One-to-One Correspondence

Student Probe

Give the student 9-12 objects to count (teddy bear counters, crayons, or any objects that can be easily manipulated) Ask: "How many are here?"
Watch how the student counts the objects. Is each object getting one and only one count? How does the student keep track of the count? If the child counts correctly, and says, for example, "Ten", ask again, "Are there ten?" If the student hesitates or has to count again the student does not have cardinality firmly in place. This is a key aspect of counting with meaning.

Lesson Description

This lesson is intended to help students develop their understanding of meaningful counting and cardinality. Using a "bowling game", students will count the objects they have knocked down or the number of objects left standing.

Rationale

Students develop understanding of counting and cardinality through physical knowledge activities and games that involve counting and comparisons. Students must act on objects physically and mentally to construct the idea of number. Examples of physical knowledge activities include: bowling, pick-up sticks, duck-duck-goose, and ring-toss. The development of number ideas cannot be forced. Only the counting sequence is learned through rote procedures.

Preparation

Gather the materials for the lesson. You will need a space to set up the game.

At a Glance

What: One-to-one correspondence including cardinality
Standard:
AR.Math.Content.K.CC.B.4
Understand the relationship between numbers and quantities; connect counting to cardinality.
When counting objects:

- Say the numbers in order, pairing each object with only one number and each number with only one object (one to one correspondence).
- Understand that the last number said tells the number of objects counted.
- Understand that each successive number refers to a quantity that is one larger.

Note: Students should understand that the number of objects is the same regardless of their arrangement or the order in which they were counted.
Mathematical Practices:
SMP2: Reason abstractly and quantitatively.
Who: Students cannot count objects accurately to 12 and/or do not have cardinality.
Grade Level: Kindergarten
Prerequisite Vocabulary: How many, Oral number word sequence to 12
Prerequisite Skills: Able to produce the standard list of counting words in order to at least 12
Delivery Format: 2 or more students
Lesson Length: 15 minutes
Materials, Resources, Technology:
10 empty water bottles or other "bowling pin" shaped objects, tennis ball
Student Worksheets: None

Lesson

The teacher says or does…	Expect students to say or do…	If students do not, then the teacher says or does…
1. (Start with 6 "pins" or water bottles). Tell the student(s) you going to play a bowling game. Ask : "How many of you have ever been bowling or know how to play the game?"	"I know how to play" "No" but I've seen it on TV "No" I don't know about bowling.	If the student(s) has played, ask he/she to explain how to play. If the student(s) does not know how to play explain: First you set-up pins and then you roll a ball and try to see if you can knock all the pins down in one roll. Let's play!
2. Let's decide who is going to go first.	A student may be upset if he/she doesn't go first.	Remind them you will be playing several games and everyone will have a chance to go first.
3. Ask the student going first to put up the pins.	The student places the pins in a cluster. The student puts the pins in a line spaced apart. The student arranges the pins haphazardly.	Do not prompt the student to cluster them together so he/she can knock more down. The student will figure this out through experience, especially when there is friendly competition involved.
4. Tell the student to roll the ball and see how many pins he/she can knock over.	Student rolls the ball towards the pin and knocks some down. Student does not knock any pins down.	Ask the student to observe what happened. Reassure a student who could be upset that no pins fell down. Tell the student to roll again. (the player has 2 chances just like the real bowling game.) If they miss again, ask them to think how to arrange the pins next time so it will be easier to knock them down.

The teacher says or does…	Expect students to say or do…	If students do not, then the teacher says or does…
5. Ask: 1) How many pins did you knock down? and 2) How many pins did <u>not</u> get knocked down?	Student counts the pins from a distance "1, 2, 3" but doesn't say "3". Student doesn't know how many there are or miscounts	Ask again, "how many did you knock down?" The student may need to recount. After they count again, ask one more time, "how many did you knock down?" Repeat until the student says "3" without having to recount. (of course, don't overdo it!) After the student says "3", ask "how do you know?" Repeat process with the second question. Have the student touch each of the pins and count with the student. At the end of the count, ask "How many did you knock down?" Do this several times as needed.
6. If you are playing with more than one student, now have the next student arrange the pins and repeat the process.		
7. Play this game for a length of time. Always try to stop the game before students lose interest so they will be excited to play again the next time.		

<u>Teacher Notes</u>

Aiming games encourage students to quantify because they are trying to determine their success. Aiming games help children acquire physical and logico-mathematical knowledge because they are acting on objects and seeing how they react. Actions that help students gain this knowledge include: dropping an object, throwing it, pushing it, rolling it, kicking it, and blowing it. Some students will need to play lots of aiming games. These games encourage quantifying because the children love to count the objects they successfully knocked over or dropped, etc.

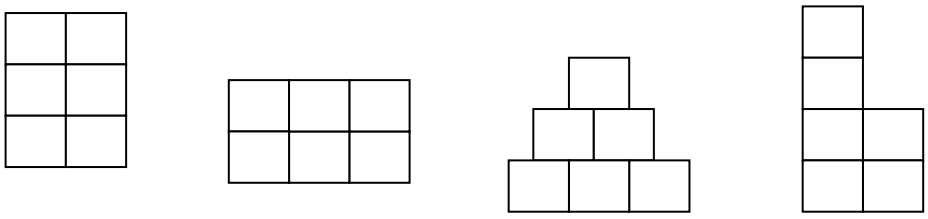
Variations

Drop the Clothespins: Players try to drop clothespins into milk cartons or other containers placed on the floor. The student stands over the carton, takes aim, and drops each clothespin – The teacher will ask the same questions as in the bowling game. Vary the number of pins as needed.

Chair Ring Toss: Players stand behind a line drawn on the floor and throws rings towards the legs of an upturned chair. If the player rings a chair, he/she scores a point. (Same questioning)

Bean Bag Toss: Players stand behind a line drawn on the floor and toss beanbags into a container. (May use wadded up paper tossed into a trash can.)

Block Knock-down: Children arrange six or more plastic blocks in any way like a target. The student who knocks the most blocks out of his arrangement is the winner.



Formative Assessment

Things to look for:
After asking how many……

- Is the student able to count each object once and only once?
- Is the student organized when counting? (doesn't count something more than once)
- After counting a set, is the student able to state the quantity of the set *without recounting*, that is, do they understand that the last count "word" is the quantity of the set. (cardinality)

Ask: Are you sure? Students who have fragile understanding will hesitate and may recount.
Ask: How do you know?
Once students are confident with cardinality, they will look at you (sometimes a little impatiently) and say because I just counted it!
Other things to look for:
When giving students a random quantity, are they careful with their counting, or are they disorganized and so sometimes count something more than once?
Once students are easily able to count any sets accurately to 12 and not hesitate with the final count, they will be considered proficient.

References

Elementary and Middle School Mathematics, Teaching Developmentally, Fifth Edition, John A. Van De Walle, pp. 119-124.
Group Games in Early Education: Implications of Piaget's Theory, by Constance Kamii and Rheta DeVries, pp. 30-32.