What are the classification and data collection skills of a young child?

From the Texas Prekindergarten Curriculum Guidelines

Mathematics Instruction in Action: Classification and Data Collection

Math All Day: Centers and Other Times

Teacher Tips:

Submit Your Ideas

What are the classification and data collection skills of a young child?

How do you know a child can sort and classify?

They can

- match objects that are alike.
- find attributes that are the same (one attribute at a time).
- sort objects into groups that share an attribute.
- describe how objects are alike and why they belong together in a specific group.
- describe why an object does not belong in a specific group.
• describe similarities and differences.
• use attributes to copy or create patterns.

For more information about theories behind developing classification and data collection skills, see *Children’s Thinking about Classification, Data Analysis, Probability and the Teacher’s Role* from TEXTEAMS Mathematics Institute Pre-Kindergarten/Kindergarten.

**From the Texas Prekindergarten Curriculum Guidelines**

The child:

• Matches objects that are alike.
• Describes similarities and differences between objects.
• Sorts objects into groups by an attribute and begins to explain how the grouping was done.
• Participates in creating and using real and pictorial graphs.

**Mathematics Instruction in Action: Classification and Data Collection**

Sample Activities with ongoing observation tips for Classification and Data Collection:

It is vital that mathematical content and teaching methods for young children be child-centered and developmentally appropriate. That is, the children's thoughts, words, actions, interests, and needs are the basis for instructional activities. Young children need opportunities to explore their world and experience mathematics through their play. While children need always to be at the center directing their mathematics development, the following contains examples of child-tested instructional activities suitable for home, preschool, Prekindergarten classrooms, and other informal learning environments.

**Activity for Classification and Data Collection**

**Graphs Galore**

Children will graph the question of the week with a different type of graph daily. On Monday, the teacher will introduce the question of the week, for instance *Do you have a sister?* (Children should answer *DO* or *DO NOT*)

*Monday: Blob graph*

Ask the question of the week. The children will then get a red Unifix® cube if their answer to the question is DO NOT and a blue Unifix® cube if their answer is DO. They then get into a blob in the appropriate corner labeled with a red blob for *DO NOT* or blue blob for *DO*.

**Questions to ask:**
**Start with:**

- Do you think there are more children in our class who do or do not have a sister? Why?

**Probe further with:**

- Point to the blob that has the most.
- Point to the blob that has the least.
- How can we make sure that the ____ blob has more/less than the ____ blob?
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**Tuesday: Human Bar graph**

Using the same question, the children will now construct a bar graph. The children make two lines next to each other behind a red label that reads "DO NOT" or a blue label that reads "DO" that are on the floor. The children will line up behind the appropriate color according to their answer. The teacher/leader then walks between the two, asking the children to hold hands with the person across from them (Each child may not have a partner to hold hands.)

Ask...

**Start With...**

Are there more children in our class who do or do not have a sister? How do you know?

**Probe further with**

- Which line is longer? How do we know?
- Which line is shorter? How do we know?
- How many children do not have a partner holding hands?
- How many more children are in the ____ line than the ____ line?
- What does the graph tell us?

**Wednesday: Bar graph**

Each child gets a red or blue Unifix® cube according to his/her answer. One child collects all the blue Unifix® cubes as another child collect all the red Unifix® cubes and form a tower. The teacher/leader then collects both towers and places them next to each other forming a line graph. The teacher/leader then asks questions such as:

Ask...

**Start With...**
Are there more children in our class who do or do not have a sister? How do you know?

Probe further with...

- Which tower is tallest? How do we know?
- Which tower is shortest? How do we know?
- Are the towers even?

*Thursday: Pie graph*

Again, using the same question, the children will make a pie graph. Each child gets a red or blue cube according to their answer. The children then get into two lines according to their answer: red ³DO NOT², blue ³DO². First, the children hold hands in their lines. Then the red line connects with the blue line forming one long line. (All the reds should be together and all the blues should be together.) The teacher/leader will the join one end of the line to the other to form a large circle.) The teacher/leader stands in the center of the circle and asks the children with red cubes to raise their hands. The teacher/leader then gets a red link chain and gives one end of the chain to the child at one end of the red section and the other end of the red chain link to the child at the other end of the red section. This procedure is then repeated for the blue. The children hold the ends of the link chains on the floor and then another child cover the red section inside the red link chain with red construction paper and repeat this procedure for the blue.

The teacher/leader will then ask questions such as:

Ask...

Start With

Are there more children in our class who do or do not have a sister? How do you know?

Probe further with...

- Which piece of the pie is bigger?
- Which piece of the pie is smaller?
- Is the bigger piece of pie more than half?

After asking questions, have the children close their eyes and have them visualize the pie as it is displayed. Then have the children, go back to their seats and have the children duplicate the class pie on their individual pie fraction plates. (Pie fraction plates: Get a large red and blue plastic plate and cut from the outer edge to a little past the center. Then interlock the plates so that the plates are moveable and make fractions.

The teacher/leader ask questions such as:

- What color has more?
- What color has less?
- Does your plate look like are classroom pie, if not how can we move the plates to make your pie look like the classroom pie?

*Friday: Math Response*

On this day have the children do a math response.

Math response is another way to report about their question of the week. For instance, they can make a big book, bring in pictures of their sister and graph, make a pictorial graph, etc.

**Activity for Classification and Data Collection**

*The Classroom Pet*

Every spring we purchase a new classroom pet. It is a two-week-long process that involves a lot of classification, data collection, data analysis, and higher-level thinking processes. It is a real-world situation that involves the collection and interpretation of data to answer real-world questions that form the basis for decision making.

Begin the first week with a unit on pets. Read books about pets, talk about pets, discuss the care and feeding of pets, what makes a "good" pet, etc. Collect data and make graphs of the pets children have at home, how many pets each family has, whether children prefer cats or dogs, etc. On Friday, announce that the coming week the children will have to decide what kind of pet they want for their classroom.

Begin the second week on Monday by brainstorming what kind of pets the children would like in the classroom. Make your list using words and diagrams so that all the children can read it easily. Don't be at all surprised at things like goats, elephants, giraffes, and dinosaurs. This is all part of it. Write it all down. Print out a list of the pet suggestions (words and diagrams) for each child and send the children home to gather information. Tell them to ask their moms, dads, aunties, grandpas, anyone they can, to comment on the animals on the list. Students are to report back on Tuesday any information they learn about any of the animals on their list that might make them good pets or bad pets.

On Tuesday, have a whole-group discussion about the animals on Monday's list. Make a T-chart to list the pros and cons for each animal. For example, a pro for the elephant might be that you could ride on his back, but a con would be cleaning up his litter box! A pro for the dinosaur might be that he just eats the grass outside so you don't have to feed him, but a con would be that he simply is not alive! Following this discussion, guide students to classify the pets from Monday's chart into two categories: "good" classroom pets and "bad" classroom pets. There may be some disagreement here, but again, that is part of the process. As a general rule, adults, any small animal that can be bought at the local pet store and kept in a cage (yes, including tarantulas, snakes, and rats!) is a "good" classroom pet for the purpose of this chart! They aren't "bad" because you don't want one!!!

On Wednesday, begin with the list of "good" classroom pets. Discuss the merits of each one. (This is the time for the adult to oh-so-subtly "load" the process by talking off-handedly about "smelly rats" and "cute little furry hamsters", or "cold scaly lizards" and "sweet little swishy fish," as in
"Who wants to be the first to clean up the smelly rat p**p?" and "Everyday someone will get to put a pinch of fish flakes on top of the water so we can watch the little swishy fish come up and nibble." Don’t hesitate to gently manipulate here after all, you have to feed and clean the pet at least until the end of the year when you can give it away!) After the discussion, vote (collect data) and create a graph. Analyze it to determine which pet will be purchased and brought to class on Thursday! If the adult has done his or her work well, you will find the class vote, fair and square, to be for the funny little chirpy bird and not that horrible hairy tarantula!

On Thursday the pet appears in class and of course the only thing left to do is to name it, which is a two-day affair. Brainstorm possible names and have the discussion on Thursday. Have your final vote (data collection) on Friday. As the votes are counted, graph the results. Make a sign with the pet’s new name on it and place it next to his cage. And good luck!

(By the way, in 22 years of doing this, I have never had to feed a rat, snake, or spider!)

**Math All Day: Centers and other Times**

The mathematical content that is described in the Prekindergarten Curriculum Guidelines is integrally tied to the ways the classroom is structured and the types of experiences children encounter. Young children need opportunities to explore their world and experience mathematics through their play. Most mathematics learning in the early years does not require sitting down for group lessons. However, although learning is often informal, it is intentional and deliberate. Careful planning is required to build upon and extend the informal knowledge of the child. In Preschool and Prekindergarten classrooms, management techniques and room arrangements are of utmost importance. SEE books by Jean Feltman (For example, A Survival Guide for the Preschool Teacher) for classroom management ideas.

Well-placed discovery centers provide hands-on learning experiences that can engage children in mathematical thinking. All centers should all be equipped with writing tools so children can represent their mathematical thinking. You may rotate if you do not have room for all of the following centers in your classroom all year. Suggested centers include:

- **An Arts and Crafts Center** with plenty of markers, crayons, stamps, glues, watercolors, buttons, shells, clay, and other items for exploring, representing, and communicating. The materials should be easily accessible in sorted containers that the children are responsible for maintaining.
- **A Manipulative Center** with pegs and peg boards, interlocking blocks, beads, puzzles, and other items to sort, match, pattern, count, put together, and take apart.
- **A Sensory Table** filled with sand, rice, beans, leaves, water, ice, or other items. Include a variety of containers for pouring and measuring or small toys and other items for exploring other mathematical ideas such as patterning.
- **A Block Area** with blocks of various sizes and shapes for constructing and exploring.
• A Dramatic Play Center with number rich props such as an imaginary class phone directory, old phone books, play money, price tags, cash registers, bathroom scale, scales to weigh plastic fruit and vegetables, measuring cups and other items to recreate settings children experience in their lives.

• A Literacy Center with a chalkboard, felt-board, listening center, puppets and stage, and word display (that includes alphabet and numerals) for exploring and communicating mathematical ideas.

• A Construction Center with non-retracting measuring tools, empty boxes, straws, PVC, pulleys, hardhats, safety goggles, large nuts and bolts, aluminum foil, clay twine, blocks with holes, brads, dowel rods, paint stir sticks and other items to explore structures, measurement, spatial reasoning, and other mathematical ideas.

• A Music and Creative Movement Center that has a large open area with a tape player, various musical instruments (store bought and child created), story props, scarves, streamers, pompoms and a wide variety of tapes with a wide variety of music styles for developing patterning, one-to-one correspondence, number sense, and communication skills.

**Classification and Data Collection at the Block Center:**

*Skyscrapers*

For this activity you will need a ten frame mat for each player, one number cube, and several Unifix® cubes. The first player rolls the number cube and makes a tower with that many Unifix® cubes and places it in the first space of the ten frame. The other players repeat the same procedure taking turns until each child has covered all their spaces on the ten frame. The children then talk about their city of skyscrapers. How many towers have the same amount of unifix cubes? Which is the tallest tower? the shortest tower? After their discussion, the children then connect all their towers to make one continuous tower. The players place the towers together and have another group discussion with questions. Whose tower is the tallest? Shortest? By how many? Extension: To crown a winner, a child spins a tallest/shortest spinner. This way the children do not make a permanent connection that the tallest/biggest/largest is always means the winner. *Down by the Ocean*

All kinds of shells are hidden in the sand table. The children are to uncover the shells in the sand table and sort them by size, shape, and color. The children put them in buckets as they sort the shells by one attribute. The children will share their findings with their peers how they grouped the shells.

**Classification and Data Collection at the Manipulative Center:**

*Grandma's Button Box*

A large box of grandma's buttons is placed in the middle of the table. The children are encouraged to take a handful of buttons and place them on their working mat. Each child
is encouraged to find buttons that are alike. (Example: two holes, four holes, round, square, etc) The children share their findings with their peers at their table. The children are then encouraged to take more buttons as needed for this activity.

**Classification and Data Collection at the Snack center:** Make snack time a station. Ask children to serve themselves one cup of a mixed snack (such as raisins and tiny crackers). Ask children to sort the snack before they begin to eat it. Ask questions such "Is your snack made up mostly of raisins or crackers?" Encourage the children to compare of number, size of the amounts, and weight of snacks to answer this question.

**Classification and Data Collection at the Creative Movement:**

**Classification and Data Collection at Dramatic Play:**

*Sorting the Socks*

A large basket of socks is placed in the dramatic play area. The children are encouraged to sort the socks by size by placing them in smaller baskets. Then the children are encouraged to hang the socks on a line in the Dramatic Play area by size. Pictures of the way the children sorted the socks are taken. **Classification and Data Collection at the Literacy Center:**

How long is your name?

Write each child¹s name on a same size sentence strip, (one for each child). Number individual sentence-strips from 0 to the number that describes the length of the longest name in the class. Children place the sentence-strips on the floor and graph their names under the appropriate number indicating how many letters the name. For instance, Joe has three letters so it would go under the number three. Angelica has 8 letters in her name, so Angelica¹s name would go under the number 8. The children will do this for all their classmates¹ names to form a graph.

**Walking Tour for Classification and Data Collection:**

*Parking Lot Fun at School*

The children are given tally sheets on a small clip board with pictures of cars, vans, trucks, and others to mark on their walk whenever they see one of the above vehicles. When the children return to the classroom they use their tally sheets to make a pictorial graph using die-cuts of cars, trucks, vans, and other from the data the children collected on their walk to the parking lot of the school.

**Teacher Tips**

*How do you connect math with real world settings? At school:*
It's clean-up time. Can you put things back where they belong? Why are you putting these things away together? Why does this NOT belong here?

At clean-up time, I say, "Let's "classify" our classroom. What goes in the Block Center? The Home Center? The Math Center? The Literature Center? How do you know this belongs in the Science Center? We have a "junk bin" for unknowns. We have a classifier of the day who is responsible for putting the lost items where they belong. Classifier of the Week

All of us have classroom helpers. One job that is posted in my classroom (along with line-leader, door-holder, etc.) is the classifier. The classifiers job is to classify objects that have been placed in the OOPs, I couldn't find it box. The OOPs I couldn't find it box, is a box that is placed in a permanent area in our classroom. When the children are classifying the room and cannot find where to classify a certain object or if they stumble on a manipulative: block, bear counter, link, Unifix® cube, pencil, etc., the children place the object in the OOPs, I couldn't find it box. The classifier is to classify the objects daily before the end of the day.

Ask children to sort objects from a "treasure box" or a "junk box" and tell why each group belongs together. They then push all groups back into one group and re-sort in a different way.

Use sorting and classifying to solve a problem or answer a question.

Examples:
Are there more boys at school today or more girls? How do you know?
Which lunch will most children eat today? How do you know?
What weather have we had most this month? Least?

Use sorting and classifying to maintain the classroom. Examples:
Sort pencils into two groups: those that are sharp and those that need sharpening.
Sort markers: those that are dry and those that still write.
Sort animals in the Science Center: farm animals, zoo animals, pets

Home Connections: At home: Ask children to empty the dishwasher or put away laundry or groceries and talk about why things go where they do. (Concentrate on shared attributes.

Example: Socks go in this drawer. Spoons go in this compartment. Cans go on this shelf.)

I ask children to clean their room by sorting into groups the things that need to be put away. They can then talk about why each group belongs together as they put away one group at a time.

Ask children to decide which things belong in the kitchen, garage, bathroom, etc. and describe why.
Away from home:

At the grocery store, talk about why the grocer organizes the store in the way s/he does. Talk about the different departments (produce, meat, deli, pharmacy, dairy, etc.) and which items they might expect to find in each department. Then go see!

In the car, play a game where one player names a group (such as red things or things with wings) and the other player sees how many items they can find that belong in that group.

Go on a "scavenger hunt". Find shapes and solids around the room. Ask the children to identify an attribute (such as things with circles, or shiny things), find, keep track of, and count how many objects found fit into that group.

**Book Corner**


Lobel, *Toad and Frog are Friends*.

