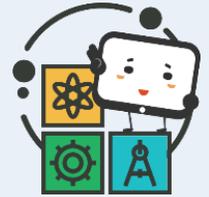


A GUIDE TO CHILD-LEVEL PROCESSES

Child-level processes are an iterative set of practices where a child is performing or doing something to answer a question (Bybee, 2004).



In this document, we define and describe child-level processes in STEM learning for all young children, including children with disabilities. We provide definitions, examples, and learning progression steps for each child-level process.

Learning Progression

A child’s progression of learning, or how their STEM (science, technology, engineering, and math) knowledge develops, is cultivated through their experiences, observations, and guidance from people in their environments.



Child-Level Processes:

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Analyze & Interpret

Examines and evaluates information in order to explain something

- They determine that the plastic shovel is better at moving water than a cup or their hands because it can scoop more water
- They see the overhead light go on in the kitchen when their sibling flips the light switch, so when their sibling walks past the light switch again on their way back from the sink, they point at the light switch and sign "again," so their sibling flips the switch, and the light goes off, then they say "again", and their sibling complies, and they smile when the light comes back on



Ask

Seeks information to answer a question

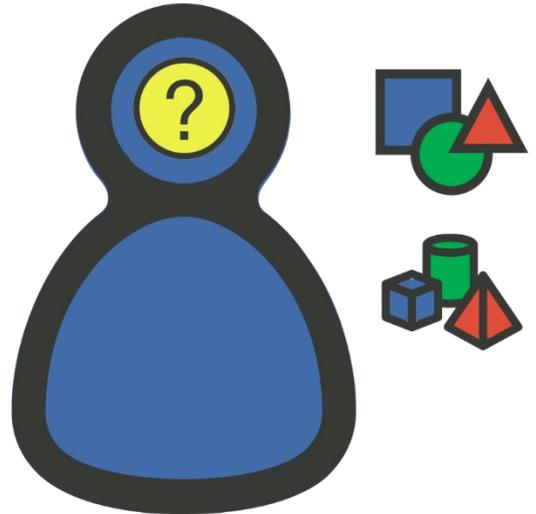
- Ask 'Why is it raining?'
- Picks up a new toy and drops it to see what it does
- Asks "why" when a family member tells them to put on their boots
- Asks if they can wear plastic bags inside their sneakers instead of wearing boots to keep their feet dry as they run errands in the rain



Classify

Arranges things and/or objects according to a specific characteristic

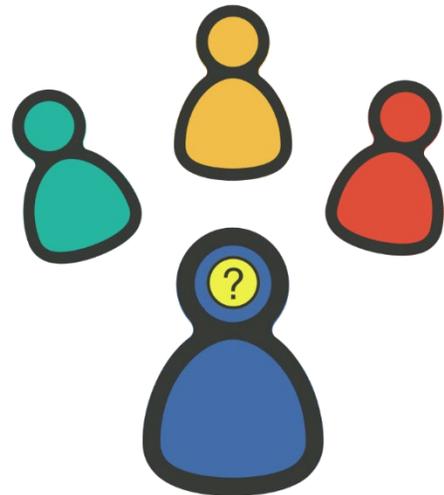
- *When cleaning up before bed, the child puts their books in the bookcase, the blocks back in the bin, and the now dry rain gear in the closet.*
- *When playing with a set of toy dinosaurs, they put all of the plant eaters in one area and all meat eaters in another area*
- *Explains to their sibling about the way they decided to arrange the dinosaurs*



Collaborate

Shares ideas and works with others

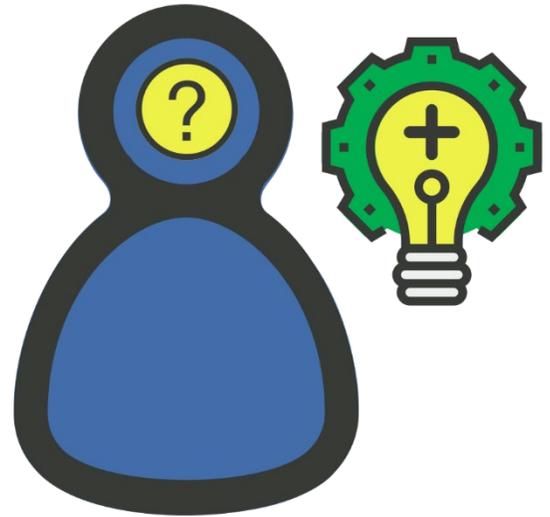
- *Invites a neighbor child who is also out playing in the puddles to help move the water from the small puddles into the biggest puddle*
- *When building a train track, two friends take turns deciding which piece to add next and click it into place*
- *While two friends play at the water table, a classmate walks over and silently watches what they are doing, so they invite the classmate to join them by offering a scoop and asking if they would help them fill the bucket*



Create

Generates and then applies an action to an experiment and/or problem

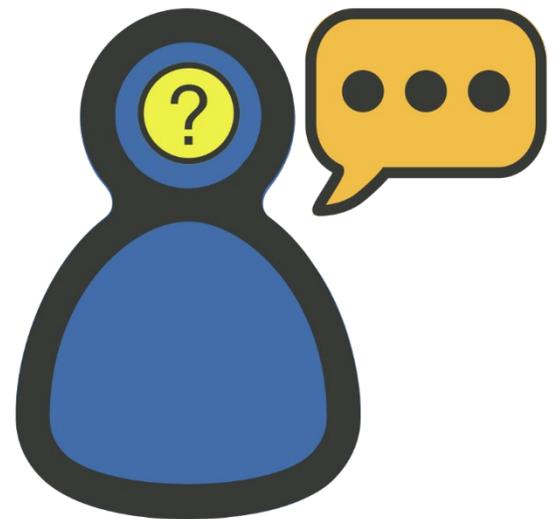
- *When encountering a puddle on the sidewalk, they use their hands to scoop up the water and dump it in the grass to empty the puddle*
- *When dropping spoon from the highchair, their parent laughs and picks it up and gives it back and then they drop it again, again the parent laughs and picks it up... repeat...*
- *When seated on the floor playing with a shape sorter, they try to fit the triangle shape into the round hole, then they open the top of the shape sorter and put the triangle block in that way*
- *Wants to build a bridge that will support 5 toy cars, so they build a small beam bridge out of two cans and a small paper bag, but the bag will only support three cars before collapsing, so they get a block and turn it on its end and put it between the two cans, so it becomes a third support for the bag, this solution allows the bridge to support all five cars*



Describe

Expresses details about something using specific characteristics

- *Tells a story about why it rains and how it creates puddles*
- *Coos when a parent picks them up out of their crib when they wake from nap.*
- *Signs 'help' and holds the string cheese out to their grandparent when they cannot get the wrapper off*
- *When a family member picks them up from preschool and asks what their favorite part of their day was, they tell the family member about "The big puzzle I did with Jordan that had lots of pieces shaped like zoo animals"*



Document

Provides and records information and/or evidence from an exploration

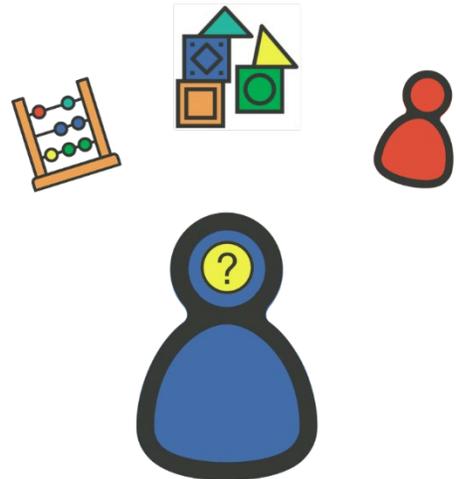
- Uses watercolor paints to create a picture of raining puddles
- Checks on plant daily with a ruler and records height of plant on the calendar
- When outside watching butterflies in the garden while seated in the paved driveway with a bucket of chalk, they see a cluster of purple butterflies flitting around a small bush with pink flowers, so they choose green, pink, and purple pieces of chalk from the bucket and draw a green scribble, then uses the pink chalk to make pink smudges in the green scribble, and then uses the purple chalk to make several purple squiggles above the green and pink scribbles



Engage

Perceives and participates in something of interest

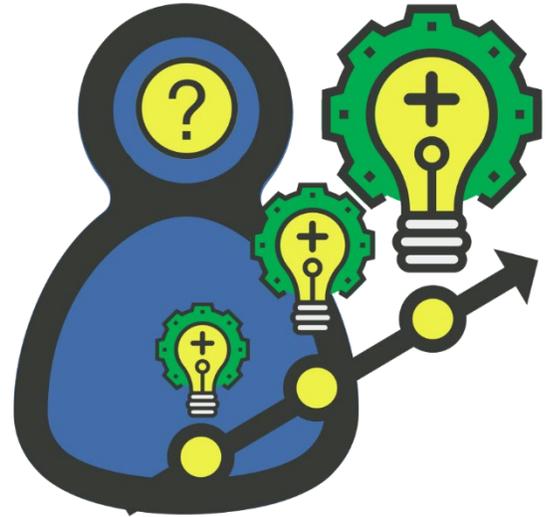
- When seeing a rain puddle, they purposefully step and stomp in it
- Smiles at their sibling when they sit down next to them
- Sits next to their sibling who is playing with blocks then they reach for and handle a block by putting it in their mouth and dropping it on the floor
- Uses a block to reach across the floor to scootch a toy animal closer to their sibling so that they can reach it.



Improve

Creates and applies a better action and/or solution to an experiment and/or problem

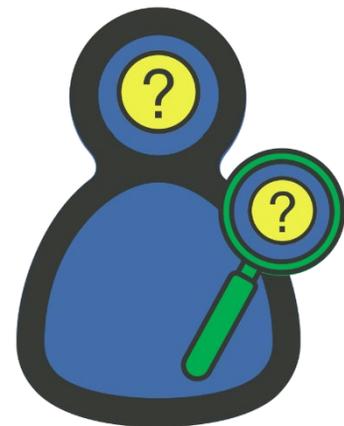
- Upon noticing the rainwater slipping through their fingers, they run back inside to get a cup to scoop up the puddle
- When playing in the sand box, they build a mountain for their toy animals, but the sand is not holding together long enough to form a big enough pile, then their sibling knocks over their cup of water right next to their mountain and the sand becomes wet, so they add the newly wet sand to their mountain and find it holds together now
- While in the sand box with friends building a mermaid sculpture, they discover that the sand is not holding together well, so they get their sand bucket and go to the hose to fill it with water, they keep the bucket with them as they sculpt and use water to moisten the sand as they work



Investigate

Intentionally engages with and examines something of interest to increase knowledge

- When noticing the rain puddle, they squat down to get a closer look at what is going on in the puddle
- Sits on their parent's lap while they read *Brown Bear, Brown Bear, What Do You See?* by Eric Carle, their favorite page is the Red Bird, so after every page their parent reads, they flip the pages back to look at the Red Bird page, then they sign to the parent "next" when they are ready for them to continue with the next animal
- The children have been standing at the fence observing the vehicles at the construction site next to their school. Of interest to the children is the excavator. They notice it looked easier for the excavator to dig holes after a rainy day. While helping to dig holes for planting vegetables in their school garden after a week without rain, the children remembered their observation and predicted that wet dirt will be easier to dig than dry dirt, so they proceeded to moisten the soil first before they start digging



Observe

Perceives and explores something of interest

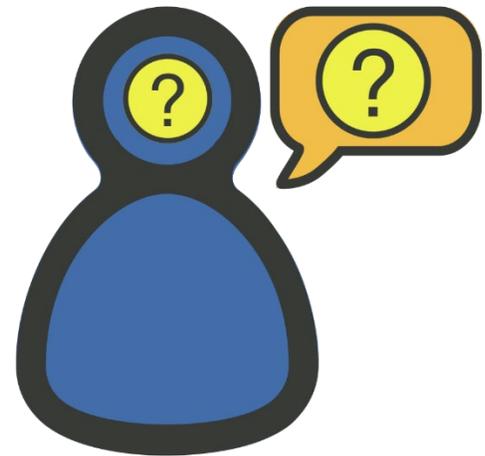
- *When stepping into a rain puddle, they observe and feel their shoe getting wet*
- *Plays peek-a-boo with their bear after a family member covers it with their blankie*
- *When bringing their sippy cup to a grandparent to be refilled with water, tells the grandparent, "My sippy cup is purple"*
- *When on a nature walk, they use their hands to observe the different textures of the tree bark where the bark of the beech tree felt smooth, and the oak tree felt rough*



Reflect

Expresses and extends thinking and/or ideas about why something occurs

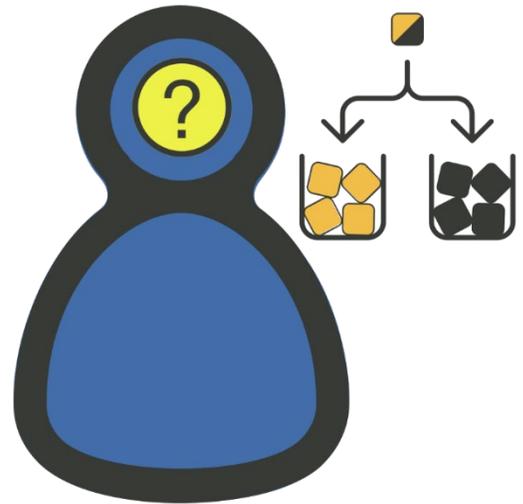
- *Compares why they think it rains to what their parent thinks*
- *Points to their ear when their grandparent asks, "can you hear that dog barking?"*
- *Comes home from preschool very excited about a book the teacher read about a child asking their parent to build a ladder to the moon, so they asked if they could look for more books about the moon because they wanted to learn more about the moon – especially how far away it is – because the idea that the moon was close enough to reach by a ladder did not seem realistic*



Sort

Intentionally groups things and/or objects according to a specific characteristic

- *Arranges things they find floating in the puddles, like leaves, small sticks, or grass into separate piles*
- *Arranges their snack items by putting cheese cubes on one side of the plate and blueberries on the other*
- *When making a necklace with yarn and stringing beads, some beads are spherical and some are cubed which come in primary colors (red, blue, green), so they make piles of the beads before they string them by putting all the spherical beads on one side and all the cubed beads on the other side, then they group the shaped beads by color*



Test

Finds out how well something worked

- *Using a plastic shovel instead of a cup, they move the rainwater from one puddle to the next*
- *When sitting in bathtub with a water wheel, they fill a cup with water and dump it on top of the wheel and watch the water run down and make the wheel spin, then after a few times, turns the wheel over and dumps water on the underside of the wheel so it runs down and makes the wheel spin*
- *When rinsing green beans in a colander at the kitchen sink, they remember that turning the water wheel upside down did not affect the way the water made the wheel turn, so as they watch the water run through the holes in the colander, they take the green beans out of the bowl of the colander, turn the colander over, and put the beans on the bottom part of the colander and notices that the water still goes through the holes, but there is not enough room for all of the beans now, so they move the beans again, flips the colander over, and puts them back into the bowl*

