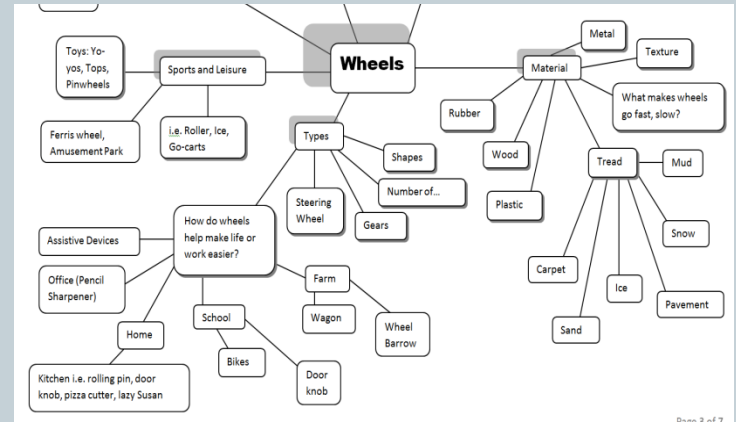
Bones Newsletter

- Sharing with Families
- Sharing with colleagues
- Documentation panel
- Under publication

Plan Books

- ❑ Plan books
- ❑ Customized to meet the schedule, assessment, individual needs, and other curriculum components.
- ❑ Will post

Conclusion

❑ **Math and science** spans across the curriculum

    ❑ **Rich investigations** , planning, and scaffolding make it possible!

❑ **Unique topics** with preschoolers are not to be feared but rather embraced. If we as teachers take risks, our students will too.

❑ **Extended and in-depth studies** provide children with opportunities to explore; it sometimes takes a while for children to 'warm up' to the investigation. We need to practice **temporal patience.**