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Handout for STEMIEfest 9-15-2020

Framework for STEM Learning for Infants and Toddlers

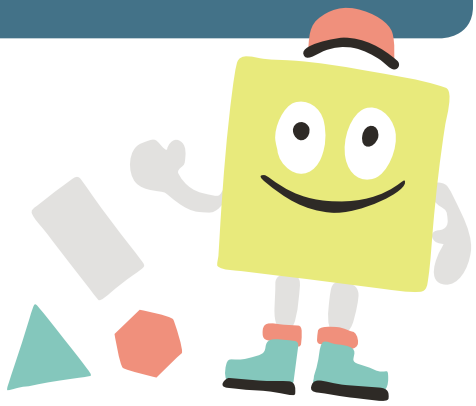
Inquiry & Problem Solving	What does the adult do?	How might adaptations enable children to participate in the activity?
Engagement/Interest	Watches child for body language that shows interest or different facial expression or to see where child is looking or pointing or verbalizing that shows interest	Big Mac switch that when activated says "This looks like fun" (or similar generic message.)
Observation	Talks about the child's behavior ("I see that you are excited about taking a bath)," where the child is looking and what the adult is interpreting ("I see you looking at the blocks and am wondering if you want to play with them.")	Think about physical access to the activity – generally this means sitting in a chair at table height or on the floor or standing
Exploration	Verbally describes/narrates what the child is doing; Expands descriptions to add vocabulary ("you're smelling the flower; you're smelling the white flower").	Consider ability to grasp and let go, hold, or manipulate materials used in the activity.
Experimentation & Conclusions	Uses statements such as "I wonder if the toy that is floating could also go under the water?" Ask closed-ended yes/no questions for children with limited verbal expression and open-ended questions so that children may express what they are thinking and learning.	Consider manipulation materials used in the activity and use demonstration when a child is unable to manipulate even with adaptations or provide another way with pictures or objects; Modify the activity itself so that cognitive experiences are foundational – e. g., simple cause and effect). Provide alternate ways for child to communicate (e.g., picture cards; voice output device)
Problem-Solving	Narrates "problems" that are created by children ("I see that you want to put the sprinkles on the cake. How do you think we could get them on there?") Or creates problems to be solved ("We have blue and green sprinkles. Which should go on the cake first?")	Modify the activity itself so that cognitive experiences are foundational – e. g., simple use of one tool to solve a simple problem (e.g., hitting a container with your hand or an object to knock it over and get the objects that are inside.) Or asking for assistance for a manipulation that the child is unable to do (e.g., child pushes jar to adult to open to shake sprinkles.)

Adaptation Hierarchy

The Goal: Use the least intrusive adaptation. If an adaptation is not having the result you want, try the next least intrusive adaptation.

LET'S TALK, READ AND SING ABOUT STEM!

TIPS FOR INFANT/TODDLER TEACHERS & PROVIDERS



From birth children are inquisitive. You can nurture early **science, technology, engineering and math (STEM)** concepts and skills through daily routines and play and exploration activities that you provide for the babies and children in your program. By talking, reading, singing, playing, signing, or using other ways to communicate – whatever works best for your infants and toddlers – you can help them purposefully develop STEM skills. For example, count a baby's toes, describe the changing leaves with children, or talk with a toddler as you play with blocks together!

Research shows that having a strong foundation in early math, for example, can lead to higher achievement in both math AND reading later in school.[1] In addition, interacting with many different materials in early childhood prepares students for science and engineering later in school. Use the **bolded STEM words** in these tips to communicate about **early STEM concepts** with young children every day. It's never too early to start!

Partner with families and encourage them to try these strategies at home, in their home language. Early exposure to home language instruction is critical for fostering a rich sense of self, and research has shown that students who are bilingual have certain cognitive and social benefits that facilitate success in school and life.[2]

For children with disabilities or developmental delays, communicate with their other service providers and keep each other informed about the strategies you are using to enhance their language environment.

While we provide some tips, we know every child is unique. As always, you should do what is best and most developmentally appropriate for each child.

WHAT IS STEM?

"STEM" stands for **science, technology, engineering and math**. STEM can refer to the subjects individually or one or more working together, but can also mean a way of doing things that includes solving problems, asking questions, and exploring the world around us.

For example, children learn about the concept of technology when they're exploring tools or simple machines and investigating how they work. These can be items they use every day like a pair of scissors, or things they might see like the wheels of a car as they walk outside.

For young children, we focus on STEM through exploration, play, and building curiosity about the natural world and the way things work. STEM learning is important for everyone and can happen anytime, anywhere. The real-life skills that people develop when learning STEM help make everyone better problem-solvers and learners.

For children who are learning English as an additional language, talk about **STEM** in the children's **home language**, in English, or both. Research shows that bilingual children have greater mental flexibility, which may be helpful in understanding math concepts.

Source: Zelasko, N., & Antunez, B. (2000). If your child learns in two languages. National Clearinghouse for Bilingual Education.

LET'S TALK STEM TIPS

- **Let's discover the world!** Observing is important in science. Talk throughout the day about what you see and what children are looking at: "Wow, I love that **big** red truck you are playing with! How many wheels does it have? **1, 2, 3, 4** wheels. Four wheels **all together**."
- **Use STEM language in everyday routines.** During snack time, encourage children to lift the **heavy** apple and the **light** napkin. Show children a **whole** sandwich being cut into **half**.
- **Ask open-ended questions.** These are questions that encourage children to respond with more than a "yes" or "no" answer. Ask children to describe objects and toys around them. Encourage them to compare the **size, shape, color, texture, smell** and **weight** of different objects.
- **Use books.** During reading time, use STEM language, too. **Count** objects on a page out loud for infants, or ask toddlers if they can find a **square** or a **triangle**.
- **Follow the child's lead.** Focus on your child's interests to create STEM learning opportunities. Observe children closely and see what they are pointing to, looking at or seem curious about. If the child is excited about playing with dolls, **count** the doll's arms and legs, talk about the **shape** of the doll's eyes, and compare the **size** of the doll to other toys. Is she **bigger** or **smaller**? **Taller** or **shorter**?
- **Make discoveries together!** Go outside and explore new objects. Talk about them and **compare** them. How many different types of leaves can you find? Can you find a **small**, **medium**, and **large** rock? Can you find a **square** object and a **circular** object?
- **Sing about STEM!** Songs with **repetitive patterns** like "Old MacDonald Had a Farm," "Wheels on the Bus," or "Los Cinco Hermanitos" can teach children about patterns.
- **Make it fun!** Children are naturally curious. Children learn best through play. Teach children **spatial awareness** skills by playing simple games like peek-a-boo. Teach them about the position of their own bodies in relation to others (e.g., next to, in front of, above, behind, etc.).

STEM CONCEPTS & ACTIVITIES

MEASUREMENT

Children develop **measurement** skills as they explore the **size**, **length**, **height**, and **weight** of people or objects—like when they describe a baby sibling as **little** and themselves as **big**.

- Babies learn about distance when they need to adjust their own movements to grab something they're interested in. Place infants' toys **nearby** and others a bit **farther away**, but still within reach. Put words to their actions: "You are reaching so **far** to get the ball!" Or, "That one is very **near**—can you get it?"
- Toddlers can start comparing objects by size. Teach them about large and small. Ask them to sort a set of objects from **smallest** to **largest**. Help children learn by asking questions like "Who is **taller**?" and "Which ball is **heavier**?"
- At the park, you can explore and measure everyday objects together. Use a stick or a leaf to see how **long** or **tall** the slide is. Is it **three or four sticks long**? Build skills to create future **scientists** by exploring and measuring things together!

COUNTING, ADDITION & SUBTRACTION

When you **count** with children and point out how amounts change when you **add** or **remove** objects, you help lay the foundation for **addition** and **subtraction** (and, much later, multiplication and division).

- Teach infants about the concept of "**more**" –the first step toward understanding addition. As you feed a baby, pause and ask if she wants **more**. Wait to see how she responds to your questions and read her cues.
- Use numbers with infants as you go about your day together. **Count** the steps as you walk up or down them, or a baby's fingers or toes while you play.
- Sing simple number songs like "**One**, **two**, buckle your shoe" and "Tres Pececitos."
- Play "silly stacks" with toddlers. Count as the toddler stacks blocks. Stack two blocks or objects and then ask the toddler, "Do you want **one more**?" Keep offering **one more** for the child to add to the stack. Building together can inspire future engineers!
- At the playground, ask toddlers to count **how many** big-kid swings you see, and how many little-kid swings. Then count the two groups of swings **all together**.

SPATIAL RELATIONS

Children develop **spatial relations** skills as they explore and learn to compare shapes and sizes of objects, space and position like **on top of** and **under**, and direction and movement—following and predicting the path of a moving object, like a rolling ball. These simple activities can build the foundation for later math and engineering skills.

- When you move infants from one position or place to another, put words to your actions. Say "**up, up, up**" when you lift baby from the changing table, crib, or floor. When you place her down, say "now **down, down, down** you go to play!"
- Make an obstacle course with pillows for babies to climb over and to sit on. As the baby explores the course, describe their position in words: "Now you're sitting **on top of** the cushion! Now you're crawling **over** it. You went **around** it!"
- Give toddlers a large cardboard box to climb **inside** and **outside** of. Describe their position as they play. Provide empty boxes or kitchen containers of various sizes for children to stack or place **inside of**, **next to**, or **behind** the larger box or each other.

SHAPES

Teach your child the names of shapes and what makes them different. Understanding **shapes** is one of the early math and science concepts that children develop, like knowing that a **triangle** has **three straight sides** and **three angles**.

- Encourage babies to explore the shapes of objects using their sense of touch. With an infant, hold an orange in your hand and say, "An orange is **round** and **smooth**." Hold a dish towel and say, "This towel is a **rectangle** and feels **soft**." Ask questions that encourage observation and description, like "Which fruit is red? Can you find the yellow fruit?"
- Explore shapes by rolling a ball back and forth, stacking **flat** objects on top of one another, or putting small objects inside a box or bucket. Use words to describe the activity such as, "The ball is **round** and **rolls**," "The newspapers are **flat** and make a neat stack."
- Have a shape snack with toddlers. Offer a **square** (or **rectangle**) cracker. Cut a grape in **half** to show children its **round** shape. Cut a piece of cheese into a **triangle**. Talk about and trace each shape with your finger before you eat it. Ask children, "Would you like your sandwich cut in **four triangles** or **four squares**?"
- Point to shapes in the world around you. A stop sign is a red **octagon with eight sides**. The clock in a classroom is a **round circle**.

PATTERNS

Thinking about **patterns** helps children make sense of math and science; it helps them predict what will happen. A pattern is as easy as something that repeats more than once—like red, blue, red, blue, red, blue. Or it's light during the day and dark at night.

- Routines help babies feel safe and secure, and also build an early understanding of patterns. A **daily routine** is a pattern for infants. You might say: "It's time for a nap. Let's do our routine – diaper, milk and a story."
- Share songs that have **repetitive** patterns, like "Old MacDonald Had a Farm" and "Wheels on the Bus." Try rhymes with hand movement patterns like "Itsy-Bitsy Spider."
- Help children make a **pattern** with crayons. Place one pointing up, the next pointing **down**, etc. As you make the pattern, ask, "**What comes next?**"

EARTH, PHYSICAL, AND LIFE SCIENCE

Children are natural scientists, and it's never too early to start learning basic science skills like **observation** and **prediction**.

- Encourage toddlers to use **all their senses** as they observe and explore the natural world. Take a nature walk. Ask **open-ended questions** as they explore nature like, "What does it **look** like? **Feel** like? **Smell** like? **Sound** like?" Or, "I **wonder** what those ants are doing? Let's take a closer look."
- Conduct fun **investigations** together. Mix different colors of paint together to see what new colors you can create. "I wonder what color we will make." You could also provide a large container of water and a variety of objects, and make predictions aloud on whether each item will **float** or **sink**.

ENGINEERING SKILLS AND CONCEPTS

Children can explore early engineering skills through building models, trying out new ideas, and designing structures.

- Encourage children to describe structures they see outdoors (e.g., bridges, buildings, towers). To support children's engineering skills, talk together about the buildings and other structures in your neighborhood. Encourage children to describe how they look (**tall**, **short**, **pointy**, **wide**, etc.) or what kinds of **materials**, **tools**, or **machines** they were built with.
- Create a **ramp** with a cardboard box or wooden board. Place objects with different **shapes** and **materials** at the top to find out what they do on the ramp. Some might **roll**. Some might **slide**. Some might not move at all! Talk about the attributes of objects that roll and those that slide.

TECHNOLOGY

Explore **technology** with children by observing and using simple **tools** and **machines** you find around you.

- Encourage children to explore toys that have wheels and those that do not. Take the **wheels** off a toy car or find a broken one so children can explore and compare function.
- Let children explore tools like spoons, forks, popsicle sticks, and plastic shovels and rakes. Have children use the "wrong" tool for the job (e.g., a fork to eat soup or a rake to dig). This helps even young children focus on the function of the "best" tool and about other ways to solve the problem.

You can find more tips like these—as well as videos, information, and more—at Too Small to Fail and Let's Talk about Math. Other early childhood STEM resources can be found at the Early Childhood Learning & Knowledge Center. Track the development of the children in your program and encourage families to the do the same by using the Milestones Moments Booklet. If you have concerns about a child's development, including their language development, talk to the child's family about it. Ask them if they have concerns and if they observe the same issues at home. With their permission, conduct a developmental and behavioral screening and encourage them to talk to their primary care provider.

For more information on developmental and behavioral screening, visit Birth to Five: Watch Me Thrive! and Learn the Signs. Act Early. For more information on early learning, please visit the National Center on Early Childhood Development, Teaching, and Learning (NCECDTL), Head Start's Center on Quality Teaching and Learning, Early Head Start National Resource Center and the U.S. Department of Education early learning webpage.

For more information on working with young children who are learning more than one language, please visit Head Start's National Center for Cultural and Linguistic Responsiveness and the National Clearinghouse for English Language Acquisition (NCELA). For more information on making the language environment richer for children with developmental disabilities or delays, please visit the Center for Early Literacy Learning, and Facts about Developmental Disabilities. For resources on building language, see the Talk, Read, and Sing Together Every Day! tip sheets.

NOTES

1. K. Denton and J. West, "Children's Reading and Mathematics Achievement in Kindergarten and First Grade (Washington, DC: U.S. Government Printing Office, 2002). A. Claessens and others, "Kindergarten skills and fifth-grade achievement: Evidence from the ECLS-K," Economics of Education Review 28(4) (2009): 415–427. G. Duncan and others, "School readiness and later achievement," Developmental Psychology 43(6) (2007): 1428-46.

2. Diaz, R. (1985). The intellectual power of bilingualism. In Southwest Hispanic Research Institute, Second language learning by young children. Albuquerque, NM: University of New Mexico. Zelasko, N., & Antunez, B. (2000). If your child learns in two languages. National Clearinghouse for Bilingual Education. Retrieved from http://www.ncela.gwu.edu/files/uploads/9/IfYourChildLearnsInTwoLangs_English.pdf

STEM MOMENTS: EVERYDAY FUN WITH SCIENCE

Young children, beginning from birth, are naturally curious about science, or the study of the natural world. They are drawn to questions that help them make sense of their world like how birds fly, why leaves change color, and which objects sink and which float in the tub. At the same time, young children are also fascinated with the process of doing science—exploring cause-and-effect, discovering patterns, and more.

In the early years, children use scientific practices like:

- Making observations and noticing similarities and differences;
- Asking questions;
- Describing animals and plants, and natural processes like rainstorms;
- Predicting what will happen next in a process;
- Providing explanations for processes they observe—such as why there is thunder;
- Using tools to further exploration, such as binoculars, a shovel, or measuring cups.

By following your child's lead, describing his actions and discoveries, and guiding this learning, you help your child begin to understand big ideas about science.

LEARNING STEM THROUGH PLAY: PARENT-CHILD PLAY ACTIVITIES THAT SUPPORT SCIENCE SKILLS

0–12 MONTHS Play games that help your baby understand cause-and-effect—like figuring out the doors and buttons on a busy box or learning to flick the light switch from your arms.

12– 24 MONTHS Give your young toddler opportunities to explore the natural world through her senses—like looking at, touching and tasting different fruits at snack-time. Ask questions like, What do you see? What does it feel like? How does it taste? Talk about what feels smooth or rough, the colors you see, or how a food tastes sweet or sour.

24–36 MONTHS Give your toddler simple tools to safely explore and discover—like using a magnifying glass to look closely at the colors and textures of veggies before you put them in the salad or using a strainer to separate leaves from sand in the sandbox.

3–5 YEARS Encourage your preschooler to notice the plants and animals in his world. Offer him a little bag or bucket to collect different leaves, rocks, or seeds at the park. Talk about all the animals the two of you see on the way to the bus-stop. Which fly? Which climb? Where do they live? What do they eat? Talk together about your child's observations and questions. It's okay if you don't have all the answers…just let your child know: "We can find out together!"

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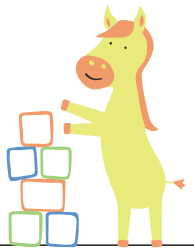
STEM MOMENTS: EVERYDAY FUN WITH ENGINEERING AND TECHNOLOGY



Engineering is the process of using math, science, and technology to create, innovate or solve a problem. Technology describes the tools that children use to observe, measure, and experiment. Think of a toddler whose ball has rolled under a chair. She uses a toy rake to reach it and, in 30 seconds, shows us she's an engineer who uses the rake as a "technology" tool to solve her problem. With support from parents and caregivers, children—starting at birth—can learn to think like engineers and problem-solve throughout their daily routines and activities.

From birth to five, children develop an understanding of engineering and technology as they:

- Experiment with solving the problems they encounter in their world;
- Use and combine objects in new ways—like leaning a piece of cardboard against a pile of books to make a ramp;
- Test how things work, like turning a light switch on and off;
- Make predictions, like predicting how high a block tower can be built before it falls; and
- Use information about what works and doesn't work to improve their creations.

Young children learn about engineering and technology through their own exploration and by talking, watching, and playing with you. When you follow your child's lead and describe his actions and discoveries, you help him learn these important STEM skills.

LEARNING STEM THROUGH PLAY: PARENT-CHILD PLAY ACTIVITIES THAT SUPPORT ENGINEERING SKILLS

0–12 MONTHS Give your baby lots of opportunities to explore materials and combine objects during play. Let her drop spoons in a metal bowl or show her how to tap a spoon on the bowl. Point out how the "shiny, metal spoon" sounds loud!

12– 24 MONTHS Encourage your young toddler to build using boxes of different sizes—empty cereal boxes, shoe-boxes, and more. Use words like big, small, tall, wide or square to describe the boxes as he plays. Point out what makes the tower stronger, like starting with a flat, solid base. And remember that knocking it down and starting over is half the fun!

24–36 MONTHS Give your child some technology to explore: Lean a piece of cardboard against the side of a chair. Let your toddler roll balls or cars down the ramp and talk about how far and fast each one goes. Test ramps that you find in your community, like rolling pinecones or balls down the slide at the park. What makes objects go faster or slower down the ramp?

3–5 YEARS Give your preschooler challenges to try. How many plastic cups can she stack while you set the table? Can she find a different way to dig a hole at the park, without using a shovel? Talk about her experiments by asking questions like, "What do you think will happen if..." Or, "What else could we use to..."

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Infants and Toddlers Block Play: STEM in the Blocks Center

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PURPOSE OF BLOCK PLAY IN THE INFANT- TODDLER CLASSROOM

Blocks are timeless, classic play materials that have endured as an activity through many different ideologies and beliefs and theories of child development. Playing with blocks provides endless opportunity for the development of emerging perceptual-motor skills (Hendrick & Weissman, 2006, p. 65).

Blocks can be an integral part of the learning environment throughout childhood beginning with infants and toddlers. Babies are intrigued by blocks. They love to hold them in their fists, mouth them, and bang them together. By the time they are 6 months old. they can be endlessly engaged in a game where a block is partially hidden under a blanket so that the infant can retrieve it. As they develop the ability to sit, stand, and move, babies can have prolonged interest when adults vary the number of blocks, the types of blocks, and the area in which the baby plays with them.

As toddlers develop more muscle control, they learn to stack and line up the blocks. They reveal their developing cognitive skills as they attempt to build basic structures by combining the blocks together. At around eighteen months, toddlers begin displaying their creativity and imagination (Sarama & Clements, 2009) such as holding two colored window blocks in front of their eyes and looking through them to suggest glasses. Adults can support the development of children ages twelve to twenty-four months by imitating what they do and then adding subtle variations in order to invite further explorations (Kamii, Miyakawa, & Kato, 2004).

As children grow and develop in their block play, their understanding of the complexity of blocks and how they compare and contrast to one another is enhanced. Their developing understanding of and familiarity with the materials enables them to construct more elaborate and complex structures: the foundations of science, technology, engineering, and math skills.

WHAT DO INFANTS AND TODDLERS DO WITH BLOCKS?

- Bat at blocks before they are able to grasp
- Reach for blocks that are placed in proximity to their play area
- Manipulate and feel blocks with hands
- Grasp
- Pass from hand to hand
- Bang two blocks together
- Put blocks in mouth
- Engage in volumetric block play
    - Dumping out a tub of blocks
    - Placing blocks in containers (such as tubs, baskets, or muffin tins)
- Carry blocks around the room
- Drop blocks repeatedly and watch them fall (especially if in a high chair)
- Look for a hidden block (approximately 8-12 months)
- Knock over block structures erected for them
- Stack blocks as high as they can and knock them over (toddlers)

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What are infants and Toddlers Learning when engaging in block play?

Block play is a rich context for physical development as well as cognitive, math, science, and social-emotional learning. Infants and toddlers practice eye-hand coordination when they reach for and grasp, knock down, or stack blocks. They develop both **fine and large motor skills** as they figure out how to grasp, bang, stack, and carry blocks.

When adults play with blocks with infants they promote the development of **object permanence** (the understanding that objects continue to exist even when they cannot be seen, heard, touched, smelled, or sensed). The development of cognitive skills continues as infants and toddlers play with a variety of blocks. They encounter the **science** of physical properties as they mouth, grasp and manipulate, drop, or bang different kinds of blocks together to make interesting sounds. Toddlers experience the effects of gravity and balance; cause and effect.

Infants and toddlers engage in **mathematics** as they begin to notice likenesses and differences, begin matching, grouping, classifying, and organizing. They grapple with spatial thinking as they place blocks on, under, in front of, and behind each other. Babies begin stacking objects at one year, which demonstrates the infant's understanding of the spatial relationship of "on" (Kamii, Miyakawa, & Kato, 2004). The "next-to" relationship develops at about 18 months and two-year-old toddlers begin to place blocks on or next to the block previously placed (Stiles-Davis, 1988). Two-year-olds appear to understand that blocks do not fall when stacked carefully on one another (Kamii, Miyakawa, & Kato, 2004).

The ability to construct a tower that uses the builder's knowledge of balance has been linked to high performance in math and science starting in middle school. Children who work with blocks in the early years outperform their peers who have not had these experiences in math and science because of all of the mathematical concepts that can be addressed through block play.

Finally, through block play, infants and toddlers can exhibit their developing **emotional regulation** when they show surprise and anticipation when the blocks are introduced or when they are able to calm themselves when frustrated. Block play provides many opportunities to develop problem solving skills, the power of imagination, persistence, and confidence in their ability to create.

Stages of Infant and toddler Block Play

Stage 1: Discovering During this stage infants and young toddlers learn about the properties of blocks by mouthing, touching, moving, holding, and feeling them.

Stage 2: Carrying Carrying typically begins in children under the age of two. During this stage blocks are generally not used for construction. Children carry blocks around from place to place, explore them with their senses (touch, sight, taste), hit blocks together or against other objects to explore sound, and dump them in piles from containers filled with blocks.

Stage 3: Stacking The number of blocks that a child can stack is correlated with their level of motor development. A 15-month old can stack 2 blocks, an 18-month old at least 4 blocks, and a 24-month old can stack 5 or more blocks. Stacking may:

- be either vertically in towers or horizontally in rows (demonstrating relationship of ***on*** and ***next to***)
- be haphazard
- be meticulous (demonstrating toddler is noticing congruence)
- be in multiple rows and towers
- resemble floors and walls
- show flexibility in integrating parts of the structure

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Ways Adults Can Extend the Learning in Block Play

Adults can be the most effective in their teaching when they are aware of infants' and toddlers' developmental levels and previous experiences. This begins when they provide an environment that inspires infant and toddler interests and ideas and allows them to try out their ideas. Suggestions to create such an environment include:

- Provide a stable, flat surface such as a low table or floor for building that allows play to grow.
- Add loose parts that entice toddlers to engage in a variety of play scenarios.
- Add farm animals, construction vehicles, plastic food, and baby dolls to the block area.
- Post pictures of buildings or structures on the wall in the blocks area.
- Keep out only a number of blocks that toddlers can put away on their own or with minimal help.
- Provide woven baskets or other attractive containers for ease of clean up.
- Provide containers of various sizes for dumping and filling blocks.
- Take digital pictures of toddlers as they build structures and display them where the toddlers can easily see.
- Add pictures of children to cylindrical blocks to encourage interest in the blocks center.
- Know when to make comments and ask questions and when to sit quietly to observe.

Comments and Questions For Adults to Consider

Comments

Let's see what happens when you _____.

Look how high that is. I wonder if they could go higher.

Oooh, you stacked that one on top. Now there are 1-2-3-4-5-6 blocks on the tower.

I wonder what would happen if you turned that piece around and tried again.

I see you playing here often. You really like this center.

You are putting all of the red blocks in one bucket. You're sorting! It looks like the blue blocks are going into the basket. You have lots of blocks in your pile!

You look upset about something. How can I help you feel better?

Questions

Could you do this in another way?

Can you find one to use with this?

How are these things the same?

How are these different?

Can you find one that can……?

Could you make another one like it? Bigger? Smaller?

What did you do first?

What else could you find that might work?

That's a problem! What can you do about it?

What happened to all of these?

Which pieces did you use to make that?

Do you think you can make that go higher?

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KINDS OF BLOCKS AND MATERIALS TO CONSIDER IN AN INFANT (0-12 MONTHS) AND TODDLER (12-36 MONTHS) BLOCK CENTER

Age	Needs
Infants (0-9 months)	Selection of blocks with various sizes, weights, textures, & colors Enticement from adult or older play partner to engage in sensory motor play Soft cloth, vinyl, or foam blocks that won't hurt when mouthed and can be washed after use Containers such as cans or boxes that can be filled with blocks and dumped (over & over)
Mobile Infants (6-12 months)	Not too many – enough to make a short stack or dump and to invite exploration Rotate kinds of blocks regularly to provide a range of block sizes, shapes, & types Blocks in different shapes that they can grasp Containers to drop blocks into
Young Toddlers (12-24 months)	Large, soft foam blocks for stacking & knocking down Large interlocking blocks such as Mega Bloks® or Duplos® Thin plastic boxes or empty cardboard cartons or boxes that can be knocked down Medium-sized wood blocks in a variety of shapes & colors Wagons for hauling Buckets/baskets for carrying Boxes to pile the blocks Suitcases or briefcases to pack the blocks
Older Toddlers (24-36 months)	Protected block area so children can build &save their structures Many different types of blocks & of a quantity so multiple toddlers can build A good set of wood unit blocks including arches, pillars, ramps, & curves (essential) Large hollow blocks Small color cubes Large interlocking blocks (Mega Bloks® or Duplos®, bristle blocks) Interesting blocks to inspire imagination (window blocks, magna-tiles, natural tree blocks) Materials to support dramatic/creative play (toy people, animals, vehicles, trees, wooden trains & tracks) Materials to encourage pretend play (small pieces of fabric, colored paper, foil) Fiction & non-fiction books about building

LINKS TO DIRECTIONS FOR DIY BLOCKS

Cardboard Building Blocks b-inspiredmama.com/recycled-diy-toys
Milk Carton Blocks blogshewrote.org/milk-carton-blocks
Home-Made Wooden Blocks thecreatedhome.com/diy-wooden-blocks-kids
Jumbo Building Blocks thestay-at-home-momsurvivalguide.com/diy-jumbo-building-blocks
Wooden Tree Blocks adventure-in-a-box.com/how-to-make-waldorf-inspired-nature-blocks-creative-challenge
Fabric Blocks for Baby andnextcomesl.com/2014/07/homemade-personalized-fabric-blocks-for.html

RECOMMENDED RESOURCES/READING

Gura, P., & Bruce, T. (1992). *Exploring learning: Young children and blockplay.* London, UK: Paul Chapman.

Hendrick, J,. & Weissman, P. (2006). *The whole child: Developmental education for the early years and early childhood settings and approaches.* Columbus, OH: Merrill.

Kamii, C., & DeVries, R. (1978/1993). *Physical knowledge in Preschool Education: Implications of Piaget's theory*. New York, NY: Teacher's College Press.

Kamii, C., Miyakawa, Y., & Kato, Y. (2004). The development of logico-mathematical knowledge in the block-building activity at ages 1-4. *Journal of Research in Childhood Education, 19*,44-57.

Lewin-Benham, A. (2010). *Infants and toddlers at work*: *Using Reggio-inspired materials to support brain development.* New York, NY: Teachers College Press.

Provenzo, E., & Brett, A. (1983). *The complete block book*. Syracuse, NY: Syracuse University Press.

Sarama, J., & Clements, D. (2009). Building blocks and cognitive building blocks: Playing to know the world mathematically. *American Journal of Play, 1*, 313-337.

Stiles-Davis, J. (1988). Developmental change in young children's spatial grouping ability. *Developmental Psychology, 24*, 522-531.

Wellhausen, K., & Kieff, J. (2001). *A constructivist approach to block play in early childhood.* Albany, NY: Delmar.

Resources within Reason

STEM Resources for Young Children with Disabilities

Jessica Amsbary, Hsiu-Wen Yang, Camille Catlett, & Chih-Ing Lim

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All young children are born ready and able to engage in early science, technology, engineering, and math (STEM) learning opportunities. Young children are naturally interested in many STEM-related concepts such as exploration, cause-effect, and problem-solving. Facilitating STEM learning early may improve long term outcomes for children and their families. These resources to help early educators, families, and specialists target early STEM learning opportunities for young children with and without disabilities.

STEM Learning Brief

STEM learning is important, yet not all children have equal access to STEM learning opportunities. This discrepancy is especially evident for children with disabilities. This brief report provides an overview of the importance of STEM education for all young children.

http://cadrek12.org/sites/default/files/DRK12-Early-STEM-Learning-Brief.pdf

Let's Talk about STEM Video Series

In order to do something or integrate a new learning target at school or home, video examples can be helpful. This video series created by Zero to Three is intended to help parents and caregivers facilitate early STEM learning experiences in daily activities and play. These resources are also available in Spanish.

https://www.zerotothree.org/resources/series/let-s-talk-about-stem-video-series

Little Discoverers by Sesame Street

This STEM-focused website, created by Sesame Street, includes a number of practical tools for addressing early STEM learning for young children. There are games, videos, and art activities for educators, specialists, and families to use with their children. Family and educator newsletters with resources and strategies are also available.

https://www.sesamestreet.org/toolkits/stem

Let's Talk, Read, and Sing About STEM

This tip sheet offers resources for families with young children and professionals. It includes specific tips for infants, toddlers, and preschoolers, as well as ideas for supporting children who are dual language learners.

https://www2.ed.gov/about/inits/ed/earlylearning/talk-read-sing/stem-toolkit-families.pdf

STEM Innovation for Inclusion in Early Education Center (STEMI$_2$E$_2$)

The U.S. Department of Education funded this center to develop the knowledge base and provide technical assistance focused on engaging all children, especially those with disabilities, in early STEM learning opportunities. Researchers at STEMI^{2}E^2 are working on developing learning trajectories focused on science, technology, engineering, and STEM, and developing recommended practices for engaging all children in early STEM learning. The STEMI^{2}E^2 team is also developing resources to support families and practitioners including a storybook conversations series, STEM in daily routines series, video examples, and tele-coaching supports. Join the STEMI^{2}E^2 early learning community to connect with colleagues who are interested in early STEM learning!

https://stemie.fpg.unc.edu/ (website)
https://stem4ec.ning.com/blog (learning community)

PEEP and the Big Wild World

Funded by the National Science Foundation and created by WGBH, 9 Story Entertainment, TV Ontario, and American Public Television, PEEP began as an animated video series to help young children learn about science and math. PEEP now includes videos, games, and activities for children as well as resources for families and educators to develop STEM learning activities. The DIAGRAM Center and WGBH's National Center for Accessible Media have also developed accessible PEEP activities.

http://www.peepandthebigwideworld.com/en/kids/ (kids)
http://www.peepandthebigwideworld.com/en/parents/ (families)
http://www.peepandthebigwideworld.com/en/educators/ (educators)
http://diagramcenter.org/peep.html (accessible activities)

Resources within Reason is a free, one-way listserv provided by the Division for Early Childhood (DEC). All resources are evidence-based, readily available and free.

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Want to receive this listserv directly? Go to **http://www.dec-sped.org/resources-within-reason** and click "Join the Listserv".