INSTRUCTIONAL NAVAJO - MATH

The specific language used in teaching
Foundational Math in Head Start
(and Kindergarten) Level
Navajo Immersion Programs

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A Navajo Nation Language Project

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Introduction

Instructional Navajo is the third book of the resource materials developed by the Navajo Nation Language Project.

Although these materials are intended as resource materials for Navajo Immersion programs at the pre-school level, they could also be used in Navajo Immersion Kindergarten programs.

what is "Navajo Immersion"?

By Navajo Immersion, we mean a program where Navajo is the language of communication, interaction, and instruction. Navajo is not a "foreign language". We do not teach "about Navajo"; we do not teach "Navajo words". Instead, we simply make Navajo the language of center. As much as possible in a pre-school setting, we try to replicate the way the child learned his/her first language: by (re-)creating a situation in which Navajo is needed for communication.

But successful Navajo Immersion is not just a matter of 'letting Navajo language happen' to the child. It's too late for that. The teacher knows the language of those children that know no Navajo--English. Although she doesn't use English with the children, she understands what they say to her--or to one another--in English. And she doesn't just 'let Navajo language happen'. She tries to see that the child is presented with samples of Navajo language in real communication situations that are likely to give the child some awareness and insight into 'how the system works'--especially the verb-system. And she tries to help the child to be successful in communicating in what may be--at first--rather limited Navajo.

The Navajo Language Today
Research in the early 90's by Platero, Holm, and others has shown that many young Navajo children are not acquiring Navajo. As few as half of the Navajo children entering Head Start centers or Kindergarten classrooms have even passive knowledge of Navajo.

The Native American Language Act

Congress has (perhaps belatedly) recognized the seriousness of the plight of Native American languages. In testimony before Congress, Michael Krauss suggested that there might be 150-180 Native American languages still spoken. But that only about twenty Native American languages--Navajo among them--are still spoken by children.

Congress made a small amount of money--$1M the first year and up to $2M in subsequent years--available for projects under the Native American Language Act.

The Navajo Nation Language Project

Recognizing the problem, and the opportunity, The Office of Diné Culture/Language submitted a proposal in 1995 to the Administration for Native Americans for a project to develop resource materials for Navajo pre-schools.

In 1996, then-President Albert Hale issued an Executive Order making Navajo the language of Navajo Head Start.

Situational / Interactional / Instructional Navajo

According to our original prospectus, we suggested that there might be three kinds of language used in a Navajo Immersion program:

Situational Navajo: the Navajo that is used--or could be used--in specific recurring situations day after day. Children get on the bus, buckle up, get off the bus, come in the center, wash their hands... etc. every day. We try to exploit these situations for the language that could be taught by the teacher and used by the child in those situations.

Interactional Navajo: the Navajo that is used--or could be used--in interaction in any of a number of specific situations. For example, a child may need to say that s/he is sick, or tired, or sad in a number of different situations. A child may ask someone to help him/her in a number of different situations. This language, then, is not specific to just one situation. We say it is interactional; it enables the child to 'get things done' with adults or other children.

Instructional Navajo: the Navajo that is used to teach those things that are usually taught in pre-school.
The Project conducted a four week workshop in June 1996 on situational Navajo. We worked with a group of four Head Start teachers on the Navajo of recurring situations in the Head Start day. The results were published as the resource book *Situational Navajo*.

The project conducted a second four week workshop in July 1997. Using the "Basic Functions" of Alice Omaggio, we worked with a group of six Head Start teachers on the Navajo of recurring but not situation-specific interactions. The results were published as the resource book *Interactional Navajo*.

The question the third year was: was there an appropriate way of getting at instructional Navajo?

Because of the funding cycles of multi-year contracts, it has taken the Department of Head Start a while to gear up to try to implement the Executive Order. Under the able leadership of Afton Sells, Navajo Head Start has developed an impressive Curriculum of culture-based activities. This was in the final stages of development as we approached the summer workshop. The question was: did this make further work in the area of instructional Navajo unnecessary? We felt that work in some of the cognitive areas--particularly pre-math and pre-reading--might be useful. The question was: was there anything in existing Navajo Head Start curriculum or practice that might serve as a basis for such work.

**enter MAPS**

It was at this stage that we encountered MAPS. MAPS is an assessment instrument developed by Assessment Technology Inc. (ATI) in Tucson. It is widely used in Head Start programs, including Navajo Head Start.

Wayne drove down to Tucson to meet with Jason Feld and John Bergan of ATI. They were very helpful and have kindly allowed us to make use the MAPS as the basis of these materials.

**MAPS**

We have taken Assessment Technology Inc. (ATI)’s "Foundational Math as the basis for this work.

We should say at the outset that we have used only a portion of the MAPS. MAPS has five main areas: Perceptual/Motor development, Social Development, Early Math, Language and Emerging Literacy, and Nature and Science. We worked only with the Early Math and some parts of the Emerging..Literacy. Only the Math is being reported here.
And we should say at the outset that we have used their work in ways quite different than was originally intended.

Their work, as we understand it, is an assessment instrument. It is intended as the basis for close observation of individual children. As we understand it, Navajo Head Start teachers are expected to spend a considerable amount of time early in the schoolyear attempting to ascertain what each child seems to know and be able to do. It does not involve explicit 'testing' of children; it is meant as a guide to close and careful observation of what each child seems to be able to do in relatively 'natural' pre-school situations. Implicit in all this assessment is the idea that pre-school teachers will, at some stage, begin to use this information to decide what to teach. But MAPS, as we understand it, is not directly concerned about what to teach or how to teach it--particularly, with how to teach it in Navajo.

At the heart of MAPS, as we understand it, is careful analysis of the developmental progression of the abilities assessed. This is based on careful analysis of the research literature on what (most) children seem to be able to do (in a pre-school setting) at different ages. Careful attention to this has enabled the authors to develop a series of statements about observable behaviors that seem to happen for most children in a definite order.

what we have done

At the heart of the MAPS Foundational Math is a list of abilities that seem to serve as the foundation for children's development of abilities in mathematics.

The original list is un-numbered.
Assuming that the list is arranged from bottom to top, and concrete to abstract, we have numbered the activities.
On the first page will be found a copy of the original list.
On the second page will be found a copy of the original list with the addition of our numbers.
EARLY MATH FOUNDATIONAL SKILLS
MAPS DEVELOPMENTAL PATH (PL1)
FOR CHILDREN 2-4 YEARS

Writes numerals to indicate 10 or less objects.
Writes numerals to indicate 6 or less objects.
Identifies an activity that takes about an hour to do.
   Exchanges two halves for a whole.
Identifies an activity that takes about a minute to do.
Makes a triangle.
   Counts to find how many are in a group of \( \leq 11 \).
Asks for half of something.
Adds two small groups by combining the groups and counting all the objects.
Makes a square.
Distinguishes between numbers, letters, and scribble.
Indicates how many are left after taking one from a small group.
Indicates that one was added to a small group.
Indicates that a group has less after taking some away.
Indicates that one was taken away from a small group.
Identifies a morning, afternoon, or evening activity.
Counts to find how many are in a group \(< 6\)
Indicates that a small group has more after some have been added.
Identifies the shortest or tallest in a group.
Says numbers to refer to quantity.
Uses words (e.g. day, night, morning) to refer to times of day.
Touches an object for each number said while attempting to count.
Uses words such as some to indicate a portion.
Refers to familiar shapes (e.g. circle, square, triangle) by name.
Uses words (now, soon, later, when) to refer to time.
Identifies the shorter or taller of two persons or things.
Gives a part of a group when requested to give some.
Attempts to count by saying numbers and touching objects.
Makes a circle.
Places a circle, square or triangle appropriately in a form board.
Asks for more of something.
Attempts to count by saying numbers.
Constructs a block tower at least four blocks high.

The capabilities are arranged from simple to complex, and from concrete to abstract.
EARLY MATH FOUNDATIONAL SKILLS
MAPS DEVELOPMENTAL PATH (PL1)
FOR CHILDREN 2-4 YEARS

M-33 Writes numerals to indicate 10 or less objects.
M-32 Writes numerals to indicate 6 or less objects.
M-31 Identifies an activity that takes about an hour to do.
M-30 Exchanges two halves for a whole.
M-29 Identifies an activity that takes about a minute to do.
M-28 Makes a triangle.
M-27 Counts to find how many are in a group of < 11.
M-26 Asks for half of something.
M-25 Adds two small groups by combining the groups and counting all the objects.
M-24 Makes a square.
M-23 Distinguishes between numbers, letters, and scribble.
M-22 Indicates how many are left after taking one from a small group.
M-21 Indicates that one was added to a small group.
M-20 Indicates that a group has less after taking some away.
M-19 Indicates that one was taken away from a small group.
M-18 Identifies a morning, afternoon, or evening activity.
M-17 Counts to find how many are in a group < 6.
M-16 Indicates that a small group has more after some have been added.
M-15 Identifies the shortest or tallest in a group.
M-14 Says numbers to refer to quantity.
M-13 Uses words (e.g. day, night, morning) to refer to times of day.
M-12 Touches an object for each number said while attempting to count.
M-11 Uses words such as some to indicate a portion.
M-10 Refers to familiar shapes (e.g. circle, square, triangle) by name.
M-9 Uses words (now, soon, later, when) to refer to time.
M-8 Identifies the shorter or taller of two persons or things.
M-7 Gives a part of a group when requested to give some.
M-6 Attempts to count by saying numbers and touching objects.
M-5 Makes a circle.
M-4 Places a circle, square or triangle appropriately in a form board.
M-3 Asks for more of something.
M-2 Attempts to count by saying numbers.
M-1 Constructs a block tower at least four blocks high.

[The capabilities are arranged from simple to complex, and from concrete to abstract.
We've added the numbers, assuming the simple-to-complex and the concrete-to-abstract run from bottom to top.]
On these two pages, we have organized these abilities into what we considered to be related activities. We stress that there is no research behind this. This is done to allow us to see the development of related abilities. See the notes at the bottom.

**EARLY MATH FOUNDATIONAL SKILLS**
**MAPS DEVELOPMENTAL PATH (PL1)**
**FOR CHILDREN 2-4 YEARS**
[re-ordered: see notes at bottom]

**I COUNTING**
M-1 Constructs a block tower at least four blocks high.
M-2 Attempts to count by saying numbers.
M-6 Attempts to count by saying numbers and touching objects.
M-12 Touches an object for each number said while attempting to count.
M-14 Says numbers to refer to quantity.
M-17 Counts to find how many are in a group <6
M-27 Counts to find how many are in a group of <11.

**II QUANTIFICATION**
M-3 Asks for more of something.
M-7 Gives a part of a group when requested to give some.
M-11 Uses words such as some to indicate a portion.

**III SHAPES**
M-4 Places a circle, square or triangle appropriately in a form board.
M-5 Makes a circle.
M-10 Refers to familiar shapes (e.g. circle, square, triangle) by name.
M-24 Makes a square.
M-28 Makes a triangle.

**IV COMPARISON**
M-8 Identifies the shorter or taller of two persons or things.
M-15 Identifies the shortest or tallest in a group.

**V TIME**
M-9 Uses words (now, soon, later, when) to refer to time.
M-13 Uses words (e.g. day, night, morning) to refer to times of day.
M-18 Identifies a morning, afternoon, or evening activity.
M-29 Identifies an activity that takes about a minute to do.
M-31 Identifies an activity that takes about an hour to do.
VI MORE/LESS
M-16 Indicates that a small group has more after some have been added.
M-20 Indicates that a group has less after taking some away.

VII PATTERN CONVENTIONS

VIII ADDITION/SUBTRACTION
M-19 Indicates that one was taken away from a small group.
M-21 Indicates that one was added to a small group.
M-22 Indicates how many are left after taking one from a small group.
M-25 Adds two small groups by combining the groups and counting all the objects.

IX NUMERALS
M-32 Writes numerals to indicate 6 or less objects.
M-33 Writes numerals to indicate 10 or less objects.

X FRACTIONS
M-26 Asks for half of something.
M-30 Exchanges two halves for a whole.

We numbered the abilities in the original ATI listing from bottom-to-top, assuming that this reflects the simple-to-complex and concrete-to-abstract order ATI mentions.

We then grouped these into nine areas—and later added a tenth area. We then re-ordered the abilities top-to-bottom within each area. The nine areas have been ordered, then, simply on the basis of the lowest-numbered items occurring first in each area.
On these two pages, we have added some abilities. There is no research behind this. But there is considerable experience in teaching math with manipulatives to kindergartners. The added abilities are marked with an "X".

The MAPS materials are intended for the assessment of activities that one might expect to occur in a pre-school environment. But some of the things that we wish to teach—and wish to test to see if we have taught—are not easily observable in natural settings. But because we are interested in teaching, we have inserted additional abilities.

In most cases, we think the abilities added are logical steps on the way from one of the MAPS abilities to another. In some cases, however, we have gone beyond the MAPS abilities.

EARLY MATH FOUNDATIONAL SKILLS
MAPS DEVELOPMENTAL PATH (PL1)
FOR CHILDREN 2-4 YEARS
[re-ordered: see notes at bottom]

I COUNTING
M-1 Constructs a block tower at least four blocks high.
M-2 Attempts to count by saying numbers.
M-6 Attempts to count by saying numbers and touching objects.
M-12 Touches an object for each number said while attempting to count.
M-14 Says numbers to refer to quantity.
M-17 Counts to find how many are in a group <6
M-27 Counts to find how many are in a group of <11.

II QUANTIFICATION
M-3 Asks for more of something.
M-7 Gives a part of a group when requested to give some.
M-11 Uses words such as some to indicate a portion.

III SHAPES
M-4 Places a circle, square or triangle appropriately in a form board.
M-5 Makes a circle.
M-10 Refers to familiar shapes (e.g. circle, square, triangle) by name.
M-24 Makes a square.
M-28 Makes a triangle.

IV COMPARISON
M-8 Identifies the shorter or taller of two persons or things.
M-15 Identifies the shortest or tallest in a group.

V TIME
M-9 Uses words (now, soon, later, when) to refer to time.
M-13 Uses words (e.g. day, night, morning) to refer to times of day.
M-18 Identifies a morning, afternoon, or evening activity.
M-29 Identifies an activity that takes about a minute to do.
M-31 Identifies an activity that takes about an hour to do.

VI MORE/LESS
M-X1 Indicates whether two groups have the same or different numbers.
M-X2 Indicates which of two groups has more/less.
M-16 Indicates that a small group has more after some have been added.
M-20 Indicates that a group has less after taking some away.

VII PATTERN CONVENTIONS
M-X1 Builds and ‘unbuilds’ two-by-two patterns.
M-X2 Replicate a given two-by-two pattern.
M-X3 Adds or takes away two or three blocks.

VIII ADDITION/SUBTRACTION
M-19 Indicates that one was taken away from a small group.
M-21 Indicates that one was added to a small group.
M-22 Indicates how many are left after taking one from a small group.
M-25 Adds two small groups by combining the groups and counting all the objects.
M-X1 Counts how many in the original amount, the amount taken away, and the remaining amount.
M-X2 Counts how many in the original amount, the added amount, and the combined amount.

IX NUMERALS
M-X1 Matches number-names with number-patterns 1-6.
M-X2 Matches number-names to numerals 1-6.
M-X3 Matches numerals with number-patterns 1-6.
M-32 Writes numerals to indicate 6 or less objects.
M-X4 Matches number-names with number-patterns 1-10.
M-X5 Matches number-names to numerals 1-10.
M-X6 Matches numerals with number-patterns 1-10.
M-33 Writes numerals to indicate 10 or less objects.
X FRACTIONS
M-X1 Recognizes halves and wholes
M-26 Asks for half of something.
M-X2 Indicates that a half is less than a whole or more than a quarter.
M-X3 Recognizes and explains one-half.
M-30 Exchanges two halves for a whole.

[We've added some new objectives. Some are intended to prepare children for some of the ATI items. Others are intended to extend some of the ATI items. These are marked with an X.

What is problematic now is how the new abilities would be incorporated into a teacher's yearly plans. We can't be sure how the inserted activities inserted relate to activities in other areas. Therefore we've left the X in the numbers rather than try to re-number all abilities.]

the workshop

The Instructional Navajo workshop met through the month of July, 1998 at the Navajo Nation Museum and Library. We would like to thank Mr. Irving Nelson and the staff of the Library for their kindness in giving us a place in which to work.

There were four Head Start teachers:
-Alice Mae Johnson, Tsaile Head Start
-Sue E. Martinez, Counselors Head Start
-Kathy R. Scott, Indian Wells Head Start
-Evonne Thompson, Round Rock Head Start
Each had been recommended as a teacher who made extensive use of Navajo at her center and was able to articulate what one might say to teach a given concept and why. Three of the teachers--Alice Johnson, Tsaile, had participated in previous workshops. Without their background experience, and their willingness to share that experience, this work would not have been possible.

There were three of us with the project:
Wayne Holm, the project director,
Irene Silentman, the project linguist,
Laura Wallace, the project ethnographer.

We met for four weeks in July. We met for four hours each morning, four days a week. Working from the list of abilities shown above, Wayne roughed out materials for each activity.
We worked as a group. The group discussed the lesson and, in particular, what should be said in Navajo. Often we found that the language
necessitated approaching the lesson in a different way. Laura facilitated the discussion, recording in Navajo on a chart tablet. Irene recorded on a laptop.

That afternoon, after the teachers had gone home, Irene typed up a fair copy of the group's work from that morning. This usually took most of the afternoon.

The following morning, we would start by reviewing, and editing, the typescript for the previous day before proceeding to new material.

It may not sound like hard work, but it is. Four hours at a time of trying to work through just which language is most appropriate and why is extremely demanding work. And the teachers were driving considerable distances to just get to the meeting.

The summer's work had to be set aside while we worked on getting the Interactional Navajo out. It is only after that was finished that we were able to get back to the Instructional Navajo.

how the materials are organized

This preliminary version contain most of the first five areas:
I   COUNTING
II  QUANTIFICATION
III SHAPES
IV  COMPARISON
V   TIME

We hope to print the other five areas in a subsequent version.

-Wayne Holm, NNLP
March 31, 1999
MATH FOUNDATIONAL SKILLS:

**Enumeration**

M-1 Constructs a block tower at least four blocks high.
M-2 Attempts to count by saying numbers.
M-6 Attempts to count by saying numbers and touching objects.
M-12 Touches an object for each number said while attempting to count.
M-14 Says numbers to refer to quantity.
M-17 Counts to find how many are in a group <6.
M-27 Counts to find how many are in a group of <11.

In enumeration, we are working toward being able to count a group of objects. This involves three things:
* touching each object in turn, neither missing nor repeating any;
* saying the number names in order, one number-name for each object;
  (that is, the child has to *synchronize* the pointing and the number-naming)
* realizing that the last number-name also names the group as a whole
  (not just the last object counted).

The child cannot be considered to be truly counting until s/he can do all three of these things. Just saying the number-names in order is not 'counting'...
yet. But we can help the child 'build up' the ability to 'count'.
In M-2, the child is saying number names, in any order.
In M-2, the child is saying number names (in any order) and touching objects (in any order).
In M-12, the child says a number-name (in any order) as s/he touches each block (in any order).
In M-14, the child is referring to a group of objects as being of a certain number (not necessarily correctly).
In M-17 and 27, the child is finally 'counting' (as defined above).

DO NOT ASSUME that saying or singing the number-names in order is 'counting'. It is a start; a child must be able to say the number names in order to 'count'. But s/he is not really counting until s/he can do all three things at once.
MATH: Enumeration 1

M-1 Constructs a block tower at least four blocks high.

Objective:
Given a set of blocks or block-like objects, and instructed to put one on top of the other, the child will stack them to a height of at least four.

Criterion:
Child will stack up to four blocks, one on top of the other, to make a “tower” of sorts. (Child should stack the blocks in the easiest manner possible. Usually this will be with the large faces horizontal.)

Language:
ALT 1
T: TELLS CHILD TO PUT ONE BLOCK ON ANOTHER,
   Díí alk’i dahdaninił. (POINTS; INDICATES) OR
   Díí díí bikáá’ dahsi’aah.
C: PLACES BLOCKS AS DIRECTED
T: IF CHILD CONTINUES PILING UP BLOCKS, TEACHER NEED SAY NOTHING.
   IF CHILD STOPS BEFORE HAVING PILED UP FOUR BLOCKS, TEACHER TELLS
   CHILD TO PLACE ANOTHER BLOCK ON TOP
   Díidó’ bikáá’ dahnaásí’aaah. (POINTS; INDICATES)
C: CHILD PLACES ANOTHER BLOCK ON TOP OF STACK
T: Áádóó díí bikáá’ dahnaásí’aaah.

... CONTINUE UNTIL CHILD HAS A STACK OF AT LEAST FOUR BLOCKS

ALT. 2
T: TELLS CHILD TO STACK BLOCKS
   Tsíneheeshjíí yázhí alk’i dahdaninił OR
   Tsíneheeshjíí yázhí alkáá’ dahdaninił.
C: CHILD STACKS BLOCKS, ONE AFTER THE OTHER, TO AT LEAST FOUR
T: IF CHILD DOES NOT UNDERSTAND, TEACHER DEMONSTRATES
   Díígi át’éego alk’i dahdaninił. OR
   Díígi át’éego alkáá’ dahdaninił. OR
C: CHILD STACKS BLOCKS UP TO AT LEAST FOUR

Instruction: <WATCH LANGUAGE CAREFULLY, BEING CAREFUL TO BE CONSISTENT>
Activity 1

ALT 1

Child demonstrates.
TEACHER CALLS ON A STUDENT TO STACK BLOCKS TO MAKE A TOWER

T to C1: Tsineheeshjii yázhí al’k’i dahdaninil OR
Tsineheeshjii yázhí akáá’ dahdaninil.

C1: STACKS BLOCKS TO AT LEAST FOUR.
TEACHER CALLS UPON OTHER STUDENTS IN TURN.

ALT 2

Children take turns.
TEACHER ASKS MEMBERS OF A GROUP, EACH OF WHOM HAS ONE OR MORE
BLOCKS TO STACK THEIR BLOCKS.

T: Tsineheeshjii yázhí al’k’i daahnil. OR
Tsineheeshjii yázhí akáá’ dahdaahnil.

Where children's Navajo is limited, the teacher should choose one phrase,
and use it consistently. This should be the same phrase she will use in testing.

The teacher may count, or have the children count with her as they stack
the blocks. But if she does so, she should remember that this is additional
information; this is not part of what the child is expected to do to meet this
objective.

Activity 2

ALT. 1

teacher commands.
TEACHER PUTS OUT THE FIRST BLOCK.
TEACHER TELLS C1 TO PUT A BLOCK ON TOP OF THAT.

T to C1: Díi bik’i/bikáá’ dahsl’aah.

C1: PUTS BLOCK ON TOP
TEACHER THEN TELLS C2 TO PUT A BLOCK ON TOP OF THAT.

T to C2: K’ad ninááná, díi bik’i/bikáá’ dahnáási’aah.

C2: PUTS BLOCK ON TOP.

CONTINUE UNTIL THERE ARE AT LEAST FOUR BLOCKS OR EACH CHILD HAS
STACKED ONE BLOCK.

T: Díi bik’i/bikáá’ dahnáási’aah.

ALT 2

chain commands.
C1 SETS OUT FIRST BLOCK.
C1 TELLS C2 TO PUT A BLOCK ON TOP OF FIRST BLOCK.

C1 to C2: Díi bik’i/bikáá’dahsl’aah.

C2 PUTS BLOCK ON TOP OF FIRST BLOCK.
C2 TELLS C3 TO PUT A BLOCK ON TOP OF THAT.
C2 to C3: K’ad ninááná, díi bik’i /bikáá’ dahnaásí’áah.
   C3 PUTS BLOCK ON TOP OF SECOND BLOCK.
   C3 DIRECTS C4 TO DO THE SAME.
C3 to C4: K’ad nináána, díi bik’i/bikáá’ dahnaásí’áah.

   CONTINUE UNTIL THERE IS A STACK OF AT LEAST FOUR BLOCKS OR UNTIL EACH STUDENT HAS PLACED ONE BLOCK.

Activity 3
HERE THE CHILDREN ARE EXPECTED TO TALK AS THEY PLACE A BLOCK.
THIS IS EXTRA; THEY ARE NOT REQUIRED TO DO SO TO PASS THE OBJECTIVE.

ALT 1

   teacher commands
T: PUTS OUT FIRST BLOCK.
   TELLS C1 TO PUT BLOCK ON TOP.
T to C1: Díí díi bik’i/bikáá’ dahsi’áah. (POINTS; INDICATES)
C1: PLACES BLOCK ON TOP
   Díí díi bik’i/bikáá’ dahsi’á.

T to C2: Ni dó’ díi bik’i/bikáá’ dahnaásí’áah.
C2: PLACES BLOCK ON TOP
   Díí díi bik’i/bikáá’ dahsi’á.

T to C3: Dídó’ díi bik’i/bikáá’ dahnaásí’áah.
C3: PLACES BLOCK ON TOP
   Shídó’ díi bik’i/bikáá’ dahsi’á.

   ... CONTINUE UNTIL THERE IS A STACK OF FOUR BLOCKS OR EACH STUDENT HAS ADDED ONE BLOCK.

ALT 2

   chain commands
C1: PUTS OUT FIRST BLOCK.
C1 to C2: Díí bikáá’ dahsi’áah. (POINTS TO ANOTHER BLOCK; INDICATES)
C2: Díí bikáá’ dahsi’á. (PLACING A BLOCK ON TOP)
C2 to C3: Dídó’ bikáá’ dahnaásí’áah. (POINTS TO ANOTHER BLOCK)
C3: Díí bikáá’ dahsi’á. (PLACING A BLOCK ON TOP)
C3 to C4: Nidó’ díi bikáá’ dahnaásí’áah. (POINTS TO ANOTHER BLOCK)

   ... CONTINUE UNTIL THERE IS A STACK OF FOUR BLOCKS OR EACH STUDENT HAS ADDED ONE BLOCK.

Language note:
Note the differences in the verb stems. In the one version, we are talking about putting one block on top of another – we use the stem ‘aah (for a single
bulky object). In the other version, we are thinking of stacking a sets of blocks -- we use the stem -nii (for a set of objects).

**Situations:**

There are a number of situations where the children might be asked to stack things such as: chairs, cups, plates, trays, boxes of crayons, books, boxes, mats, blankets.

**Comments:**

This is the first approach to enumeration. The child is expected to stack the blocks but is not required to count. While the child will not be tested on his/her ability to say the numbers, we can have students do these things in the practice activities if they are able to do so.

Teachers can also exploit opportunities for having children use numbers with activities involving repetitive movements.
MATH: Enumeration 2

M-2 Attempts to count by saying numbers.
M-6 Attempts to count by saying numbers and touching objects.
M-12 Touches an object for each number said while attempting to count.

[We have combined objectives 2, 6, and 12 here. These are successively closer approximations of counting.]

Objective:
Shown a set of six or less objects, and instructed to count those objects, the child will attempt to count those objects by saying number-name (not necessarily in order) as s/he touches objects (but not necessarily touching each block once and only once).

Criteria:
These are three successively closer approximations to counting. The task is the same; only the criteria are different. We give the child credit for the highest level s/he can pass. But we want for all children to eventually pass M-12. (Note that M-12 is still not necessarily 'counting'. If the child can synchronize saying number names in order and touching objects

M-2 Child will:
* say at least three number-names;
* in any order.
M-6 Child will:
say at least four number-names;
* in any order
* while touching objects;
* touching not necessarily synchronized with saying number-names.
M-12 Child will:
* say at least five number-names;
* number names in any order;
* pointing synchronized one-to-one with number names;
* points to objects in some sort of order

Language:

TEACHER POINTS TO A SET OF BLOCKS OR BLOCK-LIKE OBJECTS.

T: Díí shá yíníta'. OR
Díish díkwíí? Yíníta'.

C: COUNTS OBJECTS, POINTING TO OBJECTS AND SAYING NUMBER-NAMES
C: Lá'ii, naaki, táá'...
PROBLEM:
T: POINTS TO A SET OF BLOCKS OR BLOCK-LIKE OBJECTS.
    Díí shá yíníłta’. OR
    Díísh dikwíí? Yíníłta’.
C: STARTS TO COUNT IN ENGLISH.
C: One, two, three...
T: CORRECTING CHILD
    Diné k’ehjí OR
    Diné k’ehjí shá yíníłta’.
C: COUNTS OBJECTS, POINTING TO OBJECTS AND SAYING NUMBER- NAMES
C: Łá’ii, naaki, táá’...

ALT.
T: POINTS TO A SET OF BLOCKS OR BLOCK-LIKE OBJECTS.
    Díí shá yíníłta’. OR
    Díísh dikwíí? Yíníłta’.
C: DOES NOTHING
T: DEMONSTRATES
    Łá’ii, naaki, táá’...
C: COUNTS OBJECTS, POINTING TO AN OBJECT AND SAYING A NUMBER
C: Łá’ii, naaki, táá’...

Language Notes:
1. Notice the difference in meaning with the use of different postpositions. Consultant-teachers use Shich’i’ yíníłta’ to mean “read it to me” and shá yíníłta’ to mean “count it for me”.
2. Notice the different forms for “one”. Łá’ii is used as the first number in counting and t’áállá’í is used to talk about a group/set of one.

Instruction:

Activity 1:
    Teacher might have the children count the teacher’s fingers and then, together, their own.

Activity 2:
    Teacher might have the children count the children in the group: boys, girls, children, adults, etc.

Activity 3:
    Teacher might have the children count sets of hand-held objects or pictures of sets of objects.
    (Children can count any set of objects as long as there is some way to be sure that the children are looking at the same object at the same time: the children must be aware which object is being number-named.)
Activity 4 (enrichment)  
Teacher might have child or children count different sets of objects.  
(Doing so successfully actually constitutes passing M-17 or -27)  

T: OBJECTS (shá) yíníłta’ OR  
OBJECTS (shá) deiyínólta’.

Activity 5 (enrichment)  
Teacher might have child or children count to a given number.

T: T’áalá’i dóó ňléí ash dla’ji’ da’iínóta’ OR  
T’áalá’i dóó ňléí ash dla’ji’ (shá) iíníłta’.

T: OBJECT t’áá la’ągo bidiniilchíd.

C: CHILD POINTS TO ONE BLOCK OR IF S/HE DOES NOT KNOW TEACHER WILL DEMONSTRATE THAT ONE BLOCK IS T’áalá’i.  
OR

T: OBJECT NUMBER-go shá yínílt’a’. TEACHER MAY POINT TO THE BLOCKS

C: CHILD COUNTS BLOCKS

Activity 6 (enrichment)  
Teacher might have each child give the command to count to another child.
T to C1: C2 OBJECT shá yínílt’a’ bidini.
C1 to C2: OBJECT ná yínishta’.
C2: Hágošíí, shá yíníshta’.

EACH CHILD IN TURN WILL GET A CHANCE TO COUNT TO ANOTHER CHILD

Activity 7 (enrichment)  
Teacher might have child say s/he is counting (objects).
T: OBJECT yíníshta’ diní.
C: OBJECT yíníshta’.

TEACHER WILL GIVE EACH CHILD A CHANCE TO SAY S/HE IS COUNTING (OBJECTS).

Situations:  
Teacher may use any activity which lends itself to counting. Examples: counting objects used in setting tables for eating; counting the number of students on the bus, counting the number of snacks needed for a group; counting the number of objects needed (such as pencils, crayons, sheets of paper) by a group; counting objects as they are put away (such as blankets or mats); counting the number of times a given action is performed; counting the children as part of a fire drill. The more ‘practical’ or ‘realistic’ these activities seem, the better.
Enrichment Activity:
  Teacher leads children in finger plays involving counting such as:
  Tsidii ashdla' tsin yáh dahnaháaztá. OR
  Ashdla' magí tsésk'eh yikáá' dahnidahacha', OR
  Magí ashdla' tálkáá' ts'ín yaa daadloh.
Words are given on the following page.
INSTRUCTIONAL NAVAJO

Counting Songs

Sin 1

Magí Yázhi Ashdlá' 

Magí yázhí ashdla' tsin yąąh dah nidaalch'ąął Tálkáá' ts'in yaa daadloh.
"Doo shił didíidí da." "Doo shił didíidí da." Aadée' hazhóó'ígo tálkáá' ts'in yi'ol.
KAL yísts'ąą'ií magí yázhí ła' ayííłna'.

Magí yázhí dįį' tsin yąąh dah nidaalch'ąął Tálkáá' ts'in yaa daadloh.
"Doo shił didíidí da." "Doo shił didíidí da." Aadée' hazhóó'ígo tálkáá' ts'in yi'ol.
KAL yísts'ąą'ií magí yázhí ła' anááyííłna'.

Magí yázhí tąą' tsin yąąh dah nidaalch'ąął Tálkáá' ts'in yaa daadloh.
"Doo shił didíidí da." "Doo shił didíidí da." Aadée' hazhóó'ígo tálkáá' ts'in yi'ol.
KAL yísts'ąą'ií magí yázhí ła' anááyííłna'.

Magí yázhí naaki tsin yąąh dah naalch'ąął Tálkáá' ts'in yeiidloh.
"Doo shił didíidí da." "Doo shił didíidí da." Aadée' hazhóó'ígo tálkáá' ts'in yi'ol.
KAL yísts'ąą'ií magí yázhí ła' anááyííłna'.

Magí yázhí t'ąąáá'í tsin yąąh dah naalch'ąął Tálkáá' ts'in yeiidloh.
"Doo shił didíidí da." "Doo shił didíidí da." Aadée' hazhóó'ígo tálkáá' ts'in yi'ol.
KAL yísts'ąą'ií magí yázhí yęęę anááyííłna'. Aąji' magí yázhí yęęę ásdįįj.

Five Little Monkeys

Five little monkeys sitting/swinging in the tree
Teasing Mr. Alligator.
"You can't catch me." "You can't catch me."
Along came Mr. Alligator
Quiet as can be [SNAP].

(CHILDREN WILL KNOW THAT ONE GOT EATEN)

[NOTE: There is one less monkey after every SNAP]
Magí Yázhi Ashdla'

Magí yázhí ashdla' tsék'eh yikáá' dahnidahacha'.
La' adah'íígo'go bitsiits'iin yists'il.
Bimá azeé'ii'íini yích'į' hoolne'.
Áádóó azeé'ii'íini hóóshkeed,
"K'ad t'áaká tsék'eh bikáá' dahnidahohcha' lágo."

Magí yázhí dij' tsék'eh yikáá' dahnináádadahacha'.
La' adah'anáánáágo'go bitsiits'iin náánéists'il.
Bimá azeé'ii'íini yich'į' nááholnle'.
Áádóó azeé'ii'íini nááhóóshkeed,
"K'ad t'áaká tsék'eh bikáá' dahnináádadahacha' lágo."

Magí yázhí táá' tsék'eh yikáá' dahnináádadahacha'.
La' adah'anáánáágo'go bitsiits'iin náánéists'il.
Bimá azeé'ii'íini yich'į' nááholnle'.
Áádóó azeé'ii'íini nááhóóshkeed,
"K'ad t'áaká tsék'eh bikáá' dahninááhóchha' lágo."

Magí yázhí naaki tsék'eh yikáá' dahninááhácha'.
La' adah'anáánáágo'go bitsiits'iin náánéists'il.
Bimá azeé'ii'íini yich'į' nááholnle'.
Áádóó azeé'ii'íini nááhóóshkeed,
"K'ad t'áaká tsék'eh bikáá' dahninááhóochha' lágo."

Magí yázhí t'áálą'íi tsék'eh yikáá' dahninááhácha'.
T'áá bì t'éí yidziíhe adah'anáánáágo'go bitsiits'iin náánéists'il.
Bimá azeé'ii'íini yich'į' nááholnle'.
Áádóó azeé'ii'íini nááhóóshkeed,
"Sháá' k'adí nihidishni!"

**Five Little Monkeys**

Five little monkeys jumping on the bed.
One fell off and broke his head/crown.
Momma called the doctor.
The doctor said, "No more monkeys jumping on the bed."

*[NOTE: There is one less monkey after every call to the doctor.]*
Dólíi Yázhí Ashdła'

Dólíi, dólíi, dólíi ashdła'
Dólíi, dólíi t'iis yíi' dahataał.
Ła' dah diit'a'go dijí siljí'.

Dólíi, dólíi, dólíi dijí'
Dólíi, dólíi t'iis yíi' dahataał.
Ła' dah náádiit'a'go táá' siljí'.

Dólíi, dólíi, dólíi táá'
Dólíi, dólíi t'iis yíi' dahataał.
Ła' dah náádiit'a'go naaki siljí'.

Dólíi, dólíi, dólíi naaki
Dólíi, dólíi t'iis yíi' hataał.
Ła' dah náádiit'a'go t'áálá'í siljí'.

Dólíi, dólíi, t'áálá'í
Dólíi, dólíi t'iis yíi' hataał.
Éí dah náádiit'a'go
hodiíyeel.

FIVE BLUEBIRDS
Bluebird, bluebird, five (little) bluebirds
Bluebird, bluebirds singing in a tree
One flew away, there were only four.
...

[NOTE: There is one less bluebird after each flies away.]
MATH: Enumeration 3

M-14 Says numbers to refer to quantity.

Objective
Shown a set of six or less objects, and asked how many there are, the child will state that there are X--a number-name--objects. [The child should be asked at least two questions: one question about one object and one about two-to-six objects.]

Criterion:
[It's all right if the child counts on his/her own but the teacher need not tell the child to count. That will be tested in M-17 and M-27.]

The child should answer the question about one object correctly but may answer the question about two-to-six objects with any number from two to six. In other words: all that is being tested here is the child's awareness that there are groups of one and groups of more-than-one.

The child will be expected to use the appropriate handling verb, e.g., NUMBER-NAME si'ą OR NUMBER-NAME sinil.

Language:
T: Dii OBJECT dikwiin sinil? OBJECT si'ą daats'i? OR
Dii OBJECT shą' dikwiin sinil? OBJECT si'ą daats'i?
C: NUMBER-NAME si'ą / sinil.

PROBLEM
T: Dii lá OBJECT dikwiin sinil? OR
Dii OBJECT shą' dikwiin sinil? OR
Dikwiish OBJECT sinil nínízin?
C: NUMBER-NAME sinil (shįį /nisin).
T: IF CHILD ANSWERS NUMBER-shįį, TEACHER WILL MODEL THE CORRECT FORM OF VERB AND THEN ASK ANOTHER QUESTION
T: NUMBER-NAME sinil OR
NUMBER-NAME (t'áálá'į) si'ą.

Language Notes:
When making a response to a question regarding the number of objects, we have to use the correct handling verb. Example: blocks: (OBJECT) t'áálá'į si'ą; OR (OBJECT) naaki sinil. Example: >one pencil : bee ak'e'alchíihí sită , pencils: bee ak'e'alchíihí sinil. Example: one sheet of paper: naaltsoos sitsooz, sheets of paper:naaltsoos sinil.

While we want the children to use the handling verbs appropriately in their responses we will use sinil in all questions. Thus we will use Dii lá OBJECT dikwiin sinil?
Instruction:

Research shows that children (and adults) can recognize the number of objects in small groups up to six or so without necessarily having to count them one by one. This is an opportunity to teach children to recognize ‘patterning’ in small numbers.

This is best done by placing the objects—or pictures of object—in pairs.

\[
\begin{array}{ccccccc}
\text{i} & \text{ii} & \text{i} & \text{ii} & \text{i} & \text{ii} & \text{i} \\
\end{array}
\]

Situations:
1. Counting or recognizing the number of shoes that three children have all together. \textit{\text{Álchini táá', ké t'áá át'égo dikwii?}} There are three children, how many shoes all together?
2. Recognizing and counting there are six snacks for six children per table. (Children will be paired with their snacks.)
3. Art materials set at a table for four: Four sets of drawing paper with a crayon per child,

Notes:

This will not involve counting—although it’s all right if the child counts. (It is possible to ‘see’ groups of two-to-six or seven without actually counting, particularly if they’re arranged in readily perceivable patterns.) But M-14 only requires the child to use number-names—almost any number names—to show that the child understands the difference between the number-name "one" and number-names "more-than-one".

The teachers may want to experiment with showing objects or pictures of objects in two-by-two patterns (as above).

We do not want to spend long on this objective. This is only a step on the way to M-17 and M-27 where the child enumerates a group by counting.
MATH FOUNDATIONAL SKILLS:
Quantification

M-3 Asks for more of something.
M-7 Gives a part of a group when requested to give some.
M-11 Uses words such as "some" to indicate a portion. [add one]

M-X1 Asks for "a little/a few" or "lots/many"
M-X2 States that a given quantity is "too much", "too little", or "(just) enough".
M-X3 Uses quantifiers such as "some", "all" and "none" [add "one"]

In quantification, we are working toward being able to use "quantifiers" -- words other than number-names that indicate something about the number involved.

In M-3, 7, and 11, we introduce the quantifier "some" with mass and count nouns. We have added the quantifier "one" for contrast.

In M-X1, we introduce the quantifiers "a little" áíchįįdi and "lots" ła'i with mass nouns and "a few" t'áá dikwíí and "many" t'óó ahayóí with count nouns.

In M-X2, we introduce comparisons between an amount and the amount wanted/needed. We introduce the terms "too little" and "too much" with mass nouns and "too few" and "too many" with count nouns.

In M-X3, we have the children use the quantifiers "one" t'ááláí, "some" la daal__, "all" t'áá át'é, and "none" doo la'__ da to talk about the distribution of attributes.

Navajo does not handle quantifiers the same way English does. The extremely widespread, often obligatory, use of so-called handling verb stems has forced us to introduce some practice on four or five of the most common handling verb stems. Thus, for example, certain stems having to do with single objects are used for single objects; other stems are used for groups of objects.

"Mass" and "count" nouns do not work the same way in Navajo as they do in English. But the fact that many "mass" nouns found in a Head Start centers have to be handled in containers affects the way they are talked about in Navajo.
Quantification 1A [Mass]

M-3 Asks for more of something.
M-7 Gives a part of a group when requested to give some.
M-11 Uses words such as "some" to indicate a portion.

[These three objectives have been combined because they can all be tested in a single activity.]

Purpose:
To give children to contrast "some" and "some more" as indefinite quantifier. In 1A we use these in talking about mass (non-count) substances.

Objective

Shown a container with a mass substance by Child 1, and led to ask for "some" by the teacher, Child 2 will ask for "some" and Child 1 will give him/her some (not all). Led to ask for "some more", Child 2 will ask for "some more" and Child 1 will give him/her some more (not all).

[Each child will have a turn being Child 1 and Child 2.]

Test Format

Teacher has three pairs of little bowls or cups—six in all. One of each pair of bowls has a substance in it: a liquid substance (like water), granular substance (like salt), and a substance made up of very small objects (like dried kernels of corn). The other member of each pair of bowls will be empty.

Teacher will lead Child 1 to make two requests—one with "some" and one with "some more"—and Child 2 to respond with the appropriate actions. Children will be led to use "some" and "some more" with three different substances: liquids, granules, and very small objects.

1) The teacher sets out two bowls: one with water and one empty. She tests the students on "some" and "some more". Then she sets those two bowls back.

2) The teacher sets out another two bowls: one with salt and one empty. She tests the students on "some" ła' and "some more" ła'nááná with those bowls. Then she sets those bowls back.

3) The teacher sets out another two bowls: one with kernels of corn and one empty. She tests the students on "some" and "some more" with those bowls. Then she sets those bowls back.

By keeping the bowls in pairs, the teacher avoids mixing the substances.

While using spoons might make the tests less messy, it may be that actually pouring the substance from one little bowl to another preserves the distinction between "some" and "all" that spooning does not. As you wish; if you...
MATH: Enumeration 4

M-17 Counts to find how many are in a group <6
M-27 Counts to find how many are in a group of <11.
[We have combined objectives 17 and 27. They call for the same abilities only with different sized groups. i.e., any child that passes 27 has, in effect, passed 17.]

Objective
Shown a set of ten or less blocks or block-like objects, and told to count them, the child will count the objects. Asked how many objects there are, the child will state that there are X--a number-name--objects.
[The child should be asked at least three questions: one question about one object, one question about two-to-six objects, and one question about seven to ten objects. These questions may be asked in various orders.]

Criterion:
To be considered successful, the child must answer (at least) three questions correctly about::
* one object;
* two-to-six objects;
* seven to ten objects;
in various orders.

For each of these questions, the child must:
* count the number of objects correctly;
* state the number-name of objects in the group correctly.

Language:
T: LAYS OUT A GROUP OF OBJECTS
INSTRUCTS CHILD TO COUNT THE OBJECTS
T'ááłá'í nį́ąnígo yinílt'a
C: COUNTS OBJECTS
Lá'ií, naaki, táá' . . .
T: ASKS HOW MANY ARE IN THE GROUP
T'áá át'égosh dikwii (lá)?
(Shį́į́l hólne'. OR Baa hólne').
C: CHILD TELLS HOW MANY ARE IN THE GROUP
NUMBER-NAME (sinil) lá.

Language Note:
The questions are asked in such a way here that neither the teacher nor the child needs to use objects-at-rest verb form. If, however, the child does use handling verbs incorrectly, the teacher should quietly correct that part of the student's
answer. It might be well, in situations and in practice, to have students use the correct forms of the objects-at-rest verb.

**Instruction:**

**Activity 1:** Teacher has children count a given number of fingers on one hand.

T: TEACHER HOLDS UP A NUMBER OF FINGERS.
CHILDREN HOLD UP THE SAME NUMBER OF FINGERS.
TEACHER INSTRUCTS THE CHILDREN TO COUNT.

T: T'áá lá'í nitánígo deiínóta'.

T/C: TEACHER AND CHILDREN COUNT (THE FINGERS)

C: Łá'ii, naaki, táá'...

T: TEACHER ASKS THE CHILDREN HOW MANY (FINGERS).

T: T'áá át'égósh díkwíí (lá)?

C: CHILDREN TELL HOW MANY (FINGERS).

C: NUMBER (go) deiínííta'.

**Activity 2:** Teacher has the children count the children in the group: boys, girls, children, adults; chairs, etc. Example: boys:

T: TEACHER INDICATES THE BOYS IN THE GROUP.
TEACHER INSTRUCTS THE CHILDREN TO COUNT (THE BOYS)

T: Ashiiké t'áá lá'í nitánígo deiínóta'.

T/C: TEACHER AND CHILDREN COUNT (THE BOYS)

C: Łá'ii, naaki, táá'...

T: TEACHER ASKS THE CHILDREN HOW MANY (BOYS).

T: Ashiiké t'áá át'égósh díkwíí (lá)?

C: CHILDREN TELL HOW MANY (BOYS).

C: NUMBER (go) deiínííta'. OR
NUMBER-NAME (gi) ánéeleí'té' lá.

**Activity 3:**

Teacher has the children count classroom objects.

[Children can count any set of classroom objects as long as there is some way for the teacher to point to or move each object in turn to get the children to all look at the same object at the same time.]

Example: a set of large beads on a string or wire.

T: TEACHER INDICATES THE GROUP OF BEADS TO BE COUNTED.
TEACHER INSTRUCTS THE CHILDREN TO COUNT (THE BEADS).

T: Yoo' t'áá lá'í ni'ánígo deiínóta'.

T/C TEACHER AND CHILDREN COUNT (THE BEADS)

C: Łá'ii, naaki, táá'...

T: TEACHER ASKS THE CHILDREN HOW MANY (BEADS).

T: Yoo' t'áá át'égósh díkwíí (lá)?

C: CHILDREN TELL HOW MANY (BEADS).

C: NUMBER (go) deiínííta'. OR
NUMBER-NAME (gi) ánéeleí'té' lá.
Situations:
Teacher might use any activity which lends itself to counting. Examples: counting objects used in setting tables for eating; counting the number of students on the bus, counting the number of snacks needed for the children in a group; counting the number of objects needed by a group (such as pencils, crayons, sheets of paper); counting objects as they are put away (such as blankets or mats); counting the number of times a given action is performed; counting the children outside as part of a fire drill. The more 'practical' or 'realistic' these activities seem, the better.

Language Note: ****Ánéelt'ę́ is a verb that is in the third person and cannot be used with animate "things" including humans. Ánéelt'ę́ is used only with inanimate objects which can be handled or placed in a container and is used in a comparative sense. These may include beads, beans, nuts, pencils, rocks, etc.

Notes:
We have collapsed these two items as the actions are the same. Only the criteria are different.
Children may be able to count a group of objects, saying the number names that go with each object, but still not realize that the last number-name is both the number-name for that last object but is also the number-name for all the objects in that group as a group. This objective requires the child to both count the objects out loud and to make a statement about the number of objects in the set.

This objective itself tends to avoid dealing with so-called handling verbs. Teachers are encouraged to use them situationally and in practice but not to require them on the test. If the children use handling verbs incorrectly, quietly correct them and go on. These will be taken up in the activities having to do with Quantification.
do use spoons, do not switch to a verb "spoon some out for me (again)". We want to concentrate on the simple forms of "give some to me (again)".

Criterion:
Child 2 will make the distinction between forms for "some" ła' and "some more" ła' nááná (by including náá- in the verb for "some more". The distinction is between "some" (part of, not all) and "some more" (an additional part of, not all).
Child 1 will by his/her actions, make the distinction between "some" and "some more" (not all).

Language

T: SETS UP ACTIVITY BY GIVING C1 A SMALL CONTAINER WITH A MASS SUBSTANCE (LIQUID/GRANULES/SMALL OBJECTS) IN IT
T: TEACHER TELLS C2 TO ASK FOR "SOME".
T: OBJECT ła' biíníkeed.
C2: ASKS C1 FOR "SOME".
C2: OBJECT ła' shaa níkaah.
C1 GIVES C2 SOME.

T: TELLS C2 TO ASK FOR "SOME MORE".
T: ła' nááníníkeed.
C2: ASKS C1 FOR "SOME MORE".
C2: ła' shaa náníkaah
C1: GIVES C2 SOME MORE.

This sequence will be repeated for the liquid, the granules, and the very small objects. The three kinds of substances may be tested in any order; the order should be different for different students.

Language Note:
In talking about objects/substance being moved or at rest, Navajo uses of handling verbs. These mark the shape (or number) of objects being talked about. It is impossible to say much in Navajo without making use of these handling verbs. Therefore, we have made the correct use of the handling verbs part of this objective.
There are a dozen or more handling verbs. Here we are only asking the children to use the one that has to do with the stem -kaah which has to do with moving a substance out of an open container.

Instruction:
In all of these activities, children will use the stem -kaah. Use a variety of different substances. In this case, it is not the different substances but the fact that some is being moved out of an open container that determines the stem.
Teachers should see that the action is the same. That is, we don't shift the command to "pouring" or "spooning" but focus on "give me".
Activity 1
LIQUIDS: water, milk, juice, soup, stew, broth...
Teacher has students ask for, and give, "some" and "some more".

Activity 2
GELATINOUS/MUSHY: jello, jelly, pudding, oatmeal, cornmeal, mush, glue, paste, mud...
Teacher has students ask for, and give, "some" and "some more".

Activity 3
POWDER: toothpowder, flour, powdered sugar...
Teacher has students ask for, and give, "some" and "some more".

Activity 4
GRANULES: flour, dust, salt, suga, cornmeal, pollen, sand
Teacher has students ask for, and give, "some" and "some more".

Activity 5
VERY SMALL OBJECTS: rice, kernels of corn, beans, (dried) peas, dried cereal, beads, sequins...
Teacher has students ask for, and give, "some" and "some more".

Situations:

Notes:
In English, the distinction is between the independent words "some and "some more". In Navajo, one might be able to say something like "some again" as in ta' nááná. But we want the child to incorporate the idea of "repeated action" by incorporating náá- into the verb. Ex.: ta' shaa náánikaah.

English seems to focus on the quantity as a thing; Navajo on the nature of the action.

*   *   *   *
MATH: Quantification 1B [Count]

M-3 Asks for more of something.
M-7 Gives a part of a group when requested to give some.
M-11 Uses words such as "some" to indicate a portion.
[These three objectives have been combined because they can all be tested in a single activity.]

Purpose:
To give children to contrast "some" and "some more" as indefinite quantifier. In 1B we use these in talking about count objects.

Objective
Shown a set of six or more similar objects by Child 1, and led to ask for some by the teacher, Child 2 will ask for "some" and Child 1 will give him/her "some" (not all). Led to ask for some more, Child 2 will ask for "some more" and Child 1 will give him/her "some more" (not all).
[Child will be tested over the stem -nii'it.]
Each child will have a turn being Child 1 and Child 2.]

Test Format
Teacher has three sets of objects with six or more similar objects in each sets: let's say six blocks, six full length crayons, and six sheets of colored paper.
Teacher will lead Child 1 to make two requests--one with "some" and one with "some more" and Child 2 to respond with the appropriate actions. Children will be led to use "some" and "some more" with three different kinds of objects: small bulky objects, long slender objects, and flat flexible objects

1) The teacher gives the set of six blocks to Child 1. She then leads Child 2 to ask for "some"; Child 1 gives him "some" (two or three, not all). Teacher returns those blocks to the original set. Teacher leads Child 2 to ask for "some more"; Child 2 gives him/her "some more (two-three, not all).

2) The teacher gives the set of six full-length crayons to Child 1. She leads Child 2 to ask for "some"; Child 1 gives him "some" (two or three, not all). Teacher returns those crayons to the original set. Teacher leads Child 2 to ask for "some more"; Child 2 gives him/her "some more (two-three, not all).

3) The teacher gives the set of six sheets of colored paper to Child 1. She leads Child 2 to ask for "some"; Child 1 gives him "some" (two or three, not all). Teacher returns those sheets to the original set. Teacher leads Child 2 to ask for "some more"; Child 2 gives him/her "some more (two-three, not all).
Criteria:
Child will correctly make the distinction between forms for "some" and "some more" by inserting náá- in the verb form Ex.: ła' shaa náání'niil.
Child will use the correct stem for sets of discrete objects -niil.

Language
T: SETS UP ACTIVITY BY GIVING C1 A SET OF (AT LEAST) SIX OBJECTS
T: TELLS C2 TO ASK FOR "SOME".
T: OBJECT ła' bíníkeed.
C2: ASKS C1 FOR "SOME".
C2: OBJECT ła' shaa níínil.
C1: GIVES C2 "SOME" (MORE THAN ONE; NOT ALL).
T: TELLS C2 TO ASK FOR "SOME MORE".
T: ła' náánéíñíñíñleed.
C2: ASKS C1 FOR "SOME MORE".
  ła' shaa náání'niil.
C1: GIVES C2 "SOME MORE".

Language Note:
In talking about groups of objects being moved or at rest, Navajo makes use of handling verbs. These mark the shape of the objects or action being talked about. It is impossible to say much in Navajo without making use of these handling verbs. Therefore, we have made the use of the handling verbs part of this set of objectives.

There are a dozen or more handling verbs. Here we are only asking the children to use the stem -niil for a relatively small set of discrete objects.
We will introduce a few of the other stems in 1C.

Instruction:
In preparation for 1C, it may be good to have the children practice with objects of different shapes.

Activity 1
small bulky objects. Lead children to ask for "some" and then "some more" of small bulky objects. This might include: prunes or apricots, pieces of clay or playdough, small balls or leggo blocks, bars of soap; etc.

Activity 2
slender rigid objects. Lead children to ask for "some" and then "some more" of slender rigid objects. This might include: pieces of spaghetti, spoons or forks, full-length crayons or magic markers, pencils or pens; etc.

Activity 3
flat, flexible objects. Lead children to ask for "some" and then "some more" of flat flexible objects. This might include: pieces of paper or cardboard, washcloths and towels, etc.
Situations:
MATH: Quantification 1-C [count with "one"]

M-X0 Uses quantifiers "one" and "some".

Purpose: This lesson is to introduce a contrast between "one" t'áá lá'í (as a quantifier) and "some" ła. In Navajo, this requires choosing between the stems -aah, -tįį, and -tsóós with "one" [for the objects used here] and -níiį with (a set consisting of) "some".

Objective

Shown a set of six or more similar objects by Child 1, and led by the teacher to ask for "one", Child 2 will ask for one and Child 2 will give him/her one. Led to ask for "some", Child 2 will ask for some and Child 2 will give him/her "some"

Each child in the group will then have a turn being Child 1 and Child 2.

Children will do so for using four common handling-verbs: -aah, -tįį, -tsóós, with "one" and -níiį with "some"--a group.

Test Format

Teacher will lead Child 1 to make two requests--one with "one" and one with "some"--and Child 2 to respond with the appropriate actions. Children will be led to use "one" with three different kinds of objects: small rounded objects, long slender objects, and flat flexible objects. Children will use "some" in asking for a set of (similar) objects.

Teacher has three sets with five or more similar objects in each set.

1) The teacher gives the set of five little blocks [or other small bulky objects] to Child 1. She tells Child 2 to ask for "one". La' sha'a nitįį. Child 2 does so. Child 1 gives him/her one. Putting that block back, the teacher tells Child 2 to ask for "some". Child 2 asks for "some". Child 1 gives him/her "some" (more than one; not all).

2) The teacher gives the set of five full-length crayons [or other slender rigid objects] to Child 1. She tells Child 2 to ask for "one". Child 2 does so. Child 1 gives him/her one. Putting that crayon back, the teacher tells Child 2 to ask for a set (of two or three). Child 2 asks for "some". Child 1 gives him/her some (more than one; not all).

3) The teacher gives the set of five sheets of paper [or other flat flexible objects] to Child 1. She tells Child 2 to ask for "one". Child 2 does so. Child 1 gives him/her one. Putting that sheet of paper back, the teacher tells Child 2 to ask for a set (of two or three). Child 2 asks for "some". Child 1 gives him/her some (more than one/not all.)

Activities numbered 1, 2, 3 above should be used in various orders.

The "one" object is returned before the second question to minimize the idea of "some more" or "some again".
Criteria:
Child will correctly make the distinction between forms for "one" and "some" (more than one) by using the appropriate verb stems: -aah for a small, bulky object, -tijh for a slender, flexible object, -tsóós for a flat, flexible object, and -níít for a small set of objects.

Language

1) little blocks or other small bulky objects (-aah)
   T: GIVES C1 A SET OF (AT LEAST) FIVE BLOCKS.
   T: TELLS C2 TO ASK FOR "ONE".
   T: OBJECT tʼááłáʼigo bíníkeed. OR
       OBJECT láʼ bíníkeed.
   C2: ASKS C1 FOR ONE.
   C2: OBJECT tʼááłáʼigo shaa níʼaah.
   C1: GIVES C2 ONE.
   T: PUTS THAT OBJECT BACK WITH THE OTHERS.
   T: TELLS C2 TO ASK FOR "SOME".
       OBJECT łaʼ bíníkeed. OR
       OBJECT díkwilgo da bíníkeed.
   C2: ASKS C1 FOR SOME.
       OBJECT łaʼ shaa nínííł
   C1: C1 GIVES C2 SOME.

2) full-length crayons or other small stiff objects (-tijh)
   T: GIVES C1 A SET OF (AT LEAST) FIVE CRAYONS.
   T: TELLS C2 TO ASK FOR "ONE".
   T: OBJECT tʼááłáʼigo bíníkeed.
   C2: ASKS C1 FOR ONE.
   C2: OBJECT tʼááłáʼigo shaa ní-_____.
   C1: GIVES C2 ONE.
   T: PUTS THAT OBJECT BACK WITH THE OTHERS.
   T: TELLS C2 TO ASK FOR "SOME".
       OBJECT łaʼ bíníkeed.
   C2: ASKS C1 FOR SOME.
       OBJECT łaʼ shaa nínííł.
   C1: C1 GIVES C2 SOME.

3) pieces of paper or other flat flexible pieces of paper (-tsóós)
   T: GIVES C1 A SET OF (AT LEAST) FIVE PIECES OF PAPER
   T: TELLS C2 TO ASK FOR "ONE".
   T: OBJECT tʼááłáʼigo bíníkeed.
   C2: ASKS C1 FOR ONE.
   C2: OBJECT tʼááłáʼigo shaa ní-_____.
   C1: GIVES C2 ONE.
   T: PUTS THAT OBJECT BACK WITH THE OTHERS.
T: TELLS C2 TO ASK FOR "SOME".
OBJECT ła' biinikeed.
C2: ASKS C1 FOR SOME.
OBJECT ła' shaa ninill.
C1: C1 GIVES C2 SOME.

Language Note:
In talking about groups of objects being moved or at rest, Navajo uses so-
called handling verbs. These mark the 'shape' of the objects or the action being
talked about. It is impossible to say much in Navajo without making use of these
handling verbs. They deal with some of the distinctions made by quantifiers in
English. Therefore, we have made the correct use of the handling verbs part of
this objective.

There are a dozen or more of these stems. Here we are only asking the
children to use four of the more common ones: -aah, tijj, -tsos, and -nìll.
(Earlier, they worked with -kaah.)
- aah: small, bulky, objects such as balls, blocks, lumps of clay, toy cars,
plates, cups, bowls, and (interestingly) knives...
- tijj: slender, rigid objects such as pencils, full-length crayons, rulers,
paintbrushes, spoons, forks, toothbrushes...
- tsós: a flat, flexible object: a piece of writing paper, colored paper, or
light cardboard, napkins, dishcloth, washcloth, towel, a piece of cloth, a
shirt, a blouse...
- nìll: a (relatively small) set of discrete objects such as a set of any of the
objects above.
We have had to gloss ła' here as both 'one' and 'some'. The distinction is
not made with ła' but by the stem of the handling verb.

Instruction:

Activity 1  Child asks another for "one" or "some" of several different kinds of
small bulky objects: for example, blocks, balls, toy cars. [Children's attention will
be on the names of the objects but all take the same verb-forms .] Teacher
might first cue child's questions by pointing to the objects and showing one finger
or two-three. Later she might name the object and tell the child to ask (as in the
test) for one or two-three.

Activity 2  Child asks another for "one" or "some" of several different kinds of
common, slender, rigid objects: for example, pencils, crayons, rulers. [Children's
attention will be on the names of the objects but all take the same verb-forms.] Teacher
might first cue child's questions by pointing to the objects and showing
one finger or two-three. Later, she might name the object and tell the child to ask
(as in the test) for one or two-three.

Activity 3  Child asks another for "one" t'áá lá'í or "some" ła' of several
different kinds of common, small, bulky objects or small, bulky objects": for
example, pencils, crayons, little blocks, toy cars; or perhaps spoons, forks, cups, and knives. [Here we want a contrast between shapes and numbers.] Teacher might first cue child's questions by pointing to the objects and showing one finger or two-three. Later she might name the object and tell the child to ask (as in the test) for one or two-three.

Activity 4 Child asks another for "one" or "some" of several different kinds of common, flat, flexible objects: for example, white paper, colored paper, cloth. [Children's attention will be on the names of the objects but all take the same verb-forms.] Teacher might first cue child's questions by pointing to the objects and showing one finger or two-three. Later, she might name the object and tell the child to ask (as in the test) for one or two-three.

Activity 5 Child asks another for "one" or "some" of several different kinds of common, slender, rigid objects and flat, flexible objects: for example, forks, spoons, napkins, and dishcloths. [Here we want a contrast between shapes and numbers.] Teacher might first cue child's questions by pointing to the objects and showing one finger or two-three. Later, she might name the object and tell the child to ask (as in the test) for one or two-three.

Activity 6 Child asks another for "one" or "some" of several different kinds of common, round, bulky objects, slender, rigid, objects, and flat, flexible objects. Teachers may want to think of objects found in the same settings. For example: spoons, bowls, and napkins. Or soap, towel, and toothbrush. Etc. Teacher might first cue child's questions by pointing to the objects and showing one finger or two-three. Later, she might name the object and tell the child to ask (as in the test) for one or two-three.

REMEMBER, while we are using different objects and would like for the child to name the objects, that is not the purpose of these activities. The purpose is to get the children to make a distinction in the stems of the handling verbs in asking for one or more than one ("some") object(s).

Situations:
There are a number of situations where students might be asked to use this language in more-or-less realistic situations. Such as

Setting Table:
A child helping set tables could ask for "one" or "some" or a given number of small, bulky objects (such as dishes, cups, glasses, and (interestingly) knives; slender rigid objects (spoons, forks, but not knives), and flat, flexible objects (napkins, cloths to clean the table).

Supplies:
A child helping pass out supplies for activities could ask for "one" or "some" or a given number of small, bulky objects (such as balls of clay, boxes or cans of
crayons, closed containers of paint, erasers), slender, rigid objects (full-length crayons, pencils, sticks of chalk) and flat, flexible objects (writing paper, drawing paper, construction paper, cloths to clean the table).

While these can be given out without talking, writing/drawing can be turned into situations where each child asks for each item: OBJECT t'áála'í shaa ni... and the one passing out responds: OBJECT t'áála'í naanish... 

Play

A child asking for a given item or items for free play can be required to ask for it/them using the correct handling verb stem. If they don't know the name of the object(s), they can ask. But they should use the correct handling verb stem. If they err, they should be corrected quietly.

Teacher should be on the lookout for other situations in which children want objects from adults or other children. This is a natural way to slip in most of the other handling verb stems, not just the four used here.

* * * *
MATH: Quantification 1-D

M-X0 Uses quantifiers "one" and "some".

Purpose: This lesson is introduced to give children more practice on choosing between the three handling verb stems -'aah, -tijh, and -tsóós when asking for "one" (as a quantifier). Where 1C focuses on a contrast between just one of these stems at a time and -nií, 1D focuses on a three-way contrast between the three stems.

Objective

Shown one of a set of three objects--an eraser, a pencil, and a piece of paper--and led by the teacher to ask for a given object, child will ask for it using OBJECT t'áálá'ígo shaa ni-. . . with the correct stem -'aah, -tijh, or -tsóós.

[Teacher will lead the child to ask for one each of the three items in different orders.]

Test Format

Teacher will have several erasers [or any other small bulky object] several pencils [or other slender, rigid object] and several sheets of paper [or other flat, flexible object]. [The reason for having several of each is to motivate the request for "(just) one".]

Teacher will lead Child to request each of the items in turn. The child will request "one" of the items indicated, and the teacher will give the item to the child.

1) small, bulky object
The teacher indicates one eraser in the set of two or three and leads the child to ask for "one". Child asks for one eraser. Teacher gives child an eraser.
2) slender, rigid object
The teacher indicates one pencil in the set of two or three, and leads the child to ask for "one". Child asks for one pencil. Teacher gives child a pencil.
3) flat, flexible object
The teacher indicates piece of paper in the set of two or three, and leads the child to ask for "one". Child asks for one (piece of) paper. Teacher gives child a piece of paper.
Teacher mixes up the order of 1, 2, 3, for different children.

Criteria:

Child will select the correct stem in a request of the form OBJECT t'áálá'ígo shaa ni-. . .-'aah / -tijh / -tsóós.
Language

1)  erasers [or other small bulky objects] (-aah)
   T:  INDICATES ONE OF THE SET OF ERASERS
   T:  TELLS CHILD TO ASK FOR "ONE".
   T:  OBJECT t'ááá'igo yíníkeed.
   C:  ASKS FOR "ONE".
   C:  OBJECT t'ááá'igo shaa ní'aah.
   T:  GIVES OBJECT TO CHILD.

2)  pencils or other slender rigid objects (-tijih)
   T:  INDICATES ONE OF THE SET OF PENCILS
   T:  TELLS CHILD TO ASK FOR "ONE".
   T:  OBJECT t'ááá'igo yíníkeed.
   C:  ASKS FOR "ONE".
   C:  OBJECT t'ááá'igo shaa nítijih.
   T:  GIVES OBJECT TO CHILD.

3)  pieces of paper or other flat flexible objects (-tsóós)
   T:  INDICATES ONE OF THE SET OF PIECES OF PAPER
   T:  TELLS CHILD TO ASK FOR "ONE".
   T:  OBJECT t'ááá'igo yíníkeed.
   C:  ASKS FOR "ONE".
   C:  OBJECT t'ááá'igo shaa nítsóós.
   T:  GIVES OBJECT TO CHILD.

Language Notes:

There are a dozen or more of these handling verb stems. We are only asking the children to use here three of the more common ones: -'aah, -tijih, -tsóós in contrast with -niiít (and, elsewhere, -kaah.

- 'aah: small, bulky objects such as balls, blocks, lumps of clay, toy cars, plates, cups, bowls, and (interestingly) knives ...
- tijih: slender, rigid objects such as pencils, full-length crayons, rulers, paintbrushes, spoons, forks, toothbrushes ...
- tsóós: a flat, flexible object: a piece of writing paper, colored paper, or light cardboard, napkins, dishcloth, washcloth, towel, a piece of cloth, a shirt, a blouse...
- niiít: a (relatively small) set of discrete objects such as a set of any of the objects above.

As the children become more proficient with these, we need to try to avoid the notion that a given thing 'goes with' one and only one handling verb stem. The stem selected depends on several factors. We cannot say that gohweééh, 'coffee' always 'goes with' the stem -kaah, For example:
* an unopened can of coffee might take -'aah,
* an open can of ground coffee or coffee beans might take -kaah,
* coffee in a cup might also take -kaah
* loose ground coffee spilled out on a surface might take -jááh
* a heap of loose coffee beans on a surface might take -jááh
* coffee singles (in a teabag-like paper bag) might take -tsóós

There is sometimes overlap; we may use different stems in what seem to be the same situation, depending on how we perceive that situation. Of course, we cannot get into these kinds of complexities with the children. But we do need to be aware of these kinds of problems. On the one hand, we want to avoid the notion that certain objects always 'take' certain stems. On the other hand, we may have to simplify some of the situations in which we expect children to use handling verbs to keep them manageable.

**Instruction:**

**Activity 1** Child asks another child for one object from a set of several different kinds of common small bulky objects: for example, a ball, a block, a toy car: OBJECT t'áátlí'igo shaa ni'aa⁷. [Children's attention will be on the names of the objects but all take the same verb-forms.] Child who doesn't know the object's name can ask for the name; the important thing is the verb-form.

**Activity 2** Child asks another child for one object from a set of several different kinds of common slender rigid objects: for example a pencil, a full-length crayon, a ruler: OBJECT t'áála'ígo shaa nitjih. [Again, the children's attention will be on the names of the objects but all take the same verb-forms.] Child who doesn't know the object's name can ask for the name; the important thing is the verb-form.

**Activity 3** Child asks another child for one object from a set of several different kinds of common small bulky objects or slender rigid objects: for example a set consisting of a pencil, a crayon, a little block, and a toy car; or a set consisting of a spoon, a fork, a cups, and a small bowl. Students will have to choose between OBJECT t'áála'ígo shaa ni'aa⁷ or OBJECT t'áála'ígo shaa nitjih. [Again, the children's attention will be on the names of the objects but all take the same verb-forms.] Child who doesn't know the object's name can ask for the name; the important thing is the verb-form.

**Activity 4** Child asks another child for one object from a set of several different kinds of common flat flexible objects: for example white paper, colored paper, clot: OBJECT t'áála'ígo shaa nítsóós. [Again, the children's attention will be on the names of the objects but all take the same verb-forms.] Child who doesn't know the object's name can ask for the name; the important thing is the verb-form.

**Activity 5** Child asks another child for one object from a set of several different kinds of common small bulky objects and flat flexible objects: for example, a cup, a dish, a napkin, a dishcloth, or an eraser, a chalkboard eraser, a sheet of drawing
paper, and a sheet of writing paper. [Again, the children's attention will be on the
names of the objects but all take the same verb-forms.] Child who doesn't know
the object's name can ask for the name; the important thing is the verb-form.

Activity 6  Child asks another child for one object from a set of several different
kinds of common, slender, rigid objects and flat, flexible objects: for example, a
fork, a spoon, a napkin, and a dishcloth, or a full-length crayon, a pencil, a sheet
of drawing paper, and a sheet of writing paper. [Again, the children's attention
will be on the names of the objects but all take the same verb-forms.] Child who
doesn't know the object's name can ask for the name; the important thing is the
verb-form.

Activity 7  Child asks another child for one object from a set of several different
kinds of common, small, bulky objects, slender, rigid objects, and flat, flexible
objects. Teachers may want to think of objects found in the same settings. For
example:

eating:  spoon, fork, cup, bowl, napkin, and dishcloth;
writing:  eraser, chalkboard eraser, pencil, full-length stick of chalk,
writing paper, drawing paper;
art:  jar of paint, lump of clay, paintbrush, stirring stick, piece drawing
paper, piece of construction paper;
washroom:  soap, towel, and toothbrush.
Etc., etc., etc.

REMEMBER while we are using different objects and would like for the child to
name the objects, that is not the purpose of these activities. The purpose is to
get the children to make a distinction in the stems of the handling verbs in asking
for "one" object.

Enrichment 1:  Teacher can expand any of the activities above to reintroduce
a contrast between one of these items and a small group of two-three-four,
thereby contrasting the three handling verb stems -'aah, -tijh, -tsoós with one
and the stem -nil with "some"--and t’áála’i with "one" and with "some"

Enrichment 2:  Teacher can expand the activities above to have the child
giving the item to say that s/he is doing so: OBJECT t’áála’igo naa nish- -'aah,
-tijh, -tsoós.

Enrichment 3:  Teacher can further expand Enrichment 2 by leading children
to state the "giver's NAME receiver's NAME OBJECT t’áála’i yaa yi- -'aah / -tijh
/-tsoós". Example: Jimmy Dan máazoo t’áála’i yaayi’aah. [This not only gets
the observers into the action but gives the children practice with an important
basic word-order difference between Navajo and English.]

Enrichment 4:  Teacher can expand this activity to include asking for "one"
and then "another one".
Enrichment 5: Teacher can expand upon activity 4 to make a contrast between "another one" and "some more". These will take different stems.

Situations:

There are a number of situations where students might be asked to use this language in more-or-less realistic situations. In such situations, there may be the possibility of either "one" or "some". Some situations:

Setting Table:
A child helping set tables could ask for "one" or "some" small bulky objects (such as dishes, cups, glasses, and (interestingly) knives; slender rigid objects (spoons, forks, but not knives), and flat flexible objects (napkins, cloths to clean the table).

Supplies:
A child helping pass out supplies for activities could ask for "one" or "some" or a given number of small bulky objects (such as balls of clay, boxes or cans of crayons, closed containers of paint, erasers), slender rigid objects (full-length crayons, pencils, sticks of chalk) and flat flexible objects (writing paper, drawing paper, construction paper, cloths to clean the table).

While these can be given out without talking, writing/drawing can be turned into situations where each child asks for each item OBJECT t'áálá'ígo shaa ni... and the one passing out responds OBJECT t'áálá'ígo naa nish... .

Play:
A child asking for a given item or items for free play can be required to ask for it/them using the correct handling verb stem. If they don't know the name of the object(s), they can ask. But they should use the correct handling verb stem. If they err, they should be corrected quietly.

Teacher should be on the lookout for other situations in which children want objects from adults or other children. This is a natural way to slip in all the handling verb stems, not just the four used here.

General:
It is very hard to talk much Navajo without using handling verbs. These verbs are hard to teach. But teachers can help children begin to master the system by requiring that children use verbs in (almost) every statement and that they help the child with the verbs they need. In this way, children will encounter a number of the handling verbs in natural situations.

On the other hand, as teachers become more aware of how Navajo verbs work they may have to consciously simplify the language of some situations so that children see enough consistency to become aware of the system.

* * * *
MATH: Quantification 2A [Mass]

Purpose:
Quantification 2A-B-C goes beyond Quantification 1A-B-C in that "a little"/"a few" and "lots"/"many" are somewhat more definite quantities than "some" and "some more".

M-X1 Asks for “a little/a few” álch'ígidi or “lots/many” lə́ì̀

Objective
Shown a mass substance in a small bowl, and led to ask for "a little", Child 2 will ask for "a little" and Child 1 will give him/her "a little". Led to ask for "lots", Child 2 will ask for "lots" and Child 1 will give him/her "lots" (but not all).

Purpose:
Quantification 2A forces children to make a distinction between "a little" and "lots" of mass (non-count substances). Since all are in containers, all take the stem -kaah.

Testing Format:
Teacher has three pairs of little bowls: one bowl in each set is empty and one bowl in each set is partially filled with a mass substance: a liquid such as water, granules such as salt, and very small objects such as beans. Teacher uses one pair of bowls at a time.

Teacher sets out a pair of bowls: the full one to Child 1 and the empty one to Child 2. Teacher tests the two children with those bowls. Teacher takes back those bowls.

Teacher gives another pair of bowls and tests the two children. Teacher takes back those bowls.

Teacher puts out the last set of bowls and tests the two children. Teacher takes back those bowls.

Teacher should vary the order of the questions "a little" álch'ígidi and "lots" lə́ì́.

Teacher should vary the order of the substances for each child.
Teacher may wish to have the two children reverse roles after testing so that Child 1 takes the Child 2 role and vice versa.

The reason the teacher returns the amount of substance first requested is to avoid having the child ask for "more" or "again".
Criteria
Child 1 asks for "a little" and "lots" as directed: naming the substance, quantifying it, and using a handling verb; for example: OBJECT áłchįįdígo shaa nįįáah. OR OBJECT lá'ígo shaa nįįáah.
Child 2 gives out "a little" and "lots" as asked, pouring an appropriate amount of the substance from his/her bowl to Child 1's bowl; for example: OBJECT áłchįįdígo naa nįįháah. OR OBJECT lá'ígo naa nįįháah.

Language
T: SETS OUT BOWLS: FULL BOWL TO C1; EMPTY BOWL TO C2
T: LEADS C2 TO ASK FOR "A LITTLE" BY MOTIONING AMOUNT DESIRED.
T: SUBSTANCE lá'í yínikéed.
C2: SUBSTANCE áłchįįdígo shaa níkaah.
C1: POOLS QUANTITY C2 ASKED FOR INTO C1's BOWL.

T: RETURNS THAT QUANTITY TO THE ORIGINAL BOWL.
T: LEADS C2 TO ASK FOR "LOTS" BY MOTIONING AMOUNT DESIRED
T: SUBSTANCE lá'í yínikéed.
C2: SUBSTANCE lá'ígo shaa níkaah.
C1: POOLS QUANTITY C1 ASKED FOR INTO HIS/HER BOWL.

T: RETURNS THAT QUANTITY TO THE ORIGINAL BOWL.

This procedure will be repeated for each of the three substances. Vary the order of "a little" and "lots". Vary the order of the three substances.

Instruction
In all of these activities, children will use the stem -kaah. Use different substances. In this case, it is not the nature of the different substances but the fact that some is being moved up out of an open container that requires the stem -kaah.

Teachers should see that the action remains the same. That is, we don’t shift the command to "pouring" or "spooning" but focus on "give me".

Activity 1 LIQUIDS: water, milk, juice, soup, stew, broth. . . Teacher has students ask for, and give, "a little" and "lots".

Activity 2 GELATINOUS/MUSHY: jello, jelly, pudding, oatmeal, cornmeal, mush, glue, paste, mud. . . Teacher has students ask for, and give, "a little" and "lots".

Activity 3 POWDER: toothpowder, flour, powdered sugar. . . Teacher has students ask for, and give, "a little" and "lots".
Activity 4  GRANULES: flour, dust; salt, sugar, cornmeal, pollen, sand...
Teacher has students ask for, and give, "a little" and "lots".

Activity 5  VERY SMALL OBJECTS: rice, kernels of corn, beans, (dried)
peas, dried cereal, beads, sequins...  
Teacher has students ask for, and give, "a little" and "lots".

Situations:

Food: Asking for food is probably the most natural situation. This
would apply to food items that are liquid, mushy, powdery, granular, or occur in
pieces usually too small to be worth counting. This might include: water, milk,
juice, stew, oatmeal or jello, flour, salt or sugar, dried beans or dried kernels of
corn, etc.

Art: Asking for some art items is a fairly natural situation. This would
apply to art items that are liquid, mushy, powdery, granular, or occur in pieces
usually too small to be worth counting. This might include: water or paint,
playdough or clay, powdered paint, sand, seed beads or sequins, etc.

Play: Asking for some play items is a fairly natural situation. This would
apply to play items that are liquid, mushy, powdery, granular, or occur in pieces
usually too small to be worth counting. This might include: water, juice, milk...

* * * *
MATH: Quantification 2B [count]

M-X1 Asks for "a little/a few" or "lots/many"

Objective

Shown a set of six or more count objects, and led to ask for "a few", Child 2 will ask for "a few" and Child 1 will give him "a few" (more than one). Led to ask for "many", Child 2 will ask for "many" and Child 2 will give him/her "many" (but not all).

Purpose:

Quantification 2B forces children to make a distinction between "a few" and "many" of count objects. Since all are in sets, all take the stem -niil.

Testing Format:

Teacher has three sets of objects with six or more similar objects in each set: a set of small bulky objects, such as blocks, a set of slender rigid objects, such as full-length crayons, and a set of flat flexible objects, such as sheets of colored paper.

Teacher gives any set of objects to Child 1. Teacher tests the two students with that set, returning the quantity Child 2 requested before leading Child 2 to make his/her second request. Teacher takes back that set.

Teacher gives another set of objects to Child 1. Teacher tests the students with that set, returning the quantity Child 2 requested before having Child 2 make his/her second request. Teacher takes back that set.

Teacher gives the last set of objects to Child 1. Teacher tests the students with that set, returning the quantity Child 2 requested for before having Child 2 make his/her second request. Teacher takes back that set.

Teacher should vary the order of the requests for "a few" t’áá dikwií and "many" lají.

Teacher should vary the order she uses the three sets of objects.

The reason the teacher puts the first amount Child 2 requests back is to avoid having Child 2 ask for "more" or "again".

Criteria

CHILD 1 asks for "a few" t’áá dikwií; and "many" t’óó ahayói as directed: naming the object, quantifying it, and using the handling verb -niil. Example: OBJECT t’áá dikwihi gó shaa níníil. and OBJECT t’óó ahayói gó shaa níníil .

CHILD 2 gives out "a few" (not one) t’áá dikwií and "many" (not all) t’óó ahayói as requested.; Example: OBJECT t’áá dikwihi gó shaa níníil. and OBJECT t’óó ahayói gó shaa níníil.
Language
T:  GIVES SET OF OBJECTS TO C1.
T:  LEADS C2 TO ASK FOR "A FEW" (MOTIONS FOR A FEW).
T:  OBJECT  tà'  yínìkeed.
C2:  ASKS C1 FOR "A FEW"
C2:  OBJECT  tà'áá díkwíhígo shaa níniǐl.
C1:  MOVES THE QUANTITY C2 REQUESTED TOWARD C2

T:  RETURNS THAT QUANTITY TO THE ORIGINAL SET
T:  LEADS C2 TO ASK FOR "LOTS". (MOTIONS FOR "LOTS")
T:  OBJECT  tà'  yínìkeed.
C2:  ASKS FOR "LOTS"
C2:  OBJECT  tà'íigo shaa níkaah.
C1:  MOVES THE QUANTITY C2 REQUESTED TOWARD C2

T:  RETURNS THAT QUANTITY TO THE ORIGINAL SET.

This procedure will be repeated for each of the three sets of objects: small bulky objects, slender rigid objects, flat flexible objects. Vary the order of "a little" and "lots". Vary the order of the three sets of objects.

The reason the teacher returns the original amount asked for is to avoid having Child 2 ask for "more" or "again".

Instruction:

Activity 1  small, bulky objects. Lead children to ask for "a few" or "many" small bulky objects. This might include: prunes or apricots, pieces of clay or playdough, small balls or leggo blocks, etc.

Activity 2  slender, rigid objects. Lead children to ask for "a few" or "many" slender, rigid objects. This might include: pieces of spaghetti, spoons or forks, full-length crayons or magic markers, pencils or pens, pieces of tinker toy or lincoln logs, etc.

Activity 3  flat, flexible objects. Lead children to ask for "a few" or "many" flat, flexible objects. This might include: pieces of paper or cardboard, washcloths and towels, etc.

Situations:

Food:  Asking for food is probably the most natural situation. This would apply to food items that are large enough to count but small enough for
children to expect more than one. This might include such things as: biscuits, rolls, crackers, graham crackers, prunes, dried apricots, some candies.

Art: Asking for some art items is a fairly natural situation. Again, we're looking for situations where the items are large enough to be counted but small enough for children to expect more than one. This might include: crayons, colored pencils, magic markers, pieces of tinker toy or Lincoln logs.

Play: Asking for some play items is a fairly natural situation. Again, we're looking for situations where the items are large enough to be counted but small enough for children to expect more than one. This might include: leggo blocks, Lincoln logs, tinker toys, connecting sticks, jacks, some parts of a larger puzzle.

* * * *
MATH: Quantification 2C [count]

M-X1 Asks for "a little/a few" or "lots/many" [NOTE: Here "one" has been substituted for "a few".]

Objective

Shown a set of six or more count objects, and led to ask for "one" t'ááláńi, Child 2 will ask for "one" and Child 1 will give him "one". Led to ask for "many" t'óó ahayóí, Child 2 will ask for "many" and Child 2 will give him/her "many" (but not all).
[Each child will have a turn as Child 1 and Child 2.]

Purpose:

Quantification 2C forces children to make a distinction between "one" and "many" for count objects. Talking about "one" (instead of "a few" as in Quantity 2B) requires the children to choose between the stems -aah, -tijí, and -tsóós when talking about "one"; they still choose the "stem" -nííł (as they did in Quantification 2B) when talking about (a set consisting of) "many".

Ultimately, this will establish a three-way contrast between the quantifiers for count nouns: "one", "a few" (not just one), and "many" (not all).

Testing Format:

Teacher has three sets of objects with six or more similar objects in each set: a set of small bulky objects, such as blocks; a set of slender rigid objects, such as full-length crayons; and a set of flat flexible objects, such as sheets of colored paper.

Teacher should vary leading Child 2 to request "one" or "many".

Teacher should use the sets of objects in different order.

Teacher gives any set of objects to Child 1. Teacher tests the two students with that set, returning the quantity Child 2 requested before leading Child 2 to make his/her second request. At the end, teacher takes back that set.

Teacher gives another set of objects to Child 1. Teacher tests the two students with that set, returning the quantity Child 2 requested for before having Child 2 make his/her second request. At the end, teacher takes back that set.

Teacher gives the last set of objects to Child 1. Teacher tests the two students with that set, returning the quantity Child 2 requested for before having Child 2 make his/her second request. At the end, teacher takes back that set.

The reason the teacher puts the first amount back is to avoid having Child 2 ask for "more" or "again".

Teacher may or may not choose to have the two students reverse roles right away. Each child should be tested as Child 1 and Child 2.
Criteria
Child 1 asks for "one" and "many" as directed: naming the object, quantifying it, and using the correct handling verb stem: -aah, -tįįįh, -tsóós and -nįįįl.

Child 2 gives out "one" and "many" (not all) as requested.

Language
T: GIVES SET OF OBJECTS TO C1.
T: LEADS C2 TO ASK FOR "ONE" BY MOTIONING "ONE".
T: OBJECT ła’ yínįįkeed.
C2: ASKS FOR "ONE".
C1: MOVES ONE OBJECT TOWARD C2.
T: RETURNS THAT OBJECT TO THE ORIGINAL SET.
T: LEADS C2 TO ASK FOR "MANY" BY MOTIONING "MANY".
T: OBJECT ła’ yínįįkeed.
C2: ASKS FOR "MANY".
C2: OBJECT ła’įįgo shaa nįįįl.
C1: MOVES "MANY" OBJECTS TOWARD C2.
T: RETURNS THAT QUANTITY TO THE ORIGINAL SET.

This procedure will be repeated for each of the three sets of objects: small, bulky objects, slender, rigid objects, flat, flexible objects. Vary the order of "one" and "many"; also vary the order of the three sets of objects.

The reason the teacher returns the original amount asked for is to avoid having Child 2 ask for "more" or "again".

Instruction:

Activity 1: Child asks another for "one" or "many" from a set of six or more common, small, bulky objects: for example, blocks, balls, toy cars... Here the child will have to choose between the stems -aah with "one" and -nįįįl with "many. Teacher might first cue child's questions by pointing to the objects and showing one finger or four-five. Later, she might name the object and tell the child to ask (as in the test) for "one" or "many".

Activity 2: Child asks another for "one" or "many" from a set of six or more common slender rigid objects: for example pencils, crayons, rulers... Here the child will have to choose between the stems -tįįįh with "one" and -nįįįl with "many". Teacher might first cue child's questions by pointing to the objects and showing one finger or four-five. Later she might name the object and tell the child to ask (as in the test) for "one" or "many".

Activity 3: Child asks another for "one" or "many" from two sets of common objects: a set of six or more small, bulky objects (such as blocks or balls)
and a set of six or more slender, rigid objects (such as pencils or crayons). Here the children will choose between the stems -'aah and -tjih for "one" and the stem -niih for "many". Teacher might first cue child's questions by pointing to the objects and showing one finger or four-five. Later, she might name the object and tell the child to ask (as in the test) for "one" or "many".

**Activity 4** Child asks another for "one" or "many" of several different kinds of common flat flexible objects: for example, white paper, colored paper, cloth... Here the children will choose between the stem -tsőós with "one" and the stem -niih with "many". Teacher might first cue child's questions by pointing to the objects and showing one finger or two-three. Later she might name the object and tell the child to ask (as in the test) for "one" or "many".

**Activity 5** Child asks another for "one" or "many" of two sets of common objects: a set of slender, rigid objects (such as spoons and forks) and a set of flat, flexible objects (such as napkins, and dishcloths). Here the children must choose between the stems -tjih and -tsőós with "one" and the stem -niih with "many". Teacher might first cue child's questions by pointing to the objects and showing one finger or four-five. Later she might name the object and tell the child to ask (as in the test) for one or two-three.

**Activity 6** Child asks another for "one" or "many" of two sets of common objects: a set of small bulky objects (such as small bars of soap or cans of toothpowder) and a set of flat flexible objects (such as paper or cloth towels). Here the children must choose between the stems -'aah and -tsőós with "one" and the stem -niih with "many". Teacher might first cue child's questions by pointing to the objects and showing one finger or four-five. Later she might name the object and tell the child to ask (as in the test) for one or many.

**Activity 7** Child asks another for one or some of several different kinds of common, round, bulky objects, slender, rigid objects, and flat, flexible objects. Teachers may want to think of objects found in the same settings. For example:

- dining room: spoons, bowls, and napkins.
- washroom: bars of soap, towel, and toothbrush. Etc.

Teacher might first cue child's questions by pointing to the objects and showing one finger or two-three. Later, she might name the object and tell the child to ask (as in the test) for "one" or "many".

REMEMBER, while we are using different objects and would like for the child to name the objects, that is not the purpose of these activities. The purpose is to get the children to deal with quantification by making a distinction in the stems of the handling verbs in asking for "one" or "many" object(s). This requires them to use different stems for one object than many.
Situations:

Food: Asking for food is probably the most natural situation. This would apply to food items that are large enough to count but small enough for children to expect more than one. This might include such things as: biscuits, rolls, crackers, graham crackers, prunes, dried apricots, some candies.

Art: Asking for some art items is a fairly natural situation. Again, we're looking for situations where the items are large enough to be counted but small enough for children to expect more than one. This might include: crayons, colored pencils, magic markers, pieces of tinker toy or Lincoln logs.

Play: Asking for some play items is a fairly natural situation. Again, we're looking for situations where the items are large enough to be counted but small enough for children to expect more than one. This might include: leggo blocks, Lincoln logs, tinker toys, connecting sticks, jacks, some parts of a larger puzzle.

* * * *
MATH: Quantification 3A [mass]

M-X2 States that a given quantity is "too much"/"too many", "too little"/"too few", or "(just) enough".

Purpose:
To get children to use the phrases "too much"/"too little" to compare a given amount with the amount the child is shown/offered with the amount the child needs or wants. This is more specific than the earlier requests for "some more". In 3A, we deal only with mass nouns.

Objective
Given a very small amount of water, and asked "how's that?", child will say the amount is "too little". Teacher will add more, and ask if the new amount is "enough". Teacher will continue until the child finally says the amount is "(just) enough".

Given a large amount of water, and asked "how's that?", child will say the amount is "too much". Teacher will remove some, and ask if the amount remaining is "enough". Teacher will continue until the child finally says the amount is "(just) enough".

Test Format
We suggest using two very large paper cups such as the ones used in drive-ins: 24 oz, 32 oz, or even 44 oz.
You can use any liquid, mushy, powder, granular, or substance made up of very small objects. We suggest water because it is easily poured, not sticky, and it doesn't matter if the child tries to drink some.

The test situation is essentially a "play acting" situation: we are playing that the children want some water and we are giving them some.

Teacher needs two large paper cups: one empty and one full.
For the first question, the teacher gives the child the empty cup and pours a very small amount of water into it; she keeps the full cup. Each time the child says the amount is "too little", the teacher pours more water from her cup into the child's cup.

For the second question, the teacher gives the child the full cup; the teacher keeps the empty cup. Each time the child says the amount is "too much", the teacher pours out water from child's cup back into the teacher's cup.

While this may not be completely natural, it seems an efficient way of obtaining this language in a more-or-less natural situation.
While we could also do this with mass substances of other consistencies, it is hoped that children can be given enough practice in asking for amounts of food that we don't need such a comprehensive test.

Criterion
Child will use the equivalents of "too little", "too much", and "enough" appropriately

Discussion: it may turn out that these concepts are simply too sophisticated or too unlikely for the children and that we may have to be satisfied with language that shows that the child understands the concepts such as "(just) a little" t'áá íiyisíí t'áá dikwihi and "(really) lots" t'óó ahayói or even "enough" or "not enough" t'áá biíghah.

Language
T: SETS EMPTY CUP BEFORE CHILD AND POURS A VERY SMALL AMOUNT INTO IT.
T: ASKS CHILD "HOW MUCH?"
T: Haa néeláá'go lá?
C: Responds that the amount is "Too little".
C: (T'áá íiyisíí) álch'įįchįį yee'.
T: ADDS SOME WATER TO THE CHILD'S CUP.
... (Repeat this as many times as is necessary)
T: ASKS CHILD "HOW'S THAT?"
T: K'ad shá' haa néeláá?'
C: Responds that the amount is "(Just) Enough".
C: K'ad t'áá biíghah.

T: SETS FULL CUP BEFORE CHILD.
T: ASKS CHILD "HOW MUCH?"
T: Haa néeláá'go lá?
C: Responds that the amount is "Too much".
C: (T'áá íiyisíí) là'í yee'.
T: REMOVES SOME WATER FROM THE CHILD'S CUP.
... (Repeat this as many times as is necessary)
T: ASKS CHILD "HOW'S THAT?"
T: K'ad shá' haa néeláá?'
C: Responds that the amount is "(Just) Enough".
C: Kad t'áá biíghah.

Instruction
Activity 1 liquid food
Conduct similar activities with any liquid food in large cups: water, milk, juice...
Activity 2: mushy food
Conduct similar activities with a mushy food in large bowls: jello, pudding, oatmeal. . .

Activity 3: mushy substance
Conduct similar activities with a mushy substance in large containers: paste, playdough?, clay?. . .

Activity 4: powdery food
Conduct similar activities with a powdery food item in large containers: flour, cornmeal, powdered sugar. . .

Activity 5: granular food
Conduct similar activities with a (dry) granular food in large containers: salt, sugar, pepper

Activity 6: powdery or non-granular non-food
Conduct similar activities with sand in sand-buckets.

Activity 7: very small pieces of food
Conduct similar activities with very small pieces of food in large bowls: dry rice, dry kernels of corn, dry beans. . .

Activity 8: very small pieces of non-food
Conduct similar activities with very small pieces of non-food items in large bowls: beads, sequins. . .

Teacher can conduct similar activities with any other common food or non-food items that are easy to use.

Enrichment 1
Teacher can have children combine the statement that a given amount is "too little" t'áá áiyisii álch'iidí with a request for "some more" la' nááná.

Enrichment 2
Teacher can have children combine the statement that a given situation is "too much" t'áá áiyisii lá'í with a request to "take some back" la' náádíi .kaah, jááh, níí. This should be made as a request, not as a demand.

Situations

Food:
Food is probably the most natural situation in which children might use this language.
In cafeteria style serving, the child can be asked if the amount of food in the ladle is "enough". The amount is ladled onto the child's tray only after the
child agrees that amount is "enough". While this takes time, it is very good practice in quantification and enables the child to make real choices about how much s/he wants.

In family-style serving in which an adult serves each child from the head of the table, the adult can do the same.

In serving self, adults or other children can point out that the child has taken "too much" for everyone to get some.

Where the children can handle "too little" álch'ídini /"too much" lá'ígo and "just enough" t'áá bii'ghah, adults might extend the language to include requests "some more" ílà' nááná and "take some back" ta' náádiikaah.

Non-Food:

Passing out arts or crafts supplies is another fairly natural situation in which children might use this language. For example: paint, clay, paste, beads, glitter. . . Hopefully, teachers will think of other situations as they arise.

Play:

Sand boxes or water tables are other situations in which the children might use this language. Hopefully, teachers will think of other situations as they arise.

* * * *
MATH: Quantification 3B [count]

M-X2 States that a given quantity is “too much”/“too many”, “too little”/“too few”, or “(just) enough”.

Purpose:
To get children to use the phrases "too many" t'óó ahayói /"too few" t'áá dikwiíhi to compare a given amount with the amount the child is shown with the amount the child needs or wants. This is more specific than the earlier requests for "some more" ła' nááná. In 2B, we deal just with count nouns.

Objective
Given a picture requiring three colors and a single crayon, and asked "how's that?", child will say the amount is “too few" t'áá dikwiíhi. Teacher will add more, and ask "how's that?" hait'é OR t'áásh bíighah?. Teacher will continue until the child finally says the amount is “(just) enough” t'áá bíighah.

Given another picture requiring three colors and a large number of crayons (including two or more of at least one color) and asked "how's that?", child will say that there are “too many" t'óó ahayói. Teacher will remove some, and ask again "how's that?". Teacher will continue until the child finally says the amount is “(just) enough” t'áá bíighah—one each of the colors needed.

Test Format
We suggest using coloring book type pictures that seem to require more than one color but only a few: such as a red apple with a green leaf and a brown stem, or a white dog with black spots and a red collar. We suggest using sets of crayons with just a few colors. For example, with the apple picture, maybe just reds, greens, and browns. The teacher's copy has already been colored; the child's has not. The children are given to understand that they need to color their picture to match. That way, one crayon is "too few", but having two or three of the same color is "too many".

You could use any objects but crayons seem to lend themselves to situations where you need more than one but not large numbers.

The test situation is essentially a "play acting" situation: we are playing that the children want some crayons and we are giving them some.

Teacher needs two uncolored pictures, two matching pictures already colored, and a set of crayons with two or three each of just a few colors.

The teacher shows the picture already colored and notes the colors needed to color another one just like it.
For the first question, the teacher gives the picture and one (perhaps) inappropriate crayon and asks "how's that" (to color the child's picture like the sample). Each time the child says the amount is "too few", the teacher adds one crayon and asks again if that is "enough". The convention is that it is "enough" when the child has one crayon of each color needed to color that picture.

For the second question, the teacher gives the child a "too-many" set of crayons consisting of colors not needed or two or three of each of the colors needed (to color the child's picture like the sample). Each time the child says the amount is "too many", the teacher removes one crayon. The convention is that it is "enough" when the child has just one crayon for each of the colors needed.

While this may not be completely natural, it seems a fairly efficient way of obtaining this language in a more-or-less natural situation. If teachers can find more natural or efficient ways of doing so, fine.

**Criterion**
Child will use the equivalents of "too few" t'áá dikwihi "too many" t'óó ahayói, and "enough" biighah appropriately.

**Discussion:** it may turn out that these concepts are simply too sophisticated or too unlikely for the children and that we may have to be satisfied with language that shows that the child understands the concepts such as "(just) a little" t'áá áich'jido and "(really) lots" t'áá iiyisi t'óó ahayóigo or even "enough" t'áá biighahigo or "not enough".

**Language**

| T: | SHOWS PICTURE ALREADY COLORED AND POINTS OUT COLORS NEEDED. |
| T: | GIVES CHILD AN UNCOLORED PICTURE |
| T: | SETS ONE CRAYON BEFORE THE CHILD |
| T: | ASKS CHILD "HOW'S THAT?" |
| T: | T'áásh biighah? OR Haiit'é? |
| C: | RESPONDS THAT THE ONE CRAYON IS "TOO FEW". |
| C: | Doo biighah da. OR T'áá dikwihi. |
| T: | ADDS ANOTHER CRAYON TO THE CHILD'S CRAYONS. |
| T: | ... (REPEAT THIS AS MANY TIMES AS NEEDED TO GET UP TO JUST ONE EACH OF THE COLORS NEEDED) |
| T: | ASKS CHILD "HOW'S THAT?" |
| T: | T'áásh biighah? OR Haiit'é? |
| C: | RESPONDS THAT THE AMOUNT IS "(JUST) ENOUGH". |
| C: | T'áá biighah. |

| T: | SHOWS PICTURE ALREADY COLORED AND POINTS OUT COLORS NEEDED. |
| T: | GIVES CHILD AN UNCOLORED PICTURE |
T: SETS AN UNNECESSARILY LARGE NUMBER OF CRAYONS BEFORE THE
CHILD (I.E. ONE EACH OF THE COLORS NEEDED BUT TWO OR THREE
CRAYONS OF ONE COLOR)
T: ASKS CHILD "HOW'S THAT?"
T: T'áásh biíghah? OR Hailt'é?
C: Responds that the number of crayons is "too many".
C: Doo biíghah da, t'óó ahayóí.
T: Takes away one crayon from the child's crayons.
. . .(Repeat this as many times as needed to get down to
just one each of the color(s) needed)
T: Asks child "How's that?"
T: T'áásh biíghah? OR Hailt'é?
C: Responds that the amount is "(just) enough".
C: T'áá biíghah.

Instruction

Activity 1: small, bulky objects: food
Conduct an activity with any small, bulky foods: dried apricots, prunes, jelly
beans, M&Ms. . . Teacher establishes the number "needed" by drawing
three or four circles on a paper plate or piece of paper; "just enough" is one
for each circle.

Activity 2: small, bulky objects: crafts
Conduct an activity with any small, bulky craft items such as lumps of clay,
closed jars of paint. Teacher establishes the number "needed" by drawing
three or four circles on a paper plate or piece of paper; "just enough" is
one for each circle.

Activity 3: small, bulky objects: toys
Conduct an activity with any small, bulky toys such as leggo blocks, jacks,
toy cars, toy animals. . . Teacher establishes the number "needed" by
drawing three or four circles on a paper plate or piece of paper; "just
enough" is one for each circle.

Activity 4: slender, rigid objects: food
Conduct an activity with any slender, rigid foods: dried spaghetti,
breadsticks, (pictures of) bananas? . . . Teacher establishes the number
"needed" by drawing three or four circles on a paper plate or piece of
paper; "just enough" is one for each circle.

Activity 5: slender, rigid objects: crafts
Conduct an activity with any small, bulky craft items such as crayons,
colored pencils, magic marker, tongue depressors. . . Teacher establishes
the number "needed" by indicating the colors on a paper plate or a piece of
paper; "just enough" is one for each circle.
Activity 6: slender, rigid objects: toys
Conduct an activity with any slender, rigid toys such as tinker toys, Lincoln logs, connecting stix, soap bubble pipes. . . Teacher establishes the number "needed" by drawing three or four circles on a plate or piece of paper; "just enough" is one for each circle.

Activity 7: flat, flexible objects: food
Conduct an activity with any flat, flexible foods if there are any: tortillas? fruit leather? Teacher establishes the number "needed" by drawing three or four circles on a paper plate or piece of paper; "just enough" is one for each circle.

Activity 8: flat, flexible objects: crafts
Conduct an activity with any flat, flexible craft items such as pieces of drawing paper, pieces of colored paper, pieces of cardboard, pieces of cloth . . . Teacher establishes the number "needed" by indicating a design to be matched or circles on a large piece of newsprint; "just enough" is one of each of the pieces needed.

Activity 9: flat, flexible objects: toys
Conduct an activity with any flat, flexible toys such as doll clothes, paper doll clothes. . . Teacher establishes the number "needed" by drawing three or four circles on a plate or piece of paper; "just enough" is one for each circle.

Teacher can conduct similar activities with any other common food or non-food items that are easy to use. The items have been grouped by shape so that, in the enrichment activities teachers can have the children request that the teacher give them "another one" or "take one back"—thereby practicing the appropriate handling verb stems. (See below.)

Enrichment 1
Teacher can have children combine the statement that a given amount is "too little" with a request to give him/her "another one"—requiring the use of the appropriate stem.

Enrichment 2
Teacher can have children combine the statement that a given amount is "too much" with a request to "take one back"—requiring the use of the appropriate stem.

Situations

Food:
Food is one situation in which children might use this language. But count nouns would be only those items that are large enough to count but small enough
that a child might reasonably ask for more than one: crackers, graham crackers, biscuits, cookies, meatballs, pieces of bacon, slices of lunchmeat or cheese...

In cafeteria style serving, the child can be asked if the number of items being offered is "enough". That number is placed on the child's tray only after the child agrees that that number is "enough". While this takes time, it is very good practice in quantification and enables the child to choose how much s/he wants.

In family-style serving in which an adults serves each child from the head of the table, the adult can do the same.

In serving self, adults or other children can point out that the child has taken "too many" for everyone to get some.

Where the children can handle "too few"/"too many" t'áá dikwihi/ t'óó ahayói and "just enough" bííghah, adults might extend the language to include requests for "another one" ła' (sha) nááni... -'aah, -tįįh, tsóós, and "take one back" ła' nádíi...-'aah, -tįįh, -tsóós, --these require the child to choose the appropriate stem.

Crafts:

Passing out arts or crafts supplies is another fairly natural situation in which children might use this language. This requires situations where the objects are relatively small and the child requires more than one. Or the child handing out the objects where one is supposed to give one to each child or each table. For example: lumps of clay or short pieces of crayon (small, bulky objects), full-length crayons or colored pencils (slender, rigid objects) or pieces of colored paper or cloth (flat, flexible objects).

Hopefully, teachers will think of other situations as they arise.

Play:

Obtaining items for play might be another fairly natural situation in which children might use this language. This requires situations where the objects are reasonably small and the child needs more than just one. For example: jacks or leggo blocks or tinker-toy connectors (small, bulky objects), tinker toy sticks or Lincoln logs (slender, rigid objects) or doll clothing or paper doll clothing (flat, flexible objects).

Table Settings:

Setting tables might be another fairly natural situation in which children might use this language, particularly where children sit at relatively small tables. Here it would be obvious if there are "too few" or "too many" spoons, forks, knives, dishes, glasses, etc. for the number of places at that table.

Setting Furniture:

(Re-)placing a set number of chairs to relatively small tables might be another situation where children might use this language. Here it would be obvious whether or not there were "too many" or "too few" chairs.
MATH: Quantification 4

M-X3 Uses quantifiers such as "some", "all" and "none". [NOTE: We've expanded this to include "one" as a quantifier.

Purpose:
To enable the children to use the quantifiers "one", "some", "all" and "none" to quantify the attributes of objects—or objects themselves.

Objective
Shown a group of four red or white blocks and asked to tell about those blocks, the child will say that with:

1) 2 red/2 white: "some are red" ła' daalchii'; "some are white" ła' daalgai.
2) 3 red/1 white: "some are red" ła' daalchii'; "one is white" t'áálát'í ligai;
3) 1 red/3 white: "one is red" t'áálát'í líchii'; ""some are white" ła' daalgai;
4) 4 red/0 white: "all are red" t'áá át'é daalchii'; "none are white" doo ła' ligai da;

and, if child has trouble with 4
5) 0 red/4 white: "none are red" doo ła' líchii' da; "all are white" t'áá át'é daalgai.

Test format:
Teacher has a set of four small, red blocks and four similar white blocks. Or, better yet, four small tiles which are red on one side and white on the other. [The teacher could use any two colors and any sets of similar objects.]

1) some (two) red; some (two) white
Teacher sets out a horizontal array of two red blocks and two white blocks in any order. Teacher asks the child to tell her about the red blocks; child does so. Teacher asks the child to tell her about the white blocks; child does so.

2) some (three) red; one white
Teacher changes the array to three red blocks and one white block in any order. Teacher asks the child to tell her about the red blocks; child does so. Teacher asks the child to tell her about the white block; child does so.

3) one red; some (three) white
Teacher changes the array to one red block and three white blocks in any order. Teacher asks the child to tell her about the red block; child does so. Teacher asks the child to tell her about the white blocks; child does so.
4) all (four) red; none white
Teacher changes the array to four red blocks and no white blocks. Teacher asks the child to tell her about the red blocks; child does so. Teacher asks the child to tell her about the white block; child does so.

5) none red; all (four) white.
Optional: use if child has trouble with questions in 4) above.
Teacher changes the array to no red blocks and four white blocks. Teacher asks the child to tell her about the red blocks; child does so. Teacher asks the child to tell her about the white blocks; child does so.

Here it’s probably best to ask these questions in just this order. "One" may be used as quantifier or a number; we do not want the children to tell us the number of blocks. We want them to use quantifiers. This is why we start with the "some red/some white" array. We want children to use the quantifiers "some" la', "one" t’aalá’i (as a quantifier), "all" t’áá át’é, and "none" doo la’___ da.
This is why we request the child to tell us about the COLOR blocks. We do not want to ask how many blocks are color. Such a question is likely to elicit an answer with a number; we want an answer with a quantifier.
We assume that the quantifier "none" will be the hardest; we are asking the child to talk about what s/he cannot see. This is why we place these questions last.
If the child gets situation 4 right, the teacher need not ask about situation 5.

Note that we ask the two questions separately. We do not ask the child to talk about both the red and the white in one statement. If some children realize that the one answer entails the other, fine. But don’t expect them to do so.

Criterion:
The child answers all (eight or ten) questions using the correct quantifiers: "one"t’aalá’i", "some" la’, "all" t’áá át’é, and "none" doo la’___ da.

Language:

1) some (two) red / some (two) white
T: LAYS OUT A HORIZONTAL ARRAY OF FOUR BLOCKS, TWO RED AND TWO WHITE, IN ANY ORDER.
T: ASKS CHILD TO TELL ABOUT THE ONES (BLOCKS) THAT ARE RED.
T: Daalchí'igíí baa hólne’/ bee shíl hólne’.
C: Responds that some are red.
C: La’ daalchíí’.
T: ASKS CHILD TO TELL ABOUT THE ONES (BLOCKS) THAT ARE WHITE.
T: Daalgaiiííí baa hólne’/ bee shíl hólne’.
C: Responds that some are white
C: La’ daalgai.
2) some (three) red / one white

T: CHANGES HORIZONTAL ARRAY TO THREE RED AND ONE WHITE, IN ANY ORDER
T: ASKS CHILD TO TELL ABOUT THE ONES (BLOCKS) THAT ARE RED.
T: Daalchi'igií baa hólne'/ bee shíł hólne'.
C: Responds that some are red
C: La' daalchií'. OR T'áá dikwíí daalchií'.
T: ASKS CHILD TO TELL ABOUT THE ONES (BLOCKS) THAT ARE WHITE.
T: Daalgaiígií baa hólne'/ bee shíł hólne'.
C: Responds that one (block) is white
C: T'ááátá'í lígai.

3) one red / some (three) white

T: CHANGES HORIZONTAL ARRAY TO ONE RED AND THREE WHITE, IN ANY ORDER
T: ASKS CHILD TO TELL ABOUT THE ONES (BLOCKS) THAT ARE RED.
T: Daalchií'igií baa hólne'/ bee shíł hólne'.
C: Responds that one is red
C: T'ááátá'í líchíí'.
T: ASKS CHILD TO TELL ABOUT THE ONES (BLOCKS) THAT ARE WHITE.
T: Daalgaiígií baa hólne'/ bee shíł hólne'.
C: Responds that some are white
C: La' daalgai. OR T'áá dikwíí daalgai.

4) (four) red / none white

T: CHANGES HORIZONTAL ARRAY TO ALL FOUR RED.
T: ASKS CHILD TO TELL ABOUT THE ONES (BLOCKS) THAT ARE RED.
T: Daalchií'igií baa hólne'/ bee shíł hólne'.
C: Responds that all are red.
C: T'áá át'é daalchií'. OR T'áá át'éé át'éé' daalchií'.
T: ASKS CHILD TO TELL ABOUT THE ONES (BLOCKS) THAT ARE WHITE.
T: Daalgaiígií baa hólne'/ bee shíł hólne'.
C: Responds that none are white.
C: Doo la' lígaií (lígai'í) da. OR Lígaiígií (bááh) ádín.

5) none red / all (four) white

T: CHANGES HORIZONTAL ARRAY TO ALL FOUR WHITE.
T: ASKS CHILD TO TELL ABOUT THE ONES (BLOCKS) THAT ARE RED.
T: Daalchií'igií baa hólne'/ bee shíł hólne'.
C: Responds that none are red.
C: Doo la' tíchíí' (tíchíí') da. OR Líchíí'igií (bááh) ádín.
T: ASKS CHILD TO TELL ABOUT THE ONES (BLOCKS) THAT ARE WHITE.
T: Daalgaiígií baa hólne'/ bee shíł hólne'.
C: Responds that all are white.
C: T'áá át'é daalgai. OR T'áá át'éé át'éé' daalgai.
Language Notes:

It is possible, even common, to use *la* to indicate either "one" or 'some'. It is possible to argue in English that one is "some" since it isn't "none". But for the purposes of this activity, we will ask the children to make a distinction between *la* (as 'some') and *t'áálát' (as 'one').

Note that we use *lichíi'í* with one red object and *daalchíi'í* with more than one. The same with white. Color words in Navajo are verbs; the form is different for one and more-than-one.

Some of these questions may sound like 'stupid' questions in Navajo discourse. One might ask such a question if one cannot see the answer. But ordinarily, one would not ask questions when one can see the answer. Asking questions to which one already knows the answers--'testing' children--is peculiar to 'school'.

But to keep from giving away the answers, we have to ask the same question each time.

Instruction:

In instructional activities, the teacher may begin by keeping all similar objects together. For example, all the red blocks at the left end of the line and all the white blocks at the right end of the line. But, as the children become more proficient, we should mix up the blocks. We are not trying to get the children to count the items. It is enough to see at a glance whether there is "one", "some (i.e., more than one); "all" or "none" of a given color. In teaching the use of quantifiers, we actually have to discourage counting.

Activities similar to the test can be used to teach the children to use the quantifiers correctly.

A. With other attributes. Teaching children only to quantify color is of little value. We have to teach children to quantify any number of other attributes: not only color but also size, shape, number... This is one of the justifications for teaching these attributes. We don't want children to use attributes just to describe things. We want them to use attributes to distinguish between otherwise similar things. We want them to quantify attributes. In short, we want them to use attributes as a means of thinking.

1. color: any two colors: for example "black" and "white"
   Use blocks or any objects that differ only in color. Use only two colors.

   HERE PROMPT: "TELL ME ABOUT THE BLACK ONES"
   Daalzhíiníí báa hólóní'/ bee shíí hólóní'.

2. size: "small" or "large"
   Use blocks or any objects that differ only in size. Use only two sizes.
HERE PROMPT: "TELL ME ABOUT THE LARGE ONES"
Danitsxaaígíí baa hónle'/ bee shíl hónle'.

3. shape: "circle" or "square"
Use attribute blocks or any objects that differ only in shape. Use only two shapes.

HERE PROMPT: "TELL ME ABOUT THE CIRCLES"
Nídaazbashííí baa/ bee shíl hónle'.

4. number: any two small numbers such as "three" and "four".
Use sets of objects—or pictures of sets of objects—that differ only in number. Use only two numbers. I.e., we might have several groups of three birds and several groups of one. In response to the question, the child might say that some (groups of birds) are three and some (groups of birds) are four.

HERE PROMPT: "TELL ME ABOUT THE GROUPS OF THREE" .
Táa'go níjaalííí baa/ bee shíl hónle'.

This last with number may be too confusing for the children but it's worth a try because it treats number as another attribute like color, shape, and size.

To pose these questions, one has to show groups or groups of objects; e.g., four groups of three objects; three groups of three objects (and one of four objects) etc. It may be easier to use pictures than to have to use real objects. (One can create cards with groups of different sizes using stickers.)

5. other attributes. This can be done with any two-way attributes the children are taught. Thus, in addition to color, size, shape, and number, teachers could also use such attributes as thickness (thick - thin), texture (rough - smooth), gloss (shiny - dull), height (tall - short), weight (heavy - light), frame (fat - skinny)... you name it. This can even be used with some two-way emotional attributes such as happy - sad, mad - glad, pleasant -unpleasant, helpful-unhelpful, etc. It can be used about states such as awake - asleep. It can be used to contrast any two actions such as walking - running, standing - sitting.

B. With objects, realia, or pictures of objects:

1. animals: sheep and goats
Use toy sheep and goats, or pictures of various combinations of sheep and goats. Use only two animals at a time: sheep and goats, or cows and horses, or dogs and cats.

HERE PROMPT: "TELL ME ABOUT THE SHEEP"
Dibéhíííí baa hónle'/ bee shíl hónle'.
2. vehicles: cars and pickups  
   Use toy vehicles or pictures of various combinations of cars and pickups.  
   Use only two kinds of vehicles at a time.  

   HERE PROMPT: "TELL ME ABOUT THE CARS".  
   Chidiígíí baa hóíne'/ bee shií hóíne'.

3. fruit: apples and oranges  
   Use real fruit, plastic fruit, or pictures of various combinations of fruit. Use  
   only two kinds of fruit at a time.  

   HERE PROMPT: "TELL ME ABOUT THE APPLES".  
   Bilasáanaaígíí baa hóíne'/ bee shií hóíne'.

4. vegetables: potatoes and carrots  
   Use real vegetables, plastic representations of vegetables, or pictures of  
   various combinations of vegetables. Use only two at a time.  

   HERE PROMPT: "TELL ME ABOUT THE POTATOES".  
   Nímasiítigíí baa hóíne'/bee shií hóíne'.

   Note that these activities go beyond just naming or labeling objects. But  
   while the child is busy quantifying the objects, s/he is having to attend to the  
   names as well.

C. attribute blocks (enrichment)  

   A lot can be done with attribute blocks. These are sets of plastic shapes  
   which differ (usually) in color (red and blue), shape (circle, square, triangle, and  
   rectangle), size (small and large), and thickness (thick and thin). The useful  
   feature of attribute blocks is that it shows children how to attend to certain  
   attributes and ignore others.

   Thus, looking at the same array of blocks consisting of a:  
   large, thick, red triangle  
   small, thin, blue triangle  
   large, thin, blue triangle  
   small, thin, red triangle  

   the children might be led to say:  
   size: some are large and some are small;  
   thickness: one is thick and some are thin;  
   color: some are red and some are blue  
   shape: all are triangles; none are circles, squares, rectangles.
There are a large number of 'games' children can be led to play with such blocks. The important thing for us is that the children be led to talk about what they are doing and why,

**Situations:**
There are any number of situations where one can get the children to use some of these quantifiers.

1. One of the simplest is dismissing children from a group by personal characteristics. Examples:

   HERE PROMPT: "ALL THOSE WITH LONG HAIR, STAND UP."
   Nihitsii' danineezíí daohsíjh.

   HERE PROMPT: "ALL THOSE WITH BLACK SHOES, STAND UP."
   Nihíkéé naalzhiniíí daohsíjh.

   HERE PROMPT: "ALL OF THOSE WHO ARE [A GIVEN CLAN], STAND UP."
   CLAN NAME danohiííííídaohsíjh.

   The group is then led to make statements about the group using the quantifiers "some", "one", "all", and "none"

2. Another situation is accounting for the children in a given group. When one talks about small groups, one is more likely to get situations where "only one" or "no" boys or girls are there.

   HERE STATE: "ALL OF THE BOYS/GIRLS/CHILDREN ARE HERE."
   Ashiiké/At'ééké/Áłchíní t'áá át'é kóó.

   HERE STATE: "SOME OF THE BOYS/GIRLS/CHILDREN ARE HERE."
   Ashiiké/At'ééké/Áłchíní' la' kóó.

   HERE STATE: "(ONLY) ONE OF THE BOYS/GIRLS IS HERE".
   Ashkii/At'ééd t'ááááí kóó (naaghá).

   HERE STATE: "NONE OF THE BOYS/GIRLS ARE HERE."
   Ashiiké/At'ééké doo la' kóó (naagháa) da.

   This situation is useful in that the two attributes overlap: a girl is both a girl (not a boy) and a child (not an adult). This gives children a little more insight into classification.

3. Still another situation is accounting for all the children after the roll is taken in the morning.
HERE STATE: "ALL OF THE BOYS/GIRLS/CHILDREN ARE HERE."
Ashiiké/At'ééké/Áłchíní t'áá át'é kóó.

HERE STATE: "SOME OF THE BOYS/GIRLS/CHILDREN ARE HERE."
Ashiiké/At'ééké/Áłchíní la' kóó.

HERE STATE: "ONE OF THE BOYS/GIRLS/CHILDREN IS ABSENT (NOT HERE)"
Ashiiké/At'ééké/Áłchíní la' doo níyáa da.

Teachers are encouraged to think of other situations in which the use of these quantifiers is appropriate. Passing a test on quantifiers is of little value if we don't exploit opportunities for children to use them.

* * * *
III Shapes

M-4 Places a circle, square or triangle appropriately in a form board.
M-5 Makes a circle.
M-10 Refers to familiar shapes (e.g. circle, square, triangle) by name.
M-24 Makes a square.
M-28 Makes a triangle.

Shapes have always been taught in pre-school and kindergarten. No one seems to know why; it just always has. Here children are expected to do three things with circles názbás, squares dik'á, and triangles táá'góó heets'óóz; they are expected to

* match shapes in a form board (M-4);
* name the shapes (M-10);
* draw the shapes (M-5, M-24, M-28).

Just knowing the shape-names doesn't do much for the child. If, however, the child can use the shape-names along with other attributes to develop logic abilities, then such instruction may be worthwhile.

Children can use shape-names to discriminate between objects. You may have two red blocks. I say "I want the red circle". I am using "circle" to discriminate between the two red objects.

Children can use shape-names as the basis of statements using quantifiers (as in the previous unit on Quantification). They can say that one/some/all/nine of a set of shapes are circles.

Children can learn to perceive some objects in terms of shapes: tires or cookies are circles, etc.

In these and other ways, shape-names can be useful in developing thinking and the language needed to express thinking. We need to find ways for children to use these shape-names to develop thinking ability.

shape-names

While there is a fair amount of agreement on shape-names in Navajo, there are some differences at some schools.
The terms do not have to be complete descriptions. The English terms are borrowed from other languages. They note some, but not all, characteristics. (For example: a tri-angle is a 'three points'. The word doesn't say that there are three lines, nor that the lines are straight, nor that the figure must be closed. It merely notes that 'three points' is one important characteristic.)

Similarly, the Navajo terms need describe only one important characteristic. It should be correct but it doesn't have to be exhaustive. Talk over terminology among yourselves and agree on terms for your center.

Here are examples of some other terms that describe a tri-angle:
táa'go yistl'ah, táá'góó dadeesht'osh, táá'góó dadeez'á.

We are also using these activities to teach different forms of the verb 'to draw': ****Note the different verbs and the relationship between them. Elsewhere children will be expected to make distinctions between drawing, writing, and scribbling.

The verb 'to draw' naashch'áah is selected because this is a term that is frequently used in teaching since it is one of the pre-requisites before actual writing begins. Drawing can be distinguished from scribbling since more attention is given to drawing and there is control. In scribbling there is no control. Below is a paradigm for naashch'áah in three different forms, the Imperfective, the Perfective and the Future.

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MATH: Shapes -1

M-4 Places a circle, square or triangle appropriately in a form board.

Purpose
To get children to recognize the similarities and differences of circles, squares, and triangles by matching cutout shapes with same-shaped spaces in a puzzle-like form board.
Here we only expect the child to be able to fit the circle, square, and triangle shapes into a form board. The child need only realize that:
* the different shapes are somehow different—a given piece will not fit in a different-shaped space, and
some shapes are the same—only same-shaped pieces will fit in a same-shaped space—if they are also the same size.
For the child at this stage, this involves only putting 'puzzle' pieces in the right place in a 'puzzle' board.

Objective
Given a form board with the circles názbás-, squares dik'á-, and triangles gótó heets'óóz-shapes that fit in that board, and told to put the pieces into the board where they belong, the child will correctly fit the shapes into the board.
[Note: the child is not required to name the shapes in this test.]

Note:
A 'form board' is simply a wooden or plastic 'puzzle' in which the 'pieces' are the different shapes. The important thing here is not knowing the names of the shapes but the realization that each shape 'fits' in one and only one place in the board.

If the center does not have a form board, the teacher can make something that will serve as the board.
The more elaborate 3D version involves a piece of thick cardboard from which shapes have been cut out. This is then pasted on another thick piece of cardboard. The cutout pieces are used as the puzzle pieces; they may have to be trimmed a bit to make an easy fit.
A less elaborate 2D version consists of cutouts of the shape and a piece of heavy cardboard on which those shapes have been traced.
If teachers make their own board, it might be well to make two different sizes for 'square' and 'circle' and at least three different shapes of 'triangle'.
Test Format:
Teacher has a form board or a home-made version of a form board.
Teacher removes the pieces from the form board and gives both the board and the loose pieces to the child.
Teacher tells the child to put the pieces where they belong in the board.
Teacher may encourage the child but should not coach or correct the child.
If need be, the teacher can demonstrate what is to be done, take the pieces back out, and ask the child to do the same. But if the children have had enough instruction, and a pre-test, this should not be necessary.

Criteria

Child successfully puts the circle, square, and triangle shapes into the correct places in the form board.
Children are allowed, even encouraged, to try until they succeed. The criterion is not to place each shape correctly on the first try; the criterion is to succeed, if necessary, by trial-and-error.

Language

T: EMPTIES BOARD AGAIN, GIVES BOARD AND SHAPES TO CHILD, ASKS CHILD TO PUT THE PIECES IN THE BOARD WHERE THEY BELONG.
T: Díí dábíghah góne' biih daninil.
C: PUTS SHAPES IN THE BOARD
T: MAY ASK IF IT FITS AS CHILD TRIES SHAPE IN SPACE.
T: Biíghahísh?
C: Aoo, biíghah. OR Ndaga', doo biíghah da.

Instruction:

While this objective does not require the child to name the shapes, the teacher should use the shape-names when the child is working with the form-board or attribute blocks so the child will just ‘pick them up’. In this way, the child is being prepared for the later objectives.

Activity 1
Teacher empties the shapes out of the board.
Teacher takes one piece, names that shape, and has the group repeat the name.
Teacher asks where that shape belongs, pauses, calls on a child, and allows the child to place that shape in the board.
Teacher asks if it fits and children respond that it does/doesn’t.
Teacher may ask what the shape’s name is; children respond.
Teacher repeats with each shape.
[Remember, children don’t need to name the shapes for the test of this objective but probably should use them in the activities to get them ready for M-10.]

Activity 2
Teacher empties the shapes out of the board.
Teacher takes one piece, names that shape, and has the group name that shape.
Teacher asks who can put the SHAPE where it belongs:
T: Háísh SHAPE-NAME biighah góne' iidoo'áá? [Teacher doesn't point to the shape; we want the children to recognize the shape-names when they hear them.]
Teacher calls on volunteer and tells child to show the SHAPE:
T: NAME, SHAPE dandii'aah.
Teacher asks the group what that SHAPE is:
T: Ha'át'ísh SHAPE shįį át'é?
Children name the SHAPE.
Child places the SHAPE in the form-board and says it fits:
C: SHAPE biighah.
[Again, remember, children don’t need to name the shapes for the test but we use them in the instructional activities to get them ready for M-10.]

Pre-test
Teacher empties the shapes out of the board.
Teacher asks who can put the shapes back in.
Teacher calls on child and child puts shapes in as quickly as possible.
Teacher has each child in the group do so, as quickly as possible.
If all can do so, each child has in effect passed the test.
Teacher may give additional help to those who could not do so before re-testing them.

* * * *
MATH: Shapes - 2

M-5 Makes a circle.

Purpose:
To get child to recognize a circle by drawing something resembling a circle. Being able to draw a given shape upon demand shows that the child probably has a pretty good idea what that shape-name means.

Objective
Given a piece of paper and a crayon, and told to draw a circle, the child will do so.
[Only if need be, the teacher might show a paper/plastic wooden circle shape; the teacher shouldn’t show a drawing of a circle or demonstrate how to draw a circle.]
[Child should recognize the word "circle" when told to "draw a circle" but need not say it as part of this test.]

Criterion:
Child's drawing will be:
* more-or-less one continuous circular line,
* closed or almost closed,
* circle-like; not too 'squashed',
* have few or no straight segments,
* have few or no angles.

Language:

T:  GIVES CRAYON AND PIECE OF PAPER TO CHILD
T:  TELLS CHILD TO DRAW A CIRCLE.
T:  Názbás nanich'ąh.
Ch:  DRAWS A CIRCLE.

Instruction:

Activity 1
[finger-drawing in the air]
T has children draw a circle in the air with their fingers.
T tells children: Let's draw a circle.
T:  Nihíla’ bee názbás nidadiich’ah.
T and children put their fingers up,
T leads children to say with her, "around and around"
C:  --" názbás, názbás, názbás"-- as they draw a circle in the air.
T asks group: What did we draw?
Activity 2
[finger drawing in the air]
T tells children: We are going to draw a circle.
T:  Náźbas nidadiich'ah.
T asks children: How do we draw a circle?
T:  Haash yit'ëego Náźbas nidadiich'ah?
Children say: "around and around".
C:  Náźbas, náźbas, náźbas.
T leads children to draw a circle while saying "around and around".
C:  Náźbas, náźbas, náźbas.
T asks group: What did we draw?
T:  Ha'át'ii nidadiich'ąą'.
Group responds: We drew a circle.
G:  Náźbas nidadiich'ąą'.
T asks individual children: What did you draw?
T:  Ha'át'ii nishíních'ąą'?
Child responds: I drew a circle.
C:  Náźbas nishéch'ąą'.
[Note: this forces children to contrast "we drew"--nidadiich'ąą'-- with "I drew"--nishéch'ąą'.]

Activity 3
finger-drawing on the rug
T tells group: We're going to draw a circle.
T:  Náźbas nidadiich'ah.
T asks group: What are we going to draw?
T:  Ha'át'ii nidadiich'ah?
Group responds: We're going to draw a circle.
G:  Náźbas nidadiich'ah.
[Note: this makes a contrast between the Perfective "we drew" and the Future "we're going to draw".
T asks: How do we draw a circle?
T:  Haash yit'ëego náźbas nidadiich'ah?
Group responds: "around and around".
G:  Náźbas, náźbas, náźbas
T leads group to draw circles on the rug while saying "around and around".
T asks group: What did you (plural) draw?
T:  Ha'át'iiish nidashooch'ąą'?
Group responds: We drew a circle.
G:  Náźbas nidadiich'ąą'.
[Note: here contrast between the Perfective and Future forms.]
Activity 4
Drawing with chalk on chalkboard
T tells group: We're going to draw a circle.
T: Názbás nidadii'ch'ah.
T asks individual children: What are you going to draw?
T: Ha'át'íish nidii'ch'ah?
Individual children respond: I'm going to draw a circle.
T: Názbás nidiishch'ah.
T asks: How do we draw a circle?
T: Haash yit'éego názbás nidadiich'ah?
Group responds: "around and around".
G: Názbás, názbás, názbás.
T leads group to draw circles on the rug while saying "around and around".
T asks individual children: What did you do?
T: Ha'át'íish nishéních'ąą'?
Individual children respond: I drew a circle.
C: Názbás nishéchéch'ąą'.
[Note: here contrast the "I" forms in the Perfective and the Future.]

Enrichment 1
Crayon on drawing paper
Teacher has children draw circle—on a time—on the same large sheet of
drawing paper.
T tells group: We're going to draw a circle.
T: Názbás nidadii'ch'ah.
T asks individual child: What are you going to do?
T: Ha'át'íish ábi'ninlaa?
Individual child says: I'm going to draw a circle.
C: Názbás nidiishch'ah.
T asks group: What is NAME going to draw?
T: Ha'át'íish NAME néidiich'ąą'?
Group responds: NAME's going to draw a circle.
G: NAME Názbás néidiich'ąą'.
T has child draw a circle while saying "around and around".
T asks child: What did you draw?
T: Ha'át'íish nishíních'ąą'?
Child says: I drew a circle.
C: Názbás nishéchéch'ąą'.
T asks group: What did NAME draw?
T: Ha'át'íish NAME neizhch'ąą'?
Group: NAME drew a circle.
G: NAME názbás neizhch'ąą'.
[This provides both the Perfective and the Future forms of the verb 'to draw'.
With this, children have the "I", "he/she" and "we-plural" forms of the Perfective
and the Future.]
Enrichment 2
crayon on drawing paper
Children have other children draw circles --one at a time-- on the same large sheet of drawing paper.
    T tells group: We're going to draw a circle.
    T:  Názbás nidadiich'ah.
    T leads Child 1 to command Child 2: (You-singular) draw a circle.
    T:  Názbás nanich'aagh.
    Child 2 draws a circle while saying "around and around".
    C2:  Názbás, názbás, názbás.
    T leads Child 1 to ask Child 2: What did you draw?"
    T:  Ha'át'ii lá nishinich'aagh?
    C2 responds: I drew a circle.
    C2:  Názbás nishéch'aagh.
    T (or Child1) asks group: What did NAME draw?
    T/C1: Ha'át'ii NAME neizhch'aagh?
    Group responds: NAME drew a circle.
    G:  NAME Názbás neizhch'aagh.
    [This introduces the "you-singular" form in both the Imperfective and the Perfective.]

Pre-Test
crayon on drawing paper
Teacher has children draw circles --one at a time-- on the same large sheet of drawing paper. Move briskly; call on the volunteers first but call on all children in the group.
    T tells group: We're going to draw circles.
    T:  Názbás nidadiich'ah.

    T tells Child 1: (You-singular) draw a circle.
    T:  Názbás nanich'aagh.
    Child 1 draws a circle.

    T tells Child 2: (You-singular) draw a circle.
    T:  Názbás nanich'aagh.
    Child 2 draws a circle.

Move fairly briskly to get all children to draw circles on the same sheet of paper. If children talk before, while, or after drawing that's fine, encourage them, but do not require them to do so. That's enrichment; not part of the test.
Situations:

Some of the enrichment language can be used to ask children what they are going to draw, or what they drew, in an art activity.

* * * *
MATH: Shapes - 3

M-10 Refers to familiar shapes (e.g. circle, square, triangle) by name.

Purpose
To have the children show that they recognize circles, squares, and triangles by naming them as they see them.

Objective
Shown a representation of a circle názbás, a square dik’á, a triangle táá’góó heets’óóz -- one at a time, in any order -- and asked what the shape is, the child will name the shapes correctly.

Test Format
Teacher will have seven shapes: two circles, two squares, and three triangles. The two circles and two squares will be of different sizes and possibly different colors. Both squares should be squares, not rectangles. There will be at least three different kinds of triangles: an equilateral triangle (3 equal sides), an isosceles triangle (2 equal sides), and a scalene triangle (3 sides of unequal length); these will also be different colors.

If plastic shapes are available, fine. If not, teacher should make them of heavy cardboard. Use different colors and sizes to try to be sure that children are attending to the right attributes.

Mix up the shapes in different orders for each child.

Show shape. Ask: What’s this?

T: Díísh ha’át’íí át’é?

Child responds: It's a circle/square/triangle.

C: Názbás/dik’á/táá’góó heets’óóz át’é.

If the child is correct, the teacher places that shape in front of the child.

If the child is wrong, she puts that shape back in the teacher's set without comment. If the child gets that name right on the second try (without coaching), give the shape to the child. If not, quietly end the test.

Criterion
Child should get the names of all seven shapes right. If child gets a name right on a second try without coaching, s/he gets credit for it.
If not, the child has not passed the test and needs more assistance before taking the test again.

Language:
TEACHER HAS A SET OF SEVEN SHAPES, PERHAPS IN A SMALL BOX.
TEACHER HOLDS UP ONE SHAPE; ASKS WHAT (SHAPE) IT IS.
T: Díísh ha’át’íí át’é?
C: NAMES SHAPE.
C: Názbás/ dik'á/táá'góó heets'óóz át'é. < OR WHATEVER VERB YOU
DECIDE UPON >
IF C IS CORRECT, T AGREES AND PUTS SHAPE IN FRONT OF C.
IF C IS WRONG, T SAYS NOTHING, BUT RETURNS THAT SHAPE TO THE T's
SET.
T CONTINUES UNTIL C HAS NAMED ALL SEVEN SHAPES OR HAS MISSED
ONE SHAPE-NAME TWICE.

Instruction:
Although children are not tested on their ability to draw squares and
triangles until M-24 and M-28, having them draw shapes (in groups) may be one
of the best ways to get children to attend to the important attributes. They
come to 'feel' what a given shape is instead of playing at defining it.

Activity 1
[Here we teach children to draw and talk about "circle" názbás]
[This may have to be built up one part at a time.]
Teacher tells children: We're going to draw a circle.
T: Názbás nidadii'ah.
Teacher asks children: What are you (plural) going to draw?
T: Ha'át'ilí nidadoohch'ah?
Children respond: We're going to draw a circle.
C: Názbás nidadii'ah.
Teacher asks: How do we draw a circle?
T: Haash yit'éego názbás nijich'ah?
Children respond: Around and around.
C: Názbás, názbás, názbás.
Teacher leads children to draw a circle while saying "around and around".
[This can be done with fingers in the air, fingers on the rug, chalk on the
chalkboard, crayons on paper, etc.]
Teacher asks children: What did we draw?
T: Ha'át'ilí nidashiich'aa'?
Children respond: We drew a circle.
C: Názbás nidashiich'aa'.

Activity 2
[Here we teach children to draw and talk about "square" dik'á.]
[This may have to be built up one part at a time.]
Teacher tells children: We're going to draw a square.
T: Dik'á nidadii'ah.
Teacher asks children: What are you (plural) going to draw?
T: Ha'át'ilí nidadoohch'ah?
Children respond: We are going to draw a square.
C: Dik'á nidadii'ah.
Teacher asks: How do we draw a square?
T: Haash yit'ëego dik'á nijich'ah?
Children respond: Down - across - up - back across
C: yaago, naanii, dego, nát'áá' naanii.
Teacher leads children to draw square while saying "down - across - up - back across" "yaago-naanii -dego-nát'áá' naanii".
[This can be done with fingers in the air, fingers on the rug, chalk on the chalkboard, crayons on paper, etc.]
Teacher asks children: What did we draw?
T: Ha'át'íí nídashiih'áá'?
Children respond: We drew a square.
C: Dik'á nídashiih'áá'.

Activity 3
[Here we contrast "circle" and "square"
[This may have to be built up one part at a time.]
Teacher tells children: We're going to draw a circle/square.
T: Názbás/Dik'á nídashiih'ah.
Teacher asks children: What are you going to draw?
T: Ha'át'íí nídadoohch'ah?
Children respond: We are going to draw a circle/square.
T: Názbás/Dik'á nídashiih'ah.
Teacher asks: How do we draw a circle/square?
T: Haash_yit'ëego názbás/dik'á nijich'ah?
Children respond: "Around and around" OR "Down - across - up - back across".
C: "Názbás, názbás, názbás." /"Yaago-naanii -dego-nát'áá' naanii".
Teacher leads children to draw circle/square while describing it.
[This can be done with fingers in the air, fingers on the rug, chalk on the chalkboard, crayons on paper, etc.]
Teacher asks children: What did we draw?
T: Ha'át'íí nídashiih'áá'?
Children respond: We drew a circle/square.
C: Názbás/Dik'á nídashiih'áá'.

Activity 4
[Here we teach children to draw a triangle.]  
[This may have to be built up one part at a time.]
Teacher tells children: We're going to draw a triangle.
T: Táá'góó heets'óóz nídashiih'ah.
Teacher asks children: What are you going to draw?
T: Ha'át'íí nídadoohch'ah?
Children respond: We're going to draw a triangle.
C: Táá'góó heets'óóz nídashiih'ah.
Teacher asks: How do we draw a triangle?
T: Haash yit'ëego táá'góó heets'óóz nijich'ah?
Children respond: Down - across - back up.

C:  Yaago-naanii -dego.

[Teacher must remember that there are different kinds of triangles. We don't want children to name the different kinds. But we want them to realize that they are all triangles, i.e., they should have an image of "three sides" not just of one kind of triangle like a 'right triangle'.]

Teacher leads children to draw triangle while saying "down - across - back up." Yaago-naanii -nát'áá' degoo.

[This can be done with fingers in the air, fingers on the rug, chalk on the chalkboard, crayons on paper, etc. Teacher may have to draw the triangle she's talking about on the chalkboard or tablet to be sure children are drawing the same kind of triangle.]

Teacher asks children: What did we draw?
T:  Ha'át'ii  nidashiich'ąń?

Children respond: We drew a triangle.

C:  Táá'góó  heets'óóz  nidashiich'ąń.

*Teachers need to experiment; this may not work for all triangles. We need to find directions that work for all kinds of triangles.

Activity 5
[Here we contrast "triangle" táá'góó  heets'óóz and "square" dik'ą we're assuming we do not have to contrast "triangle" and "circle"]

[This may have to be built up one part at a time.]

Teacher tells children: We're going to draw a triangle/square.
T:  Táá'góó  heets'óóz/dik'ą  nidadiiich'ąń.

Teacher asks children: What are you going to draw?
T:  Ha'át'ii  nidadoohch'ąń?

Children respond: We are going to draw a triangle/square.

T:  Táá'góó  heets'óóz/dik'ą  nidadiiich'ąń.

Teacher asks: How do we draw a triangle/square?
T:  Haash yit'éego  táá'góó  heets'óóz/dik'ą  nijich'ąń?

Children respond: "Down - across - up" "Yaago-naanii -nát'áá' degoo." OR "Down - across - up - back across" "Yaago-naanii -dego-nát'áá'naanii."

Teacher leads children to draw triangle/square while describing it.

[This can be done with fingers in the air, fingers on the rug, chalk on the chalkboard, crayons on paper, etc.]

Teacher asks children: What did we draw?
T:  Ha'át'ii  nidashiich'ąń?

Children respond: We drew a triangle/square.

C:  Táá'góó  heets'óóz/dik'ą  nidashiich'ąń.

Activity 6
[Here we contrast "circle", "square" and "triangle".]

[This may have to be built up one part at a time.]
Teacher tells children: We're going to draw a circle/square/triangle.

T:  Názbás/Dik'á/Táá'góó heets'óóz nidadiich'áh.

Teacher asks children: What are you going to draw?

T:  Ha'átií nidadooch'áh?

Children respond: We are going to draw a circle/square/triangle

T:  Názbás/Dik'á/Táá'góó heets'óóz nidadiich'áh.

Teacher asks: How do we draw a circle/square/triangle?

T:  Haash yit'eeego Názbás/Dik'á/Táá'góó heets'óóz nijich'ah?

Children respond: "Around and around" OR "Down - across - up - back across" OR "Down - across - back up".

Teacher leads children to draw circle/square/triangle while describing it.

This can be done with fingers in the air, fingers on the rug, chalk on the chalkboard, crayons on paper, etc.

Teacher asks children: What did we draw?

T:  Ha'átií nishiich'ág'á?

Children respond: We drew a circle/square/triangle.

C:  Názbás/Dik'á/Táá'góó heets'óóz nishiich'ág'á.

Enrichment 1

[Here we contrast "circle", "square" and "triangle", using "you-singular" and "I" forms of the verb.]

[We have one child command another child.]

Teacher tells children: We're going to draw circles, squares, triangles.

T:  Názbás/Dik'á/Táá'góó heets'óóz nidadiich'áh.

[Each child will tell another child what to draw. This can be done with fingers in the air, fingers on the rug, chalk on the chalkboard, crayons on paper, etc.]

[Teacher will have to teach children to do this.]

C1: CHILD 2, draw a circle/square/triangle.

C1: CHILD 2, názbás/dik'á/táá'góó heetsóóz nanich'ág'ah.

C2 draws as commanded while giving directions.

C1: CHILD 2, what did you draw?

C1: CHILD 2, ha'átiíish nishíich'ág'á?

C2: I drew a circle/square/triangle.

C2: Názbás/dik'á/táá'góó heetsóóz nishéch'ág'á.

C1: Good.

C1: Nizhóní.

Enrichment 2

[Here we contrast "circle", "square" and "triangle".]

[We have a child command another child and the group talk about that child using the "s/he" forms of the verb.]

Teacher tells children: We're going to draw circles, squares, triangles.

T:  Názbás/Dik'á/Táá'góó heets'óóz nidadiich'áh.

[Each child will tell another child what to draw. This can be done with fingers in the air, fingers on the rug, chalk on the chalkboard, crayons on paper, etc.]

[Teacher will have to teach children to do this.]
C1: CHILD 2, draw a circle/square/triangle.
C1: CHILD 2, názbás/dik'á/táá'góó heets'óóz nanich'ąąh.
Teacher to Group: What is CHILD 2 going to draw?
T: CHILD 2 ha'át'íí néidiich'ąą?
Group: CHILD 2 is going to draw a circle/square/triangle.
G: CHILD 2 názbás/dik'á/táá'góó heets'óóz neidooch'ąąh.
Child 2 draws as commanded while giving directions.
C1: CHILD 2, what did you draw?
C1: CHILD 2, ha'át'íísh nishíinich'ąą?
C2: I drew a circle/square/triangle.
C2: Názbás/dik'á/táá'góó heets'óóz nishéech'ąą.
Teacher to group: What did CHILD 2 draw?
T to G: Ha'át'íí CHILD 2 neizhch'ąą?
Group: CHILD 2 drew a circle/square/triangle.
G: CHILD 2 názbás/dik'á/táá'góó heets'óóz néizhch'ąą.

Pre-Test
[Here we contrast "circle", "square" and "triangle".]

a) Teacher asks group.
Teacher holds up shape and asks: What's this?
T: Diísh ha'át'íí át'é?
Group: It's a circle/square/triangle.
G: Názbás/dik'á/táá'góó heets'óóz át'é.

b) [Teacher asks individuals]
Teacher holds up shape and asks: What's this?, pauses, and calls on a child.
T: NAME, diísh ha'át'íí át'é?
Child: It's a circle/square/triangle.
C: Názbás/dik'á/táá'góó heets'óóz át'é.

c) [Teacher has each individual child name the three different shapes as they are shown.
Teacher holds up shape and asks: What's this?
T: NAME, diísh ha'át'íí át'é?
Child: It's a circle/square/triangle.
C: Názbás/dik'á/táá'góó heets'óóz át'é.
[Have each child name all three shapes. Move as briskly as possible. Take volunteers first. Ask all children. Go back to children having difficulty.]

Situations:
art: The questions "what did you draw?" "ha'át'íísh nishíinich'ąą?" or "what's this?" "diísh ha'át'íí át'é?" may carry over to situations where child is drawing something and teacher asks what s/he drew. The response should address the appropriate form of the verb, not just the name of the object represented.
naming: The question "what's this?" "di\text{\textsection}sh ha\'át'í\' át'é?" may carry over to situations where the teacher asks a child what a given thing (or picture of a thing) is. The question "what's this" may also carry over to situations where the child wants to know what an object or a picture of an object is/is called.

representations: The answers "It's a SHAPE" may carry over to situations where children are led to find shapes in familiar objects: a dish is a circle; e.g., a table is a square; OR a window is four squares, a kite is four triangles, etc.

* * * *
MATH: Shapes - 4

M-24  Makes a square.
M-28  Makes a triangle.
M-4   Makes a circle  [re-introduced here for contrast]

Purpose
To show that children recognize squares and triangles—as well as circles—by being able to draw them upon request.
Being able to reproduce a given shape requires a deeper knowledge than just matching or naming shapes.

Objective
Given paper and a crayon, and told to draw a square dik'á, a triangle tàá'góó heets'óóz, and a circle názbás—in any order—the child will do so.

Test format
Teacher will give the child a paper folded or marked in four quadrants.
Teacher will put child’s name in one quarter. Child will be asked to draw a shape in each of the other quadrants.
Teacher gives child paper and a crayon.
Pointing, teacher tells child to draw a SHAPE here (in the second quadrant).
Child does so, without coaching.
Pointing, teacher tells child to draw SHAPE here (in the third quadrant).
Child does so, without coaching.
Pointing, teacher tells child to draw yet another SHAPE here (in the fourth quadrant).
Child does so, without coaching.
Teacher should mix up the order in which she asked that the various shapes be drawn.
If child talks before, during, or after, drawing the shape requested, encourage the child but do not require that the child do so.

Criteria
Child will draw each of the three shapes upon request.
The square will:
* be a relatively closed figure (no more than one small gap)
* have four sides of more-or-less equal length;
* have relatively straight sides;
* have opposite sides more-or-less parallel;
* have four more-or-less right angles.
The triangle will:
* be a relatively closed figure (no more than one small gap)
* have three sides;
* have relatively straight sides.
  [can be any kind of triangle as long as it meets the above criteria]

The circle will:
* be a relatively closed figure [no more than one small gap]
* be one more-or-less continuous curve [no straight lines or angles].

Language

TEACHER GIVES CHILD PAPER FOLDED/MARKED IN QUADRANTS AND A CRAYON.

TEACHER POINTS TO SECOND QUADRANT, TELLS CHILD TO DRAW A SQUARE
T:   \textit{Dik'á} nanich'ą́ą́.
CHILD DRAWS A SQUARE.
TEACHER POINTS TO THIRD QUADRANT, TELLS CHILD TO DRAW A TRIANGLE
T:   \textit{Táá'góó} heets'óóz nanich'ą́ą́.
CHILD DRAWS A TRIANGLE.
TEACHER POINTS TO FOURTH QUADRANT, TELLS CHILD TO DRAW A CIRCLE
T:   \textit{Názhbas} nanich'ą́ą́.
CHILD DRAWS CIRCLE.

Teacher should mix up order in which s/he asks for the three shapes.
Teacher should not correct the child but let him/her finish the test.
Note that although we have the child 'talk through' how to draw the shapes in the activities, we do not require this on the test. If the child does so, fine. But do not require it.

Instruction:

Presumably, children have been tested on drawing a circle in M-5. They should have had some practice --but not have been tested-- on drawing squares and triangles.

Activity 1

[Here we review how to draw and talk about "circle"]
[This may have to be built up one part at a time.]

Teacher tells children: We're going to draw a circle.
T:   \textit{Názhbas} nidadiich'ą́ą́.
Teacher asks children: What are you going to draw?
T:   Ha'át'įį' nidadoohch'ą́ą́?
Children respond: We're going to draw a circle.
C:   \textit{Názhbas} nidadiich'ą́ą́.
Teacher asks: How do we draw a circle?
T:   Haash yit'éego \textit{Názhbas} nijich'ą́ą́?
Children respond: Around and around.
C:   \textit{Názhbas, názhbas, názhbas,}
Teacher leads children to draw circle while saying around and around. 
[This can be done with fingers in the air, fingers on the rug, chalk on the chalkboard, crayons on paper, etc.] 
Teacher asks children: What did we draw? 
T: Ha'át'ii nídashiihyą́ą́? 
Children respond: We drew a circle. 
C: Nážbas nídashiihyą́ą́.

Activity 2
[Here we review how to draw and talk about a "square".] 
[This may have to be built up one part at a time.] 
Teacher tells children: We're going to draw a square. 
T: Dik'á nídadiihyą́ą. 
Teacher asks children: What are you going to draw? 
T: Ha'át'ii nídadóohch’ą́ą? 
Children respond: We're going to draw a square. 
C: Dik'á nídadiihyą́ą. 
Teacher asks: How do we draw a square? 
T: Haash yit'éego Dik'á níjiyą́ą? 
Children respond: Down - across - up - back across. 
C: Yaago-naanii -degó -nát'ą́ą’ naanii. 
Teacher leads children to draw square while saying around and around. 
[This can be done with fingers in the air, fingers on the rug, chalk on the chalkboard, crayons on paper, etc.] 
Teacher asks children: What did we draw? 
T: Ha'át'ii nídashiihyą́ą’? 
Children respond: We drew a square. 
C: Dik'á nídashiihyą́ą’.

Activity 3
[Here we review how to draw and talk about a triangle.] 
[This may have to be built up one part at a time.] 
Teacher tells children: We're going to draw a triangle. 
T: Táá'góó heets’óóz nídadiihyą́ą. 
Teacher asks children: What are you going to draw? 
T: Ha'át'ii nídadóohch’ą́ą? 
Children respond: We're going to draw a triangle. 
C: Táá'góó heets’óóz nídadiihyą́ą. 
Teacher asks: How do we draw a triangle? 
T: Haash yit'éego Táá'góó heets’óóz níjiyą́ą? 
Children respond: Down - across - back up. 
C: Yaago-naanii-nát'ą́ą’ degó. 

[Teacher must remember that there are different kinds of triangles. We don't want children to name the different kinds. But we want them to realize that they}
are all triangles. I.e., they should have an image of 'three sides' not just of, say, a 'right triangle'.

Teacher leads children to draw triangle while saying "down - across - back up." "yaago-naanii-nát'áá' dego".
[This can be done with fingers in the air, fingers on the rug, chalk on the chalkboard, crayons on paper, etc. Teacher may have to draw the triangle she's talking about on the chalkboard to be sure children are drawing the same kind of triangle.]
Teacher asks children: What did we draw?
T: Ḥa'át'íí nidaańiih'aa'?
Children respond: We drew a triangle.
C: Táá'góó heets'óóz nidaańiih'aa'.

*Teachers need to experiment; this may not work for all triangles.

Activity 4
[Here we contrast drawing and talking about circles, squares, triangles]
Teacher tells children: We're going to draw a circle OR square OR triangle [names one].
T: Náazbaas/dik'á/táá'góó heets'óóz nidaańiih'aa'.
Teacher asks children: What are you going to draw?
T: Ḥa'át'íí nidaańooch'ah?
Children respond: We're going to draw a SHAPE [as named]
C: Náazbaas/dik'á/táá'góó heets'óóz nidaańiih'aa'.
Teacher asks: How do we draw a SHAPE?
T: Haash yit'egóo Náazbaas/dik'á/táá'góó heets'óóz niič'haah?
Children respond: Around and around "Náazbaas". OR Down - across - up - back across "Dik'á". OR Down - across - back up "Táá'góó heets'óóz".
Teacher leads children to draw the SHAPE while stating the directions.
[This can be done with fingers in the air, fingers on the rug, chalk on the chalkboard, crayons on paper, etc. Teacher may have to draw the triangle she's talking about on the chalkboard to be sure children are drawing the same kind of triangle.]
Teacher asks children: What did we draw?
T: Ḥa'át'íí nidaańiih'aa'?
Children respond: We drew a SHAPE [as named].
C: Náazbaas/dik'á/táá'góó heets'óóz nidaańiih'aa'.

Enrichment 1
[Here we contrast drawing and talking about circles, squares, triangles]
[Here we use "you-singular" and "I" forms of the verb.]
[This is complex and may have to be built up a piece at a time.]
Teacher leads group to give command:(You-singular) draw a circle/square/triangle... Teacher then calls upon one child to respond.
[i.e., teacher gives the command, pauses, then calls on a child. All should be listening to the command even though only one will be expected to respond.]
Teacher leads group to ask child: What are you-singular going to draw?
T: Ha'át'íí níidiích'ąh?
Child responds: I'm going to draw a SHAPE [as named]
T: Názbás/dík'á/táá'góó heests'óóz níidiisch'äh.
Teacher gives paper and crayon to that child and leads group to say: OK, draw a SHAPE.
Child draws and states directions while drawing: Around and around Názbás OR Down-across-up back across "Dík'á" OR Down-across-back up "Táá'góó heests'óóz".
[Group may join in but, if they do, they should coordinate what they say to what the child is actually doing with the crayon at that time.]
Teacher leads the group to ask: What did you-singular draw?
Child responds: I drew a SHAPE [as named].
[Here, we don't expect the group to give the commands or ask the questions on their own. The teacher may model them and has the group repeat them.]

Enrichment 2
[Here, we contrast drawing and talking about circles, squares, triangles]
[Here, we have the group use the "s/he" forms of the he verb.]
[This is complex and may have to be built up a piece at a time.]
Teacher gives command: (You-singular) draw a circle/square/triangle...
Teacher then names a child to respond.
[I.e., teacher gives the command, pauses, then calls on a child. All should be listening to the command even though only one will be expected to respond.]
Teacher asks child: What are you-singular going to draw?
T: Ha'át'íí níidiích'ąh?
Child responds: I'm going to draw a SHAPE [as named].
C: SHAPE níidiisch'äh.
Teacher asks group: What is NAME going to draw?
T: NAME lá ha'át'íí néidooch'äh?
Group responds: NAME is going to draw a SHAPE.
G: NAME SHAPE néidooch'äh.
Teacher gives paper and crayon to child and says: OK, draw a SHAPE.
T: Hágoshíjí. SHAPE náníich'ągh.
Child draws and states directions while drawing: Around and around Názbás, názbás OR Down - across - up - back across Yaago-naanii -dego- nát'ąą'naanii OR Down - across - back up Yaago-naanii -nát'ąą' degó.
[Group may join in but, if they do, should coordinate what they say with what the child is actually doing with the crayon at that time.]
Teacher asks the child: What did you-singular draw?
T: Ha'át'íí níshínich'ąą'?
Child responds: I drew a SHAPE [as named].
C: SHAPE níshích'ąą'.
Teacher asks the group: What did NAME draw?
T: NAME lá ha'át'íí neizch'ąą'?
Group responds: NAME drew a SHAPE.
G: NAME SHAPE neizhch'ąą'.

[Here we alternate asking the child and the group questions. The child will respond with "i" forms; the group will respond with "s/he" forms.

Enrichment 3
[Here we contrast drawing and talking about circles, squares, triangles]
[Here we have one child command another,
[This is complex and may have to be built up a piece at a time.] Teacher sets up and models activity; then gets it going.
C1 tells Child 2: NAME, draw a SHAPE.
C1: NAME SHAPE nanich'aagh.
C1 then asks Child 2: What are you going to draw?
C1: NAME ha'át'įį nidilch'aąą?
C2 responds: I'm going to draw a SHAPE.
C2: SHAPE nidiishch'ąą
C1 says: OK, draw a SHAPE.
C1: Hághoštįį, SHAPE nanich'aąą.
C2 draws the SHAPE, stating the directions as s/he does so.
C1 says: Good. What did you draw?
C1: Nizhóní. Ha'át'įį nishinich'ąą?'
C2: I drew a SHAPE.
C2: SHAPE nishèch'ąą'.

[Thereupon Child 2 takes Child 1's place and a new child becomes Child 2. Teacher may want to intersperse "s/he" questions to keep the group awake.]

Pre-Test
[Have sheets of paper ready folded or marked into quadrants with children's names on them.]
Teacher tells Child to draw a SHAPE.
Child does so.
Teacher asks group what Child drew.
Group responds: NAME drew a SHAPE [whatever Child actually drew]
Teacher tells Child to draw another SHAPE.
Child does so.
Teacher asks group what Child drew.
Group responds: NAME drew a SHAPE [whatever Child actually drew]
Tell Child 1 to draw yet another SHAPE.
Child does so.
Teacher asks group what Child drew.
Group responds: NAME drew a SHAPE [whatever Child actually drew]
[Move briskly. Call on volunteers first but call on every child. Call on children who had trouble a second time after having them watch/listen to another child do it right. Arrange for additional instruction/practice for those who can't pass the test.
Completed 'test' papers can be kept in child's folder for parents to see.]
Situations: as in Shapes 3

art: The question "what did you draw" or "what's this" may carry over to situations where child is drawing something and teacher asks what it is. Child's answer should contain an appropriate verb form.

naming: This question "what's this" may carry over to situations where the teacher asks a child what a given thing (or picture of a thing) is. The same question may also carry over to situations where the child asks the teacher what a given thing (or picture of a thing) is/is called.

representations: The answer "it's a SHAPE-NAME may carry over to situations where children are led to find shapes in familiar objects: a dish is a circle; a table is a square; car headlights are two circles; a kite is four triangles, etc.

* * * *
MATH FOUNDATIONAL SKILLS:

IV Comparison

M-8 Identifies the shorter or taller of two persons or things.
M-15 Identifies the shortest or tallest in a group.
M-X1 Identifies the smaller or larger of two things.
M-X2 Identifies the smallest or largest in a group.
M-X3 Identifies the shorter or longer of two things.
M-X4 Identifies the shortest or longest in a group.

This group of objectives involves comparing two objects and in comparing groups of three or more objects.

Comparing two objects involves:
* putting two objects together (in our hands or in our heads),
* using one as the standard, and
* saying how the other differs (in terms of the attribute in mind)

Here, we’re comparing objects in terms of height, size, and length.

Comparing three or more objects involves, in a sense, thinking of the objects two at a time until we find the one that is the greatest or the least in terms of the attribute we’re thinking about. Here, again, we’re comparing height, size, and length. We can organize the process of comparing objects two at a time by laying out the objects in order—either from least to greatest or greatest to least. In this way, the one that is the least is at one end and the one that is the greatest is at the other end.

The original MAPS involved comparisons only with only "short" / "tall".

Here we have added comparisons with "small" and "large" and with "short" and "long". The comparisons with "short"/"long" may or may not be necessary. English tends to make a distinction between "tall" (up-and-down) and "long" (sideways). For children who are much influenced by English, it may be well to specifically show children that the Navajo stem -nééz may be used for both.
MATH: Comparison - 1

M-8 Identifies the shorter or taller of two persons or things

Purpose
This introduces the activity of comparing: of putting two things together in one's mind and describing how they differ in a given attribute: in this case up-and-down height. The test is given in a way that is likely to help the child 'see' the relationship between the two terms: if one is taller then the other must be shorter. The test is given in such a way as to help the child understand the relative nature of both terms: the block that is the "shorter" of the two in the first pair becomes the "taller" of the two in the second pair.

Objective
Shown two blocks of different heights stood upright side by side, told that one is "taller" and the other "shorter", and asked to tell about these blocks, the child states while pointing that a given block is taller and the other shorter.

Test Format
The teacher has three blocks [or other 'tall' objects] of different heights; all should be as tall or taller than they are wide or deep. They should be the same color and texture and shape if at all possible [i.e., the child should concentrate on the attribute of height without being distracted by other attributes.] They should be objects that can stand alone: the child should be able to see that their bases are at the same level.

Teacher takes the two taller blocks and stands them side by side.
Without actually pointing to the taller or shorter block, the teacher says that one is taller and the other shorter.
Pointing generally to the blocks, she asks the child to tell her about the blocks.
Pointing to or touching the blocks in turn, the child indicates that a given block is taller and the other block is shorter.

The teacher replaces the tallest block with a block shorter than either of those two. She stands the two blocks (one of which is new) side by side. What had been the 'shorter' block has now become the 'taller' block.
She then repeats the earlier procedure.
Without actually pointing to the taller or shorter block, the teacher says that one is taller and the other shorter.
Pointing generally to the blocks, she asks the child to tell her about the blocks.
Pointing to or touching the blocks in turn, the child indicates that a given block is taller and the other block is shorter.
Teacher should try to avoid 'giving away the answers' by the way she points or asks the questions.

Criterion
Child will answer the four questions correctly by stating (while pointing to each in turn) that a given is "taller" and the other "shorter".

Language
T: STANDS UP THE TWO BLOCKS OF DIFFERENT HEIGHTS SIDE-BY-SIDE.
T: SAYS (WITHOUT POINTING) THAT ONE IS TALLER AND ONE SHORTER.
Ła' áláah ánínnééz; ła' a'oh ánítso.
T: ASKS CHILD WITHOUT POINTING TO TELL HER ABOUT THE BLOCKS.
T: T'áá álah baa hólne'/ bee shil hólne'.
C: SAYS THIS ONE [POINTING] IS TALLER AND THIS ONE [POINTING] IS SHORTER.

T: REPLACES TALLEST BLOCK WITH SHORTEST BLOCK
T: STANDS UP THE NEW PAIR OF BLOCKS SIDE-BY-SIDE
T: SAYS (WITHOUT POINTING) THAT ONE IS TALLER AND ONE SHORTER.
Ła' álááh ánínnééz; ła' a'oh ánítso.
T: ASKS CHILD TO TELL HER ABOUT THE BLOCKS.
T: T'áá álah baa hólne'/ bee shil hólne'.
C: (POINTING) SAYS ONE IS TALLER AND ONE IS SHORTER.

Language Notes:
It would appear that, for many, the notion "taller" is carried by the verb stem -neez, usually glossed as either 'long' or 'tall'. But the notion of shorter is carried by the verb stem -tso, usually glossed as 'large'. You may want to check to see if this seems natural to you and what is usually said in the community in which you work.

Notice that Navajo is more explicit than English about comparison. To be "taller" means literally to extend beyond the referenced object in length; to be "shorter" means literally to fail to extend to the referenced object in size.

While English seems to make a distinction between vertical extension (tall - short) and horizontal extension (long - short), Navajo does not. If this is so, it may be possible to compare both "tall" objects and "long" objects.
Instruction:

Activity 1:
At the outset, the teacher may ask which (of a pair) is taller or which is shorter.

Teacher shows two objects side by side.
Teacher asks which is taller?
Group says [while pointing] that a given one is taller.
Changing the relative location of the objects, the teacher asks the same question of individuals.

Teacher shows two objects side by side.
Teacher asks which is shorter?
Group says [while pointing] that a given one is shorter.
Changing the relative location of the objects, the teacher asks the same question of individuals.

Activity 2:
But fairly early the teacher asks the child to pair the two statements.
She may have to 'set the stage' by saying that one (without pointing) is taller and one (without pointing) is shorter.

Teacher shows two objects side by side.
Teacher says (without pointing) that one is shorter and one is taller.
Teacher asks to be told about the two objects.
Group says [while pointing] that one is taller and the other shorter.

Changing the relative location of the objects, the teacher gives the same directions to individuals.
[Teacher should take care that the "taller" object is not always on the same side, thereby giving away the answer.]

Activity 3
Teacher repeats activity 2 with other objects such as tinkertoy sticks, Lincoln logs, or other similar objects.

Activity 4
Teacher extends activity 2 from things to children. Has two children stand back to back. If necessary, she puts a ruler or other object over their heads to show which is taller. Has children say that NAME1 is taller and NAME 2 is shorter.

She may bring in other children so that the children realize--without ever really talking about it--that a child may be the "taller" in one pair but the "shorter" in another pair.
Enrichment 1
Teacher may tell children to line up side by side by height.
To maximize the language, she may have two children stand side-by-side.
T: Ádanóltssoigíi bik'ehgo daohsjih.
She tells the third child to find where s/he belongs.
T: Nish haa níníłtsso/daa níníłtsso?
The child does so, saying I'm taller than NAME1 but shorter than NAME2.
C: NAME bilááh ánísnéez. NAME bi'oh/bích'jí álístso.
[Of course, is the child is the tallest or the shortest so far, that child will make only one statement.

Enrichment 2
An extension of Enrichment 1 to get contrast 1st and 3rd person postpositions and verb-forms.
Teacher may tell children to line up side by side by height.
To maximize the language, she may have two children stand side-by-side.
T: Ádanóltssoigíi bik'ehgo daohsjih.
She tells the third child to find where s/he belongs.
T: Nish haa níníłtsso/daa níníłtsso?
The child does so, saying I'm taller than NAME1 but shorter than NAME2.
C: NAME bilááh ánísnéez. NAME bi'oh/bích'jí álístso.
[Of course, is the child is the tallest or the shortest so far, that child will make only one statement.

After each new child enters the lineup, the teacher refers to the group of children waiting their turn.
T Díí t'áá áláh baa hólne'/bee shíí hólne'. OR
Díí t'áá áláh ánílssoíigí baa hólne'/bee shíí hólne'.
G: NAME éí NAME yilááh ánílnéez. NAME éí NAME yi'oh ánílsso.

[This gives children meaningful practice on the S-O-V form of Navajo sentences in comparison to the S-V-O form of English sentences.]

Pre Test-1
Here we go back to the blocks to get the children ready for the test.
Child is given two blocks, told that one is shorter and one is taller, and asked to tell about the blocks, the child holds or places them side by side and indicates that one is "shorter" and the other is "taller" [in either order].
Have each child do so in turn. Move through the group briskly. If a child has trouble, go on to the next and let that child watch. Come back to that child again at the end..

Pre-Test-2
Child is given two blocks, told that one is shorter and one is taller, and asked to tell about the blocks, the child holds or places them side by side and
indicates that one is "shorter" and the other is "taller" [in either order]. Teacher reverses the two blocks in relation to one another and asks the same question. Have each child do so in turn. Move through the group briskly. If a child has trouble, go on to the next and let that child watch. Come back to that child again at the end.

If everybody can do this, they have, in effect, passed the test. If some cannot, the teacher needs to work some more with them before re-testing them.

Situations:
We can compare the height (or length) of objects in several situations.
Nature walk: comparing sticks, plants, shadows, trees, flowers.
Classroom: blocks, rods, flowers, plants, pencils, rulers, crayons.
Cafeteria: celery, carrots, "ants-on-a-log", bananas.

Notes:
This distinction is important for the acquisition of number-sense because there is a tendency for greater amounts to be "taller" than lesser amounts.

We want children to become aware--without really talking about it--of the reciprocal nature of two-way distinctions: if one object is + then the other object must be -. Here, if one member of a pair is "taller", the other must be "shorter". And vice versa.

We also want children to become aware--without really talking about it--of the relative nature of such statements: that B may be "taller" than "C" but shorter than "A".

While we will not assess children's ability to do so, it is good practice to lead children to arrange three or more objects in ascending or descending orders of height. Children can be led to 'talk-through' such arrangements in a number of ways. One way is to look a group of five or six objects only two at a time.

E.g. in descending order:
A and B: A is "taller"
B and C: B is "taller"
C and D: C is "taller" . . .

Or, in ascending order:
A and B: A is "shorter"
B and C: B is "shorter"
C and D: C is "shorter" . . .
This leads to what is called 'seriation': the ability to organize a set of objects in a series, with each object 'more' than the last. It also prepares them for talking about "the shortest" and "the tallest" in M-15.

* * * *
MATH: Comparison -2

M-15 Identifies the shortest or tallest in a group.

Purpose
This extends the activity of comparing: of seeing and holding three or more things in one's mind and stating which one is the 'most' and which one is the 'least' in terms of a given attribute: in this case up-and-down height. The test is given in a way that is likely to help the child 'see' the relationship between seriation--arranging objects in ascending or descending order--and statements about "the tallest" and "the shortest"

Objective
Shown a group of three to five blocks arranged in random order of height, told that one is "the shortest" and another is "the tallest", and asked to tell the teacher about the blocks, the child will arrange the blocks in ascending or descending order of height, and state correctly that a given block is "the shortest" and another given block is "the tallest".

Test Format
The teacher has four or five blocks [or other 'tall' objects] of different heights; all should be as tall or taller than they are wide or deep. If at all possible, they should be the same color and texture and shape. [i.e., the child should concentrate on the attribute of height without being distracted by other attributes.] They should be objects that can stand alone*: the child should be able to see that their bases are at the same level.

Teacher takes the blocks and stands* them up side-by-side in random order. [i.e., they should not be in either ascending--'going up'--or descending--'going down'--order.]
Without actually pointing to any one block, the teacher tells the children that one block is "the tallest" and another is "the shortest".
Pointing generally to the blocks, she asks the child to tell her about them.
The child arranges* the blocks in stair-step order, either going up (ascending) or 'going down (descending) order. Pointing to the shortest block (at one end), the child states that it is "the shortest"; pointing to the tallest block (at the other end), the child states that it is "the tallest".
*It helps if the blocks are stable enough to be stood up alone. But, if it turns out that standing up the blocks and putting them in order without letting them fall, is too difficult for the children, the teacher may lay the blocks down on the table against some long horizontal object (like a ruler) so that the base of each is at the same level.

**Language**

**T** POINTS TO THE ARRAY OF FIVE BLOCKS ARRANGED IN ANY RANDOM ORDER OF HEIGHT.
**T** STATES (WITHOUT POINTING TO ANY GIVEN BLOCK) THAT ONE BLOCK IS "THE TALLEST" AND ANOTHER BLOCK IS "THE SHORTEST".
**T:** Díí ′a aláahdi áníńnéez, ′a éí a′ohdi ánítso.
**T** TELLS CHILD TO TELL HER (ABOUT THE SHORTEST/LONGEST)
**T:** K′ad baak hólne′/ bee šíł hólne′.
**C:** SAYS WHILE POINTING THAT THIS ONE IS "THE LONGEST" AND THIS ONE IS "THE SHORTEST"
**C:** Diidigii [POINTING] aláahdi áníńnéez, diidigii [POINTING] a′ohdi ánítso.

**T** MAY PROVIDE PROMPTS IF CHILD DOES NOT RESPOND
**T** ASKS WHICH ONE IS THE LONGEST?
**T:** Haiidígísh aláahdi áníńnéez?
**C:** SAYS WHILE POINTING THAT THIS ONE IS "THE LONGEST"
**C:** Diidígí [POINTING] aláahdi áníńnéez.
**T** ASKS WHICH ONE IS "THE SHORTEST"?
**T:** Haiidígísh a′ohdi ánítso?
**C:** SAYS WHILE POINTING THAT THIS ONE IS "THE LONGEST"
**C:** Diidígí [POINTING] a′ohdi ánítso.

**Instruction:**

Teacher should build up the idea of "the tallest" by showing that "the tallest" means that that object is taller than each of the other objects in the array. One way of doing this is given below.

Teacher leads the children to see and say that the tallest of the blocks with each of the shorter blocks, and saying that it is "taller". Only after having compared the tallest block with each of the other blocks one-on-one does the teacher lead the children to say that that block is "the tallest" (of all the blocks in the array).
Activity 1:
Teacher has an array of five blocks in ascending order A, B, C, D, E.
Teacher holds up D and E and asks which is taller.
Group says [while pointing] that E is taller.
Teacher puts down D; she holds up C and E and asks which is taller.
Group says [while pointing] that E is taller.
Teacher puts down C; she holds up B and E and asks which is taller.
Group says [while pointing] that E is taller.
Teacher puts down B; she holds up A and E and asks which is taller.
Group says [while pointing] that E is taller.
Pointing to the array, and indicating that E is taller than D, C, B, or A, teacher leads group to say that E is "the tallest".

[We need some such demonstration to show what "the tallest" actually means. Otherwise, some children may assume that it simply means 'the one at the (right) end' or something like that.

Activity 2:
Teacher should build up the idea of "the shortest" in much the same way, showing that "the shortest" means that that object is shorter than each of the other objects in the array.

Teacher has an array of five blocks in ascending order A, B, C, D, E.
Teacher holds up A and B and asks which is shorter.
Group says [while pointing] that A is shorter.
Teacher puts down B; she holds up C and A and asks which is shorter.
Group says [while pointing] that A is shorter.
Teacher puts down C; she holds up D and A and asks which is shorter.
Group says [while pointing] that A is shorter.
Teacher puts down D; she holds up E and A and asks which is shorter.
Group says [while pointing] that A is shorter.
Pointing to the array, and indicating that A is shorter than B, C, D, or A, teacher leads group to say that A is "the shortest".

[As with "the tallest", we need some such demonstration to show what "the shortest" actually means. Otherwise, some children may assume that it simply means 'the one at the (left/other) end' or something like that.]

Activity 3
The teacher may have to teach the children to put the blocks in ascending order--'like stairsteps going down'. She may build up this ability by having the children note that each block is "taller" than the one before. This leads to the statement that the last one is "the tallest" (of all in the group).
Teacher has an array of five blocks in descending ("going up") order A, B, C, D, E. In this array, A is the shortest and E is the tallest.
Teacher holds up A and B and asks which is taller.
Group says [while pointing] that B is taller.
Teacher puts A back in the array. Teacher holds up B and C and asks which is taller.
Group says [while pointing] that C is taller.
Teacher puts B back in the array. Teacher holds up C and D and asks which is taller.
Group says [while pointing] that D is taller.
Teacher puts C back in the array. Teacher holds up D and E and asks which is taller.
Group says [while pointing] that E is taller.
Teacher puts E back in the array. Pointing to the array, and indicating that E is taller than D, C, B, or A, teacher leads group to say that E is "the shortest".

[This activity again indicates the relative or provisional nature of comparisons. A given object is "taller" or "the tallest" only in relation to the objects to which it is being compared. There can always be another that is even taller that must then be considered "the taller".

Activity 4:
In like manner, the teacher may have to teach the children to put the blocks in descending order—"like stairsteps going down". She may build up this ability by having the children note that each block is "shorter" than the one before. This leads to the statement that the last one is "the shortest" (of all in the group).

Teacher has an array of five blocks in descending ("going up") order A, B, C, D, E. In this array, A is the tallest and E is the shortest.
Teacher holds up A and B and asks which is shorter.
Group says [while pointing] that A is shorter.
Teacher puts A back in the array. Teacher holds up B and C and asks which is shorter.
Group says [while pointing] that C is shorter.
Teacher puts B back in the array. Teacher holds up C and D and asks which is shorter.
Group says [while pointing] that D is shorter.
Teacher puts C back in the array. Teacher holds up D and E and asks which is shorter.
Group says [while pointing] that E is shorter.
Teacher puts E back in the array. Pointing to the array, and indicating that E is shorter than D, C, B, or A, teacher leads group to say that E is "the shortest".
[This activity again indicates the relative or provisional nature of comparisons. A given object is "shorter" or "the shortest" only in relation to the objects to which it is being compared. There can always be another that is even taller that must then be considered "the shortest"][1]

Activity 5
As soon as the children actually understand what the terms "the shortest" and "the tallest" actually mean, the children should be asked to state that one block is the "tallest" and another block is "the shortest".

Teacher arranges the blocks in random order of height.
Teacher tells the children that one block is "the tallest" and another block is "the shortest". She leads the group to arrange the blocks in ascending or descending order and then to state, while pointing" that this block is the tallest and this block is "the shortest"

Activity 6
Teacher repeats activity 5 with other objects such as straws, tinkertoy sticks, Lincoln logs, or other similar objects.

Activity 7
Teacher extends activity 2 to children.
Teacher has five children arrange themselves--with or without the teacher's help--in ascending or descending order of height.
She then tells the children that one child is "taller" and another is "shorter".
She leads the children to see, and say, that NAME5 is "taller" and NAME1 is "shorter"

Enrichment 1
In this activity, children are led to talk through the relationship between "taller" and "the tallest"

Teacher has five children sit down in chairs.
She then has the first two children stand up back-to-back.
She asks the children to tell her which is "taller".
The children say that NAME is "taller".
The teacher has those two children stand side by side in ascending--'going up'--order and calls up a third child. She leads the children to compare the third child with as many of the others as are needed to determine where in the line-up the third child belongs.
The teacher then has those three children stand side by side in ascending order and calls up the fourth child. She leads the children to compare the fourth child with as many of the others as are needed to determine where in the line-up the fourth child belongs.
The teacher then has those four children stand side by side in ascending order and calls up the fifth child. She leads the children to compare the fifth child
with as many of the others as are needed to determine where in the line-up the fifth child belongs.

Having done this, the teacher leads the children to see (and say) that the right-most child in the line up is "taller" than each of the other four. Finally, she leads the children to say that the right-most child is "the tallest".

Enrichment 2
In similar fashion, children are led to talk through the relationship between "shorter" and "the shortest".

This time, she arranges the children in descending order.

Enrichment 3
Teacher starts with two children standing side-by-side in ascending order.

Teacher asks each child to explain his/her place: who are you "taller" than? who are you "shorter" than.
T: Nish haa nínítso/daa nínítso?
Child responds that s/he is taller than certain children and shorter than others.
C: NAME dóó NAME biláahdi ánísnééz.
NAME dóó NAME bi'ohdi ánistso.
Teacher adds another child to the lineup and asks him the same questions
T Díí t'áá ałtsxó baa hólne'/bee shíł hólne'. OR
Díí t'áá át'é ádanítsoígí baa hólne'/bee shíł hólne'.
Child responds that s/he is "taller" than certain children and "shorter" than others.
C: NAME éí NAME dóó NAME yiláahdi ánínééz.
NAME éí NAME dóó NAME yi'ohdi ánítso.
Having reached a lineup four or five children, the teacher leads the onlookers to name the child that is the "tallest" and the "shortest".
Gr: NAME t'áá ałtsxó yiláádi ánínééz. NAME t'áá ałtsxó yi'ohdi ánítso.

Enrichment 4
An extension of Enrichment 1 to get contrast 1st and 3rd person postpositions and verb-forms.

Teacher may tell a group of children to lineup side by side by height.
She asks who is the tallest and who is the shortest.
The tallest child (in the lineup) answers that s/he is the tallest.
The other children paraphrase that NAME is the tallest.
The teacher asks who is the shortest.
The shortest child (in the lineup) says that s/he is the shortest.
The other children are lead to paraphrase that NAME is the shortest.
As the teacher adds children to the lineup, the names of the tallest child (in the lineup) will change from time to time. This helps children see the relative or provisional nature of "the tallest" or "the shortest". It’s always only in comparison to the group with which it is being compared. There can always be someone even taller or shorter.

Pre Test
   Here we go back to objects such as blocks to prepare the children for the test.
   Child is given five blocks arranged in random order of height. Child is told that one is "the tallest" and one "the shortest".
   Child is asked to tell the teacher about the blocks.
   Child arranges the blocks in ascending or descending order—it doesn't matter which—and states, while pointing, that this one is "the tallest" and this one is "the shortest".
   Have each child do so in turn. Move through the group briskly. If a child has trouble, go on to the next and let that child watch. Come back to that child again next, and again at the end.
   If everybody can do this, they have, in effect, passed the test. If some cannot, the teacher needs to work some more with them before re-testing them.

Situations:
   While we can talk about the ‘shortest’ and the ‘tallest’ child in a group, we should not do so in ways that embarrass some children.

There are other places where it may be possible to talk about the "tallest" or "the shortest".
   Nature walk: comparing sticks, plants, shadows, trees, flowers.
   Classroom: blocks, rods, pencils, rulers, crayons.
   Cafeteria: celery, carrots, "ants-on-a-log", bananas, snacks.

Notes:
   This distinction is important for the acquisition of number-sense because there is a tendency for greater amounts to be taller than lesser amounts.

   Note that, in Navajo, we can also talk about horizontal extension: what in English would be translated as "longest" and "shortest".

* * * *
MATH: Comparison -3

M-X1 identifies the smaller or larger of two things.

Purpose
This extends the activity of comparing from vertical tall-short (up-and-down) to large-small (size or bulk or mass). The test is given in a way that is likely to help the child 'see' the relationship between seriation—arranging objects in ascending or descending order—and statements about "the smaller" and "the larger" of two objects.

Objective
Given two different-sized balls side by side, told that one is "larger" and one "smaller", and asked to tell about the objects, the child will point to each ball in turn while stating correctly which is "larger" and which is "smaller" [in either order].

Having the balls changed from hand to hand, told that one is "larger" and one "smaller", and asked to tell about the objects, the child will point to each ball in turn while stating correctly which is "larger" and which is "smaller" [in either order].

Test Format
Teacher has two different sized balls—or any other relatively small bulky objects. If objects other than balls are used, teacher should try to be sure that they are the same shape. We do not want the child to confuse shape with size.

Teacher places the two balls side-by-side in front of the child.

Without pointing or telling which is which, the teacher tells the child that one is "larger" and one is "smaller". [This, in effect, gives the child the words "larger" and "smaller" s/he will be expected to use.]

Teacher asks the child to tell her about the two balls.

Child says, while pointing, that this one is larger and this one is smaller. [The child may respond in either order as long as s/he is correctly describing the ball s/he is pointing to.]

Teacher (or the child) exchanges the balls from one hand to the other.

Teacher places the two balls side-by-side in front of the child.

Without pointing or telling which is which, the teacher tells the child that one is "larger" and one is "smaller". [This, in effect, gives the child the words "larger" and "smaller" s/he will be expected to use.]
Teacher asks the child to tell her about the two balls.
Child says, while pointing, that this one is larger and this one is smaller.
[The child may respond in either order as long as s/he is correctly describing the ball s/he is pointing to.]

[Testing in this way makes it more likely that the child will come to realize that if one of two objects is "larger", the other must be "smaller"--or vice versa. If the child can account for "smaller" and "larger" in two different arrays, we assume that the child knows what s/he is saying. It doesn't matter what order the child names the two balls.]

Criteria
Child will correctly describe both times the two balls as "larger" and "smaller" [in either order] while pointing to the ball s/he is describing.

Language

GIVES TWO BALLS TO THE CHILD
T: SAYS THAT ONE IS LARGER AND ONE IS SMALLER.
T: Ła' alááh áníltsxo; ła' ach'į́' áníltso.
T: SAYS ASK CHILD TO TELL HER ABOUT THE BALLS.
T: T'áá álah baa hólne'/ bee shii hólne'.
C: (INDICATING) SAYS WHICH IS LARGER AND WHICH IS SMALLER.
C: Diićígii alááh áníltsxo dóó diićígii ach'į́' áníltso.

EXCHANGES THE BALLS IN THE CHILD'S HANDS (OR HAS CHILD DO SO)
T: SAYS AGAIN THAT ONE IS LARGER AND ONE IS SMALLER.
T: Ła' alááh áníltsxo; ła' ach'į́' áníltso.
T: AGAIN ASKS CHILD TO TELL HER ABOUT THE BALLS.
T: T'áá álah baa hólne'/ bee shii hólne'.
C: (INDICATING) SAYS WHICH IS LARGER AND WHICH IS SMALLER.
C: Diićígii alááh áníltsxo dóó diićígii ach'į́' áníltso.

MAY PROVIDE PROMPT IF CHILD DOES NOT RESPOND
T: Haiídígísh alááh áníltsxo? Haiídígísh ach'į́' áníltso?
C: (INDICATING) SAYS WHICH IS LARGER AND WHICH IS SMALLER.
C: Diićígii alááh áníltsxo dóó diićígii ach'į́' áníltso.

Language Notes:
In Navajo as in English, tall/long is used to describe extension in one dimension, large/small is used to describe extension in two or three dimensions: size, bulk, mass.
The notion "larger" and "smaller" is carried by the verb stem -tso, usually glossed as 'big' or 'large'. While the notion of 'larger' is carried by the phrase alááh áníltso perhaps something like 'to exceed large', 'to be beyond large', to be
'more large', the notion of 'smaller' appears to be carried by the phrase ach'jí ánítso perhaps 'less than large', 'less large', 'to fail to reach large'. You may want to check to see if this seems natural to you and what is usually said in the community in which you work.

The stems tend to correspond with Navajo handling verb stems: -neeł tends to be used for both slender rigid objects and slender flexible objects; -tsó tends to be used with small bulky objects.

**Instruction:**
**Activity 1:**
At the outset, the teacher may ask which (of a pair) of similar-shape but different-size objects is larger or which is smaller. She might start with more-or-less cube-shaped blocks.

Teacher shows two objects side by side.
Teacher asks which is larger?
Group says [while pointing] that a given one is larger.

Teacher asks the same question of individuals.

Teacher shows two objects side by side.
Teacher asks which is smaller?
Group says [while pointing] that a given one is larger.

Teacher asks the same question of individuals.

**Activity 2:**
But fairly early the teacher asks the child to pair the two statements. She may have to 'set the stage' by saying that one (without pointing) is larger and one (without pointing) is smaller.

Teacher shows two objects side by side.
Teacher says (without pointing) that one is smaller and one is larger.
Teacher asks to be told about the two objects.
Group says [while pointing] that one is larger and the other smaller.

Teacher asks the same question of individuals.
[Teacher should take care that the "larger" object is not always on the same side, thereby giving away the answer.]

**Activity 3**
Teacher repeats activity 2 with other objects that are similar in shape but different in size such as" cube-shaped blocks, balls, boxes, toy cars/trucks, action figures, or dolls. She should try to find pairs of objects that differ only or mainly in size.
Activity 4

Teacher may have child or children sort small objects into two sets: buttons, marbles, jacks, paperclips, thumbtacks, etc. To do this, you need a set of objects that come in only two different sizes: "larger" and "smaller". You might have two bowls to put the objects in. As child puts object in bowl, s/he says either "smaller" or "larger".

Enrichment 1

If teacher can make up a set of three or four objects that differ only or mainly in size, she may want to start preparing children to talk about arranging a series of objects in ascending or descending order of size. For example: a jacks ball, a golf ball, a tennis ball, a softball, and a basketball. Or four apples or oranges of different sizes. Or four cardboard boxes of different sizes.

Teacher shows any two objects and asks the children to compare them. Children tell her which is "larger" and which is "smaller".

On the basis of this, teacher puts the two objects in ascending order: small to large.

Teacher brings out a third object.

Teacher asks children to compare it with the other two objects, one pair at a time: 3 with 1 and 3 with 2.

Children tell her which—in each pair—is "larger" and which is "smaller".

On the basis of this, the teacher puts the third object where it belongs in ascending order.

Teacher brings out a fourth object.

Teacher asks children to compare it with the other three objects, one at a time: 4 with 1, 4 with 2, and 4 with 3.

Children tell her which—in each pair—is "larger and which is "smaller".

On the basis of this, the teacher puts the fourth object where it belongs in ascending order.

[Four objects is about as many as the children can handle because there are three possible pairs to compare. You may have to start with three objects.]

Enrichment 2

While it is possible to compare children in size, it may not be good to do so; it's hard to separate "tall", "chubby" and "large". And the children may start teasing. One way of getting children to use these verb-stems with 1st and 3rd person is to have them compare themselves with animals in size. This requires some imagination. Teacher may have to show, or have the children show, the size of the animal.

Teacher has a child stand.

She names an animal.

Children show how large that animal might be.

Teacher asks the child to tell her about the child in relation to the animal.
The child does so, saying I'm smaller/larger than ANIMAL
T: ANIMAL biláah anístso. OR ANIMAL bich'įį' ánístso.
Child responds that s/he is smaller/larger than the animal named.
C: ANIMAL biláah anístso. OR ANIMAL bich'įį' ánístso.

Teacher leads the group to paraphrase the child's statement.
T: NAME ANIMAL yich'įį' ánístso. OR NAME ANIMAL yilaah ánístso.

Enrichment 3
If you think children can handle it, you may have children do the more difficult task of comparing the animal to themselves--from the animal's point of view
Teacher has a child stand.
She names an animal.
Children show how large that animal might be.
Teacher asks the child to tell her about the animal in relation to the child.
The child does so, saying ANIMAL is smaller/larger than me.
T: ANIMAL shiláah ánístso. OR ANIMAL shich'įį' ánístso.
Child responds that s/he is smaller/larger than the animal named.
C: ANIMAL shiláah ánístso. OR ANIMAL shich'įį' ánístso.

Teacher leads the group to paraphrase the child's statement.
T: ANIMAL NAME yich'įį' ánístso. OR ANIMAL NAME yilaah ánístso.

[This gives children meaningful practice on the S-O-V from of Navajo sentences in comparison to the S-V-O form of English sentences.]

Pre Test
Here we go back to the two balls to get the children ready for the test.
Child is given two balls, told that one is smaller and one is larger, and asked to tell about the balls, the child holds them in either hand and indicates that one is "smaller" and the other is "larger" [in either order].
Have each child do so in turn. Move through the group briskly. If a child has trouble, go on to the next and let that child watch. Come back to that child again at the end.
If everybody can do this, they have, in effect, passed the test. If some cannot, the teacher needs to work some more with them before re-testing them.
MATH: Comparison - 4

M-X2 Identifies the smallest or largest object in a group.

Purpose
This extends the activity of comparing: of seeing and holding three or more things in one's mind and stating which one is the 'most' and which one is the 'least' in terms of a given attribute: in this case size or bulk or mass. The test is given in a way that is likely to help the child 'see' the relationship between seriation--arranging objects in ascending or descending order--and statements about "the largest" and "the smallest".

Objective
Shown a group of four relatively cubical blocks laid out in random order, told that one is "the smallest" and one is "the largest", and asked to tell the teacher about the blocks, the child will arrange the blocks in ascending or descending order of size (it doesn't matter which) and state, while pointing, which is the "smallest" and which the "largest" (in either order).

Test Format
The teacher has a set of four or more blocks--or any other relatively small bulky objects. These should be more-or-less cube shaped: each "larger" object should be larger in all three dimensions. [Balls, being spheres, are "larger" in all three dimensions but may tend to roll around.]

The teacher presents the blocks to the child in a line in random order.
The teacher tells the child (without pointing to the specific blocks) that one block is "the largest" and one is "the smallest".
The teacher asks the child to tell her (the teacher) about the blocks.
The child arranges the blocks in either ascending or descending order of size--it doesn't matter which.
The child, while pointing at the blocks in question, says which one is "the smallest" and which one is "the largest" (in either order).

Criteria
The child correctly arranges all the blocks in either ascending or descending order.
The child states correctly, while pointing, that this one is "the smallest" and this one is "the largest".

Language
T LINES UP FOUR OR MORE BLOCKS IN RANDOM ORDER.
T TELLS CHILD< WITHOUT POINTING TO SPECIFIC BLOCKS THAT ONE IS "THE LARGEST" AND ONE IS "THE SMALLEST".
T: Dii' la' aláahdi ánítsxo, la' a'ohdi ánítso.
T ASKS CHILD TO TELL HER ABOUT THE BLOCKS.
T: Ła' baa hólne'/ bee šii hólne'.
C: SAYS (WHILE POINTING) WHICH IS "THE LARGEST" AND WHICH IS "THE SMALLEST".
C: Díidiígilí aláahdi áníłtsxo; díidiígilí a'ohdi áníłtsso.

T: MAY PROVIDE PROMPT IF CHILD DOES NOT RESPOND
T: Haiidigíish aláahdi áníłtsxo? Haiidigíísh a'ohdi áníłtsso?
C: (POINTING) SAYS WHICH IS LARGEST AND WHICH IS SMALLEST
C: Díidiígilí aláahdi áníłtsxo. OR Díidiígilí a'ohdi áníłtsso.

**Instruction:**

**Activity 1:**
Teacher should build up the idea of "the largest" by showing that "the largest" means that that object is larger than each of the other objects in the array. One way of doing this is given below.

Teacher leads the children to see and say that the largest of the blocks with each of the smaller blocks, and saying that it is "larger". Only after having compared the largest block with each of the other blocks one-on-one does the teacher lead the children to say that that block is "the largest" (of all the blocks in the array).

Teacher has an array of four more or less cube-like blocks in ascending--'going up'--order A, B, C, D.
Teacher holds up C and D and asks which is "larger".
Group says [while pointing] that D is "larger".
Teacher puts down C; she holds up B and D and asks which is "larger".
Group says [while pointing] that D is "larger".
Teacher puts down B; she holds up A and D and asks which is "large".
Group says [while pointing] that D is "larger".
Teacher puts down A (L) and D (R).
Teacher, pointing to the array, and indicating that D is larger than C, B, or A, leads group to say that D is "the largest".

[We need some such demonstration to show what "the largest" actually means. Otherwise, some children may assume that it simply means 'the one at the (right) end' or something like that.

**Activity 2:**
Teacher should build up the idea of "the smallest" in much the same way, showing that "the smallest" means that that object is smaller than each of the other objects in the array.

Teacher has an array of four blocks again in ascending--'going down'--order A, B, C, D:
Teacher holds up A and B and asks which is "smaller".
Group says [while pointing] that A is "smaller".
Teacher puts down B; she holds up A and C and asks which is "smaller".
Group says [while pointing] that A is "smaller".
Teacher puts down C; she holds up A and D and asks which is "smaller".
Group says [while pointing] that A is "smaller".
Teacher puts down A (L) and D (R)
Teacher, pointing to the array, and indicating that A is "smaller" than B, C, or D, the teacher leads group to say that A is "the smallest".

[As with "the largest", we need some such demonstration to show what "the smallest" actually means. Otherwise, some children may assume that it simply means 'the one at the (left/other) end' or something like that.]

Activity 3:
The teacher may have to teach the children to put the blocks in ascending order--'going up' in size, with each block larger than the one before it. She may build up this ability by having the children note that each block is "larger" than the one before. This leads to the statement that the last one is "the largest" (of all in the group).

Teacher has a set of four blocks in an array in ascending order: each block is larger than the last. A, B, C, D. In this array, A is the smallest and D is the largest.
Teacher holds up A and B and asks which is "larger".
Group says [while pointing] that B is "larger".
Teacher puts A back in the array. Teacher holds up B and C and asks which is "larger".
Group says [while pointing] that C is "larger".
Teacher puts B back in the array. Teacher holds up C and D and asks which is "larger".
Group says [while pointing] that D is "larger".
Teacher puts D back in the array. Pointing to the array, and indicating that D is "larger" than C, B, or A, teacher leads group to say that E is "the largest".

[This activity again indicates the relative or provisional nature of comparisons. A given object is "larger" or "the largest" only in relation to the objects to which it is being compared. There can always be another that is even larger that must then be considered "the largest".

[Without really talking about this, by putting the blocks in order according to size, we lead the children to see that if B is larger than A and C is larger than B, then C is also larger than A. Etc.]

Activity 4:
In like manner, the teacher may have to teach the children to put the blocks in descending order--'like stairsteps going down'. She may build up this ability by
having the children note that each block is "smaller" than the one before. This leads to the statement that the last one is "the smallest" (of all in the group).

Teacher has an array of four blocks in descending ('going up') order A, B, C, D. In this array, A is the largest and D is the smallest. Teacher holds up A and B and asks which is "smaller". Group says [while pointing] that B is "smaller". Teacher puts A back in the array. Teacher holds up B and C and asks which is "smaller". Group says [while pointing] that C is "smaller". Teacher puts B back in the array. Teacher holds up C and D and asks which is "smaller". Group says [while pointing] that D is "smaller". Teacher puts E back in the array. Pointing to the array, and indicating that D is smaller than C, B, or A, teacher leads group to say that D is "the smallest".

[This activity again indicates the relative or provisional nature of comparisons. A given object is "smaller" or "the smallest" only in relation to the objects to which it is being compared. There can always be another that is even larger that must then be considered "the smallest".]

[Without really talking about this, by putting the blocks in order according to size, we lead the children to see that if B is smaller than A and C is smaller than B, then C is also smaller than A. Etc.]

Activity 5

As soon as the children actually understand what the terms "the smallest" and "the largest" actually mean, the children should be asked to state that one block is the "largest" and another block is "the smallest".

Teacher arranges the blocks in random order of height. Teacher tells the children that one block is "the largest" and another block is "the smallest". She leads the group to arrange the blocks in ascending or descending order and then to state, while pointing" that this block is the largest and this block is "the smallest".

Activity 6

Teacher repeats activity 5 with other objects such as balls, boxes, cups, glasses. As much as possible, the sets of objects should be as similar in all attributes except in size.

Enrichment 1

If the center has a set of attribute blocks, these can be used to help children see that the same set of objects can be classified according to different attributes.
If the center does not have a set, teachers can make a simplified set out of colored paper. For greater durability, these can be pasted on heavy cardboard.

You need
three shapes: say circle, square, and triangle: Cr, Sq, Tr
three sizes: say red, blue, yellow: Rd, Bl, Ye
three sizes: small, medium, large (i.e., medium triangles would be the same general size as medium squares and circles) Sm, Md, Lg

This gives a set of 27 pieces, as shown below, using the abbreviations above:
circles: SmRdCr, SmBlCr, SmYeCr; MdRdCr, MdBlCr, MdYeCr;
         LgRdCr, LgBlCr, LgYeCr;
squares: SmRdSq, SmBlSq, SmYeSq; MdRdSq, MdBlSq, MdYeSq;
         LgRdSq, LgBlSq, LgYeSq;
triangles: SmRdTr, SmBlTr, SmYeTr; MdRdTr, MdBlTr, MdYeTr;
           LgRdTr, LgBlTr, LgYeTr.

Laying out three circles made of string on the floor, the teacher can lead the children to sort the 27 pieces by shape, color, or size.

The teacher puts one piece into each circle according to how she wants the pieces classified. She can have each child in turn take a piece from the pile and put it in the right circle. The group tells the child that they "agree" or "don't agree" with his/her placement.

If you have an attribute set kit, the teacher's guide will show many other "games" you can use which children perceive as "games" but which also teach set logic.

**Situations:**

While we can talk about the 'smallest' and the 'largest' child in a group, we probably not do so because it is hard to separate out tall-short, chubby-skinny, and large-small, and the comparisons may be embarrassing.

There may be a few other places where it may be possible to talk about the "largest" or "the smallest". This requires situations where there are three or more of the same thing that differ only or mainly in size.

Nature walk:
Classroom:
Cafeteria:

**Notes:**

This distinction is important for the acquisition of number-sense because there is a tendency for the "smallest" and "largest" objects, when measured, to involve the "smallest" and "largest" numbers.

* * * *
MATH: Comparison - 5 [optional]

M-X3 Identifies the shorter or longer of two things.

Purpose

This introduces the activity of comparing: of putting two things together in one's mind and describing how they differ in a given attribute: in this case (sideways, across) length. The test is given in a way that is likely to help the child 'see' the relationship between the two terms: if one is longer then the other must be shorter.

This objective is optional. It is intended to try to be sure that the children come to use alááh ánínéez and a'oh ánítso for both vertical height and horizontal length. It also gives an opportunity to show that the terms deal with items that are classified as slender flexible (-lé) and slender rigid (-tijh) objects.

Objective

Shown two strings of different lengths laid out horizontally with the left ends aligned for comparison, told that one is "longer" and one is "shorter", and asked to tell the teacher about the strings, the child states while pointing that a given string is "longer" and the other "shorter".

Similarly, shown two sticks [or other long, slender, rigid objects] of different lengths laid out horizontally with the left ends aligned for comparison, told that one is "longer" and one is "shorter", and asked to tell the teacher about the sticks, the child states while pointing that a given string is "longer" and the other "shorter".

[The sticks should be laid out in different order than the strings were.]

Language

T LAYS OUT TWO PIECES OF STRING OF DIFFERENT LENGTHS HORIZONTALLY SO THAT THEIR LEFT ENDS ARE ALIGNED.
T TELLS THE CHILD, WITHOUT POINTING, THAT ONE IS "LONGER" AND ONE IS "SHORTER".
T: Díí ła' alááh ánínéez, ła' a'oh ánítso.
T: ASKS CHILD TO TELL HER ABOUT THE STRINGS.
T: T'áá álah baa háólé'/ bee shílí háólé'.

T MAY PROVIDE PROMPT IF CHILD DOES NOT RESPOND
T: Háidiigíish alááh ánínéez? Háidiigíish a'oh ánítso?
C (POINTING) SAYS ONE IS LONGER AND ONE IS SHORTER.
C: Díidiígíí alááh ánínéez; díidiígíí éí a'oh ánítso.
Lays out two sticks of different lengths horizontally so that their left ends are aligned.

Tells the child, without pointing, that one is "longer" and one is "shorter".

Di: la’ aláah ánílnéez, la’ a’oh ánítso.

Asks child to tell her about the sticks.

T: T’áá álal baa hólne’/ bée shił hólne’.

May provide prompt if child does not respond

T: Háiidiíísh aláah ánín néez? Háiidiíísh a’oh ánítso?
C: (pointing) Says one is longer and one is shorter.

Diidiííí aláah ánín néez; diidiííí éí a’oh ánítso.

Test Format

The teacher two pieces of string [or other long slender flexible objects] of different lengths. They should be the same color and texture and shape if at all possible [i.e., the child should concentrate on the attribute of length without being distracted by other attributes.] The objects should be laid out horizontally. They should be arranged so that the left ends are aligned.

Without actually pointing to the longer or shorter string, the teacher says that one is longer and the other shorter.

Pointing generally to the strings, she asks the child to tell her about them.

Pointing to or touching the strings in turn, the child indicates that a given string is longer and the other string is shorter.

The teacher replaces the pieces of string with two sticks [or other long slender rigid objects] of different heights. They should be the same color and texture and shape if at all possible [i.e., the child should concentrate on the attribute of length without being distracted by other attributes.] The objects should be laid out horizontally. They should be arranged so that the left ends are aligned. The teacher arranges them in the opposite order she did the pieces of string. i.e., if the "shorter" piece of string is further away from the child, then the "shorter" stick should be closer to the child.

Without actually pointing to the longer or shorter stick, the teacher says that one is longer and the other shorter.

Pointing generally to the sticks, she asks the child to tell her about them.

Pointing to or touching the sticks in turn, the child indicates that a given stick is longer and the other stick is shorter.

Teacher should try to avoid 'giving away the answers' by the way she points or asks the questions.

If objects are of relatively similar lengths, it may help to align them at the left ends, either at the edge of a table/desk or along some imaginary vertical line. We align the left ends only because this may help develop the left-to-right
convention of reading/writing. With objects that are very dis-similar lengths—such as a ruler and a yardstick—this may not be necessary.

Criterion
Child will answer the four questions correctly by pointing to or touching the correct blocks and stating that a given is "taller" and the other "shorter".

Language Notes:
It would appear that, for many, the notion "longer" is carried by the verb stem -neež, usually glossed as either 'long' or 'tall'. But the notion of shorter is carried by the verb stem -tsö, usually glossed as 'large'. You may want to check to see if this seems natural to you and what is usually said in the community in which you work.

Notice that Navajo is more explicit than English about comparison. To be "taller" means literally to extend beyond the referenced object in length; to be "shorter" means literally to fail to extend to the referenced object in length.

While English seems to make a distinction between vertical extension (tall - short) and horizontal extension (long - short), Navajo does not. If this is so, it may be possible to compare both "tall" objects and "long" objects. Note that English is not absolutely consistent: hair is 'long' even though this would seem to involve vertical extension.

Instruction:
Activity 1:
At the outset, the teacher may ask which of two pieces of string is "longer".

Teacher shows two pieces of string laid out horizontally with left ends aligned.
Teacher asks which is "longer"?
Group says [while pointing] that a given one is "longer".
Teacher reverses the order of the two pieces of string and asks which is "longer"?
Group says [while pointing] that a given one is "longer".

Teacher asks the same question of individuals.

Activity 2:
At the outset, the teacher may ask which of two sticks is "shorter".

Teacher shows two objects laid out horizontally with left ends aligned.
Teacher asks which is "shorter"?
Group says [while pointing] that a given one is "shorter".
Teacher reverses the order of the two pieces of string, and asks which is "shorter"? 
Group says [while pointing] that a given one is "shorter". 
Teacher asks the same question of individuals. 

Activity 3: 
But fairly early the teacher asks the child to pair the two statements. 
She may have to 'set the stage' by saying that one (without pointing) is "longer" and one (without pointing) is "shorter". 

Teacher shows two long slender flexible objects* laid out horizontally with their left ends aligned. 
Teacher says (without pointing) that one is "longer" and one is "shorter". 
Teacher asks to be told about the two objects. 
Group says [while pointing] that one is "longer" and the other "shorter". 
Teacher reverses the order of the two objects and again asks the group to tell her about the two objects. 
Group says [while pointing] that one is "longer" and the other "shorter". 
Teacher asks the same question of individuals. 

* Teacher should use a variety of slender flexible objects such as pieces of string, pieces of rope, shoestrings, strings of beads, belts... 

Activity 4: 
Here we do the same with long, slender, rigid objects. 

Teacher shows two long slender rigid objects* laid out horizontally with their left ends aligned. 
Teacher says (without pointing) that one is longer and one is shorter. 
Teacher asks to be told about the two objects. 
Group says [while pointing] that one is longer and the other shorter. 
Teacher reverses the order of the two objects and again asks to be told about the two objects. 
Group says [while pointing] that one is longer and the other shorter. 
Teacher asks the same question of individuals. 

* Teacher should use a variety of slender rigid objects such as sticks, rulers (6" ruler, 12" ruler, yardstick), pencils, crayons, paintbrushes... 

Enrichment 
While we will not assess children's ability to do so, it is good practice to lead children to arrange three-to-five objects in ascending or descending orders of length. Children can be led to 'talk-through' such arrangements in a number of ways. One way is to look a group of five only two at a time.
E.g. in descending order (i.e. longest at the top, shortest at the bottom):
A and B: A is "longer"
B and C: B is "longer"
C and D: C is "longer"...

Or, in ascending order (i.e., shortest at the top; longest at the bottom):
A and B: A is "shorter"
B and C: B is "shorter"
C and D: C is "shorter"...

This leads to what is called 'seriation': the ability to organize a set of objects in a series, with each object 'more' than the last. It also prepares them for talking about "the shortest" and "the tallest" in MX-4

Pre Test
Here we go back to the pieces of string and the sticks to get the children ready for the test.

Child is given two pieces of string, told that one is shorter and one is taller, and asked to tell about the pieces of string. The child aligns the pieces of string so that the left ends are aligned, and states (while pointing) that one is "longer" and the other is "shorter" [in either order].

Have each child do so in turn. Move through the group briskly. If a child has trouble, go on to the next and let that child watch. Come back to that child again at the end.

If everybody can do this, they have, in effect, passed the test. If some cannot, the teacher needs to work some more with them before re-testing them.

Child is given two sticks, told that one is shorter and one is taller, and asked to tell about the sticks. The child aligns the sticks so that the left ends are aligned, and states (while pointing) that one is "longer" and the other is "shorter" [in either order].

Have each child do so in turn. Move through the group briskly. If a child has trouble, go on to the next and let that child watch. Come back to that child again at the end.

If everybody can do this, they have, in effect, passed the test. If some cannot, the teacher needs to work some more with them before re-testing them.

Situations:
We can compare the length of objects in a number of situations.

indoor play: strings of beads,
tinkertoys sticks, Lincoln logs [horizontally]
outdoor: jump rope, rope for tug-of-war
clothing: belts, shoestrings, shoes
food: pieces of celery, carrots, ádistsiin, spaghetti, [horizontally]
culture: yarn, haiitie-tsiitl'óól, ii' sinil, bé'ézhóó', bee na'atl'o'í
Notes:
This distinction is important for the acquisition of number-sense because there is a tendency for longer objects, when measured, to involve larger numbers.

We want children to become aware--without really talking about it--of the reciprocal nature of two-way distinctions: if one object is + then the other object must be -. Here, if one member of a pair is "longer", the other must be "shorter". And vice versa.

We also want children to become aware--without really talking about it--of the relative nature of such statements: that B may be "longer" than C but shorter than A.

* * * *
MATH: Comparison - 6 [optional]

M-X4 Identifies the shortest or longest in a group.

Purpose
This extends the activity of comparing: of seeing and holding three or more things in one's mind and stating which one is the 'most' and which one is the 'least' in terms of a given attribute: in this case sideways length. The test is given in a way that is likely to help the child 'see' the relationship between seriation--arranging objects in ascending or descending order--and statements about "the tallest" and "the shortest".

This objective like M-X3 is optional because it may not be necessary to differentiate between 'neeze' as 'height' and 'length'.

Objective
Shown a group of three to four sticks arranged in random order of length, told that one is "the shortest" and another is "the longest", and asked to tell the teacher about the sticks, the child will arrange the sticks in ascending or descending order of length, and state correctly that a given block is "the shortest" and another given block is "the longest" [in either order].

Test Format
The teacher has four sticks [or other 'long' objects] of different lengths. If at all possible, they should be the same color and texture and shape. [i.e., the child should concentrate on the attribute of length without being distracted by other attributes.]
Teacher lays out the sticks horizontally but in random order. [i.e., they should not be in order according to either shortness or length.
Without actually pointing to any one stick, the teacher tells the children that one block is "the shortest" and another is "the longest".
Pointing generally to the sticks, she asks the child to tell her about them. The child arranges* the sticks so that the left ends are aligned and the right ends are in stair-step order, short to long. Pointing to the shortest stick, the child states that it is "the shortest"; pointing to the longest stick, the child states that it is "the longest".
INSTRUCTIONAL NAVAJO

Language

T POINTS TO THE ARRAY OF FOUR BLOCKS ARRANGED HORIZONTALLY
BUT IN ANY RANDOM ORDER OF LENGTH
T STATES (WITHOUT POINTING TO ANY GIVEN STICK) THAT ONE
BLOCK IS "THE LONGEST" AND ANOTHER BLOCK IS "THE
SHORTEST".
T: Díí la' áláahdi ánínéez, ła' éí a'ohdi ánítso.
T TELLS CHILD TO TELL HER (ABOUT THE SHORTEST/LONGEST)
T: K'ad baa hólne'/ bée shìb hólne'.
C SAYS WHILE POINTING THAT THIS ONE IS "THE LONGEST" AND THIS
ONE IS "THE SHORTEST"
C: Dìidigíí aláahdi ánínéez, diidigíí a'ohdi ánítso.

T MAY PROVIDE PROMPTS IF CHILD DOES NOT RESPOND
T ASKS WHICH ONE IS THE LONGEST?
T: Haiidigíísh aláahdi ánínéez?
C: SAYS WHILE POINTING THAT THIS ONE IS "THE LONGEST"
C: Dìidigíí aláahdi ánínéez.
T ASKS WHICH ONE IS "THE SHORTEST"?
T: Haiidigíísh a'ohdi ánítso?
C: SAYS WHILE POINTING THAT THIS ONE IS "THE LONGEST"
C: Dìidigíí a'ohdi ánítso.

Instruction:
Teacher should build up the idea of "the longest" by showing that "the
longest" means that that object is longer than each of the other objects in the
array. One way of doing this is given below.
Teacher leads the children to see and say that the longest of the blocks
with each of the shorter blocks, and saying that it is "longer". Only after having
compared the longest block with each of the other blocks one-on-one does the
teacher lead the children to say that that block is "the longest" (of all the blocks
in the array).
Activity 1:
Teacher has an array of four blocks A, B, C, D with the shortest stick (A) at the top and the longest stick (D) at the bottom.
Sticks are laid out so that the left ends are aligned.
Teacher holds up A and B and asks which is "longer".
Group says [while pointing] that B is "longer".
Teacher replaces A; teacher holds up B and C and asks which is "longer".
Group says [while pointing] that C is "longer".
Teacher replaces B; teacher holds up C and D and asks which is "longer".
Group says [while pointing] that D is "longer".
Teacher replaces C. Holding up D, and indicating that D is longer than C, B, or A, teacher leads group to say that D is "the longest".

[We need some such demonstration to show what "the longest" actually means. I.e., "longer" any of the others (in that group). Otherwise, some children may assume that it simply means 'the one at the bottom' or something like that.]

Activity 2:
Teacher should build up the idea of "the shortest" in much the same way, showing that "the shortest" means that that object is shorter than each of the other objects in the array.

Teacher has an array of four blocks A, B, C, D with the longest stick (A) at the top and the shortest stick (D) at the bottom.
Sticks are laid out so that the left ends are aligned.
Teacher holds up A and B and asks which is "shorter".
Group says [while pointing] that B is "shorter".
Teacher replaces A; teacher holds up B and C and asks which is "shorter".
Group says [while pointing] that C is "shorter".
Teacher replaces B; teacher holds up C and D and asks which is "shorter".
Group says [while pointing] that D is "shorter".
Teacher replaces C. Holding up D, and indicating that D is longer than C, B, or A, teacher leads group to say that D is "shorter".

[As with "the longest", we need some such demonstration to show what "the shortest" actually means. I.e., "shorter" than any of the others (in that group)].

Activity 3:
Here, the teacher may have to teach the children to put the blocks in order--shortest on the top and longest on the bottom. She may build up this ability by having the children note that each block is "longer" than the one before. This leads to the statement that the last one is "the longest" (of all in the group).

Teacher has an array of four blocks in a pile. We think of these blocks as A shortest, B, C, and D longest.
Teacher holds up A and B and asks which is "longer".
Group says [while pointing] that B is "longer".
Teacher puts A and B into the array: shorter on top and longer on bottom.
Teacher holds up B and C and asks which is "longer".
Group says [while pointing] that C is "longer".
Teacher puts B and C back in the array. Teacher holds up C and D and asks which is "longer".
Group says [while pointing] that D is "longer".
Pointing to the array, and indicating that D is longer than C, B, or A, teacher leads group to say that E is "the longest".

[This activity again indicates the relative or provisional nature of comparisons. A given object is "longer" or "the longest" only in relation to the objects to which it is being compared. There can always be another that is even longer that must then be considered "the longest".]

Activity 4:
In like manner, the teacher may have to teach the children to put the blocks in the opposite order: "the longest" on the top and "the shortest" on the bottom. She may build up this ability by having the children note that each block is "shorter" than the one before. This leads to the statement that the last one is "the shortest" (of all in the group).

Teacher has four sticks in a pile. Here, we think of the sticks A longest, B, C, D shortest.
Teacher holds up A and B and asks which is shorter.
Group says [while pointing] that B is "shorter".
Teacher puts A back in the array. Teacher holds up B and C and asks which is "shorter".
Group says [while pointing] that C is "shorter"
Teacher puts B back in the array. Teacher holds up C and D and asks which is "shorter".
Group says [while pointing] that D is "shorter".
Teacher puts C and D into the array. Pointing to the array, and indicating that D is shorter than C, B, or A, teacher leads group to say that D is "the shortest" (of all in that group).

[This activity again indicates the relative or provisional nature of comparisons. A given object is "shorter" or "the shortest" only in relation to the objects to which it is being compared. There can always be another that is even taller that must then be considered "the shortest".]

Pre Test -
As soon as the children actually understand what the terms "the shortest" and "the tallest" actually mean, the children should be asked to state that one stick is the "tallest" and another stick is "the shortest".
Teacher arranges the sticks in random order of length.
Teacher tells the children that one stick is "the shortest" and another stick is "the longest". She leads the group to arrange the sticks in ascending or descending order and then to state, while pointing" that this block is "the shortest" and this block is "the longest".
Teacher should move briskly giving each child a turn. If a child doesn't get it right, go on, test him/her again after the next child, and again at the end. If some children don't get it, the teacher may have to work with them some more before re-testing them.

**Situations:**
There are other places where it may be possible to talk about the "longest" or "the shortest" but these are limited because of the need to compare three or more.

- **indoor play:** strings of beads,
  tinkertoy sticks, Lincoln logs [horizontally]
- **outdoor:** jump rope, rope for tug-of-war
- **clothing:** belts, shoestrings, shoes
- **food:** pieces of celery, carrots, ádistsiin, spaghetti, [horizontally]
- **culture:** yarn, hairtie-tsiitl'óól, i'i' sinil, bê'ézhóó', bee na'atl'ó'i

**Notes:**
This distinction is important for the acquisition of number-sense because there is a tendency for longer objects, when measured, to involve greater numbers.

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