

Using M⁵ to Support Learning About Data

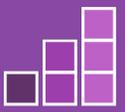
This handout provides specific examples for each practice in the M⁵ Early Math Approach to help educators support children in their developing understanding of data collection, representation, and interpretation.

Mutual Learning

Observe and learn about children's languages, cultures, strengths, and needs related to data.

- **Notice the languages and vocabulary children use when communicating about sorting and classifying.**
 - ◇ Children who are multilingual learners may understand or use some comparative vocabulary in their home language, English, or both, or use gestures to demonstrate their knowledge.
- **Engage in data activities that are meaningful to children and their families, drawing from their preference and experiences at home and in their community.**
 - ◇ Invite children to share what plants, trees, or gardens they see around their homes or in their community. Bring in photos or draw pictures together. Create a class chart of different plants and sort them by size, color, or type.
 - ◇ Invite children to share what pets they have at home (or wish they had) and create a bar graph showing the number of children with dogs, cats, fish, and so forth.
 - ◇ Ask children to collect and organize data about how they get to school (car, bus, walking, bike, and so on). Then work together to create a class bar graph.
 - ◇ Talk with children and families about how they use data in daily life, like sorting food when cooking, tracking chores, comparing items while shopping, or collecting data while gardening or caring for pets.
- **Notice how children begin collecting and organizing data using tools such as tally charts, picture graphs, or sorting trays.**





- **Provide children with multiple entry points through visuals, touch, movement, and alternative communication to learn about and express their understanding of data to meet the needs of children with varying abilities.**
 - ◇ Some children may prefer tactile graphing with real objects or picture-based charting, while others may express their understanding with movement-based data collection like Four Corners or art-based data representation like stickers or stamps.

Meaningful Math Investigations

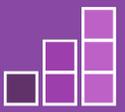
Provide children opportunities to sort, collect, represent, and interpret data to answer authentic questions within science investigations and everyday events.

- **Use everyday events and real-life situations to teach children how data and graphs help us make sense of information or solve problems.**



- ◇ Track how many classmates are present or absent each day and compare the numbers across the week.
 - ◇ Record which plants grow best in the school garden by measuring growth weekly and deciding which to plant next season.
 - ◇ Count and record how many pencils remain of each color to identify which ones need to be restocked when noticing that some colored pencils are running low.
 - ◇ Have children vote on their next story. Count the votes together and create a bar graph on chart paper or a whiteboard to show the favorite book.
 - ◇ Measure and record daily temperatures to decide whether jackets or rain boots are needed.
- **Encourage children to collect, organize, and interpret data during play.**
 - ◇ “I see you collected some leaves, rocks, and sticks. Can you sort them by type and then count how many are in each group?”
 - ◇ “Which car do you think will go the farthest down the ramp? Let’s mark their distance and measure it. Later we can create a graph together to show which car went the farthest!”
 - ◇ “We measured our shadows this morning and at lunch time. Let’s go outside and do it again now. Then, we can graph the length of our shadows at different times and tell when our shadows were longest.”
 - ◇ “I wonder how many children also eat rice at home, like in our story. Let’s make a survey about the types of foods we eat for dinner.”



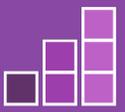


Materials and Learning Environment

Provide open-ended materials that support children in sorting, collecting, representing, and interpreting data, with materials accessible to all children.

- **Provide materials indoors and outdoors for collecting and representing data:**
 - ◇ pictures or objects from children’s homes and communities (food, animals, tools) for sorting and graphing activities
 - ◇ counters, connecting cubes, blocks, or stickers to support collecting and organizing data
 - ◇ charting materials and art supplies such as clipboards, paper, markers, stickers, stamps, whiteboards, and templates of bar graphs, pictographs, and line plots for children to fill out
 - ◇ containers and baskets for children to collect natural materials such as leaves, rocks, and sticks that they can sort
 - ◇ loose parts and collections of objects with varying attributes (for example, buttons, beads, pom-pom balls, popsicle sticks, dominoes) to sort, categorize, and represent data
 - ◇ for older children, examples of graphs from local newspapers featuring familiar themes like local sports teams, popular music, or community events
- **Set up a voting station or a “question of the day” area with picture cards, name cards, and counters for whole class data collection on questions of interest. Children can place counters, name cards, or stickers to show their choice and later help graph and interpret the results.**
- **Read books that include opportunities to explore sorting, counting, and comparing data in children’s home languages, English, or both.**
 - ◇ [*The Animals Would Not Sleep*](#) (or [*¡Los animales no dormirían!*](#) in Spanish) by Sara Levine
 - ◇ [*Sort It Out!*](#) (or [*¡Clasifícalo!*](#) in Spanish) by Barbara Mariconda
 - ◇ [*Bird Count*](#) by Susan Edwards Richmond
 - ◇ [*Show and Tell!*](#) by Stuart J. Murphy





Math Vocabulary and Discourse

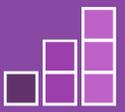
Encourage children to communicate about sorting, collecting, representing, and interpreting data.

- **Use open-ended questions and prompts to encourage children to collect data or to explain their reasoning as they interpret data. Examples of prompts for younger children:**
 - ◇ “You are wondering what people’s favorite color is. How might we find out?”
 - ◇ “Which group has the most? Which group has the least? Do more children like apples or bananas?”
 - ◇ “How many are in each group?”
- **Examples of open-ended questions and prompts for older children:**
 - ◇ “Which two groups together have the same amount as another group? How do you know?”
 - ◇ “Can you think of a story that the graph might tell? What happened, and how can you tell from the graph?”
- **For younger children, model using comparative vocabulary during daily routines, interactions, and play. Encourage children to use these words in their home languages, English, or both.**
 - ◇ “Let’s sort the leaves by color. There are a lot of yellow leaves and fewer red leaves.”
 - ◇ “How many necklaces and how many bracelets did you make? Which did you make more of?”
 - ◇ “Do we have more sunny days or cloudy days on our weather chart?”
- **Provide older children with opportunities to work collaboratively with peers to collect and graph data.**
 - ◇ Have small groups gather information about a topic they choose and decide how to record it.
 - ◇ Organize a gallery walk to help children explain, ask questions, compare, and reason about the data they collect and graphs they create.

Data Vocabulary

less than, more than,
fewer than, the most,
the least, higher, highest,
longer, longest, shortest,
the same as, none, all,
some, a lot, how many





- **Encourage older children to analyze data in different ways.**
 - ◇ “Can you tell me what this graph is showing?”
 - ◇ “What can we learn from this graph? Can you tell me something surprising or interesting about the data?”
 - ◇ “How many children in total voted in the survey?”
 - ◇ “How else could we sort and graph this data?”
 - ◇ “Based on our weather chart, what kind of weather do you think we’ll have most next week? Why?”

Multiple Representations

Offer multiple ways for children to explore sorting, collecting, representing, and interpreting data.

- **Use different methods of representing data, including charts, tables, and graphs, so children understand that data can be represented in multiple ways.**
 - ◇ During a weather observation week, have children make tally marks each day for sunny, rainy, or cloudy weather on a large chart, then work together as a class to display the data in a bar graph.
 - ◇ Roll different balls down a ramp. Represent the distance each ball traveled, first by using tape to mark the distance, representing and comparing the distance on the floor. Then create a bar graph that shows the distance each ball traveled.
 - ◇ Collect data on favorite insects, create a pictograph by placing a sticker or drawing a picture for each child’s choice.
- **Provide older children with opportunities to choose the format they want to use to create their graphs.**
 - ◇ After surveying classmates about their favorite school subject, have children create either a pictograph or a bar graph to show the results in different ways.
 - ◇ Let children measure each other’s height using whole numbers and record the data. Then, guide them in creating a line plot or a bar graph to display their findings.
 - ◇ Encourage children to paste mini-graphs or data charts into their interactive math journals and write short reflections or observations about what the data shows.

