

Counting and Cardinality

Presented by the
Center for Literacy and Disability Studies
University of North Carolina at Chapel Hill



DYNAMIC
LEARNING MAPS

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COUNTING AND CARDINALITY AGENDA

		Content	Activity
Section 1	Introduction 2-3 minutes	Review of Learning Objectives and handouts.	
Section 2	Overview of Counting and Cardinality and the Research Around Human Learning of These Skills 27 minutes	Introduction to counting and cardinality as it relates to the Common Core and information about how the brain learns mathematics.	Activity 1: Participants will order the trajectories of human learning around counting and cardinality for the typical child as outlined in the activity.
Section 3	Making Connections to the Classroom 22 minutes	Application for instruction of counting and cardinality for students with significant cognitive disabilities.	Activity 2: Participants will develop /share their own research based classroom activates that can be used to teach the skills of counting and cardinality as outlined in the activity.
Section 4	Example Lesson and Application 4 minutes	Watch a teacher teaching the skills of counting and cardinality to a student with a significant cognitive disability.	
Section 5	Wrap-up 3-4 minutes	Closing information	Dismissal



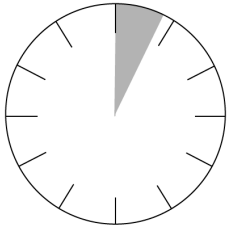
This guide describes the workshop preparation, flow, video segment and 2 different learning activities. Facilitators should use the narrated movie and pause when prompted during the movie to facilitate learning activities with your participants. Each learning activity has an activity guide that includes a description, objective(s), materials and facilitator instructions.

The entire workshop should take approximately 60 minutes when presented to a group.

Setting up:

- ✦ Equipment:
 - Presenter's computer with movie version of the Counting and Cardinality module. The module and the accompanying activities should be accessed at the Dynamic Learning Maps Professional Development web site and reviewed well before the training. There are several resources listed at the end of this facilitator's guide that will be useful before presenting the module.
 - LCD Projector with external speakers or sound system.
- ✦ Training Materials (Prior to the training create the appropriate number of packets with these materials to give to participants as they arrive at the training):
 - Agenda
 - Handouts and Worksheets
 - Order the Learning Trajectories—Handout 1
 - Ideas and Reflections—Handout 2
- ✦ Learning Objectives:
 - 1) Participants will reflect on their own teaching / students over the years and think about the development of the skills within the counting and cardinality standards.
 - 2) Participants will review and order the list of trajectory skills found on the handout for activity 1.
 - 3) Participants will develop / examine additional classroom activities that can be used to teach the counting and cardinality standards and the development of number sense.
 - 4) Participants who complete these activities will have developed an understanding of the teaching of counting and cardinality and will be able to apply this knowledge to develop research-based instruction in their classrooms.

Section 1—Introduction



- Approximately 3 minutes
- **Greet participants**
- **State the title of the module and briefly review the learning objectives**

“Welcome everyone. The topic of today’s presentation will focus on teaching the concepts within the Mathematics Counting and Cardinality Standards. During the next hour, we will be learning about the research-based instruction, how it is represented in the Common Core and the Dynamic Learning Maps, and how the development of number sense relates to traditional educational approaches for students with significant cognitive disabilities.”

- **See who is in your audience.**

*“As we get started, I would like to know a bit about who is here today. Raise your hand if you are a classroom teacher.
How many of you are speech-language pathologists?
Are there any occupational therapists here today?
Physical therapists?
Teaching assistants?
How about school psychologists?
School administrators?
Did I miss anyone? (Ask anyone who raises a hand to say what job he/she does).”*

- **Review list of handouts.**

*“I’m glad all of you could be here today. We will begin the recorded presentation in a few minutes, but before that, please take a moment to review the handout packet you received. You should have a copy of the following documents:
Today’s agenda
Order the Learning Trajectories—Handout 1
Ideas and Reflections—Handout 2*

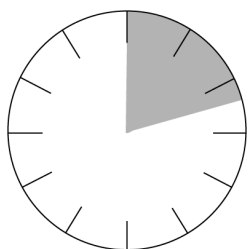
- **Make sure everyone has all of the handouts and start the module.**

“Does everyone have a copy of each of these?” Supply extra handouts to anyone who needs them.

“You need these handouts for the 3 learning activities we will do during today’s session. Does anyone have any questions?” Pause to see if there are questions and respond as appropriate.

“If there are no (more) questions, let’s go ahead and get started.”

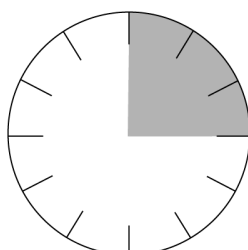
Section 2—Overview of Counting and Cardinality



- Approximately 12 minutes
- Start the movie.
- At the 11:51 time marker you will see a message on the screen to pause the movie for Activity #1

“We’re going to pause the module for a moment to examine the trajectories of human learning around counting and cardinality for the typical child.”

Learning Activity 1—Learning Trajectories



- ♦ Time Requirements: 15 minutes
 - 1 minute to set up and explain the activity
 - 8 minutes to order the trajectories
 - 5 minutes to check their work and share big ideas with entire group
 - 1 minutes to wrap up and move back to the module
- ♦ Materials
 - Handout 1: Order the Learning Trajectories
- ♦ Objectives
 - Participants will reflect on their own teaching /

students over the years and think about the development of the skills within counting and understanding cardinality

- Participants will review and order the list of trajectory skills found on the handout.
- Participants will review their work and assess their work on the list of trajectory skills found on the handout using the answer .

✦ Facilitator Directions for Activity 1:

1. Ask participants to locate the handout for activity 1

“Please find the handout called Order the Learning Trajectories for activity 1.”

2. Tell the participants to reflect on their teaching and students (give 8 minutes for this part of the activity)

“Now, take a few minutes and quietly reflect on your own experiences in the classroom around mathematics instruction as it relates to the development of the skills within counting and understanding cardinality. Then, read over the list of Trajectory / Learning Progressions on your handout. Take a few minutes and list these skills in the order you feel they would typically develop in a child. You have 8 minutes to complete this task.”

3. Share the answers found below with the group.

“Now, let’s check your work. Please plan on sharing any discoveries or changes of thought with the entire group.”

3	Reciter—counts with words or indications not necessarily in the correct order above 5.
5	Corresponder—keeps one to one correspondence between counting words and objects. May answer how many?
10	Counter—backwards from 10- Counts backwards from 10 or when removing objects from a group.
1	Pre-Counter—children have no verbal counting may indicate some number words but have no sequence.
2	Chanter—sings songs / chants indicate indistinguishable number words.

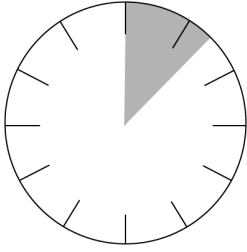
4	Reciter— (10) counts to ten with some correspondence with objects but may count with errors.
6	Counter small number—accurately counts objects in a line to 5 and answers how many questions with the last number counted. When objects are visible and with small numbers begins to understand the cardinal (total) number in the set.
7	Counter to 10—counts arrangements of objects to 10 may be able to represent or recognize numerals with meaning.
8	Counter / Producer with small numbers—counts out objects to 5 and recognizes that counting is relevant to real life.
11	Counter from N (N+1, N-1)—counts with objects from numbers other than one, skip count by 10's to 100- Counter to 100- Skip Counter by 5's and 2's.
9	Counter and Producer to 10—counts and counts out objects accurately to 10.

“Let’s take a few minutes and share ideas or thoughts. Who would like to start?”

4. **Wrap up the discussion and provide additional information around the idea of the Learning Trajectories and the population of students we work with in our classrooms.**

“Everyone please give me your attention. I would like to remind you that the Learning Trajectories are the developmental order of skills for the typical child. Students with significant cognitive disabilities may not develop these skills in this order, but it is important to know which skills should build on previous skills. This will allow us to plan our instruction based on current research and what is most likely going to be effective for our students. Thank you for your work and comments related to this activity.”

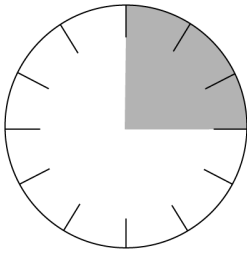
Section 3—Making Connections to the Classroom



- Approximately 7 minutes
- Continue the movie.
- At the 18:48 time marker you will see a message on the screen to pause the movie for Activity #2.

"We're going to pause here for the second learning activity. Please pull out the handout called Ideas and Reflections."

Learning Activity 2—Making Connections to the Classroom



- ◆ Time Requirements: 15 minutes
 - 2 minutes to set up and explain the activity
 - 7 minutes to reflect and develop lessons around counting and cardinality as a small group
 - 5 to check their work share big ideas with entire group
 - 1 minute to wrap up and move back the module
- ◆ Materials
 - Handout 2: Ideas and Reflections
- ◆ Objectives
 - Participants will reflect on their own teaching / students over the years and think about the development of the skills within the counting and cardinality standards.
 - Participants will develop / examine additional classroom activities that can be used to teach the counting and cardinality standards and the development of number sense.
 - Participants will share their ideas / lessons around the counting and cardinality standards and the development of number sense
- ◆ Facilitator Directions for Activity 2:
 1. **Tell participants to reflect on the information presented thus far and develop lessons around counting and cardinality within small groups (give 7 minutes for this part of the activity)**

“Please make sure you are within a group of 5-7 participants. Take out the handout for activity 2: Ideas and Reflections. You will use this sheet to jot down your thoughts and ideas as you work on this activity. Take time to reflect on activities/lessons you have taught or seen that would build the counting and cardinality standards and the development of number sense in our students. Within your group, come up with one or two lessons/ideas that could be used to teach the counting and cardinality standards. Please note that the key ideas to ensure the development of number sense are listed on your handout. You’ll have about 7 minutes to complete this task.”

- 2. After 7 minutes, bring the entire group back together. Ask if anyone would like to share their ideas with others in the group. Please make sure you are encouraging and facilitating the whole-group discussion by connecting what the groups are saying to the key ideas of the development of number sense (listed on the handout). If needed there are example ideas/lessons/resources listed below. You may wish to share some of these with your group, if time allows.**

““Let’s take 5 minutes and share ideas or thoughts. Who would like to start?”

Resources:

- <http://etc.usf.edu/clipart/galleries/723-counting>
- <http://illuminations.nctm.org/ActivityDetail.aspx?ID=74>
- <http://illuminations.nctm.org/ActivityDetail.aspx?ID=219>
- <http://illuminations.nctm.org/ActivityDetail.aspx?ID=73>

Lessons:

- <http://illuminations.nctm.org/LessonDetail.aspx?ID=U57>

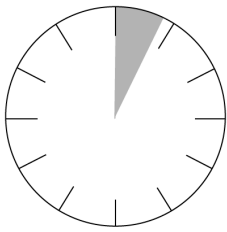
Activities:

- Sing “If you’re happy and you know it” (teaches the concept 2)
- Same, more, or less
- Numbering picture schedules
- Counting off when standing in line or when getting into groups for classroom activities
- Counting shoes in the classroom or other objects
- Questioning:
 - How many are there?
 - How many of each kind?
 - Which has more? Which has less?

3. Wrap up the discussion.

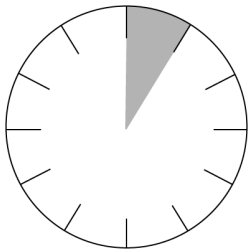
“Everyone please wrap up what you are working on and give me your attention. Thank you for your work and comments related to this activity.”

Section 4—Example Lessons and Application



- Approximately 3 minutes
- Continue the movie and let it play to the end. It will end at the 22:16 time marker.

Section 5—Closing



- Approximately 5 minutes
- Wrap up the session. Have participants complete any final paperwork that is needed (e.g., an evaluation, sign out to document attendance, etc.)

“That completes the Counting and Cardinality module. Thanks for your attention and participation.”



ORDER THE LEARNING OBJECTIVES
COUNTING AND CARDINALITY
ACTIVITY 1

Learning Trajectories (Learning Progressions) identify waypoints along the path in which the typical child's knowledge and skills are likely to grow and develop. Take a few moments and order the following trajectories as you feel they would typically develop. Place the skills listed below in order using numbers 1 through 11 (1 developing first and 11 developing last).

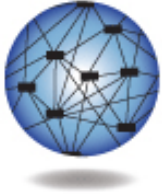
- _____ Reciter—counts with words or indications not necessarily in the correct order above 5.
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- _____ Reciter— (10) counts to ten with some correspondence with objects but may count with errors.
- _____ Counter small number—accurately counts objects in a line to 5 and answers how many questions with the last number counted. When objects are visible and with small numbers begins to understand the cardinal (total) number in the set.
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IDEAS AND REFLECTIONS
COUNTING AND CARDINALITY
ACTIVITY 2

Participants will develop /share their own research based classroom activities that can be used to teach the skills of counting and cardinality. Please use this sheet of paper to jot down ideas / reflections. Keep in mind the instructional ideas listed below. These will help ensure that your activities / lessons encourage the development of number sense with our students.

- Pair numbers with meaningful objects
- Correct use of language
- Use counting activities
- Connect to the environment
- Provide experience with number lines
- Plan meaningful estimation experience



Name: _____

Date: _____

1. Counting and Cardinality enables students to use number, including the written number, to represent quantities and solve quantitative problems.

True

False

2. Which of the following is not a primary component of the domain of Counting and Cardinality:

- a. knowledge of place value
- b. knowledge of the count sequence
- c. ability to count to tell the number of objects in a set
- d. ability to compare numbers

3. Number lines have a key role in helping students develop number sense.

True

False

4. A clock is an alternate form of a number line.

True

False

5. The distance between two numbers influences how quickly we can decide which is larger. Which pair of numbers make it fastest for you to determine which number is larger?

- a. 15 and 16
- b. 15 and 25
- c. 15 and 18



COUNTING AND CARDINALITY INFORMATION FOR CEU'S

The Dynamic Learning Maps does not provide CEU's for the completion of modules. However, states and/or Local education agency (LEA) are encouraged to use the information provided below to help facilitate the application process required by your state or LEA.

MODULE OBJECTIVES

1. Participants will reflect on their own teaching / students over the years and think about the development of the skills within the counting and cardinality standards.
2. Participants will review and order the list of trajectory skills found on the Counting and Cardinality Activity #1 Handout 1.
3. Participants will develop / examine additional classroom activities that can be used to teach the counting and cardinality standards and the development of number sense.
4. Participants who complete these activities will have developed an understanding of the teaching of counting and cardinality and will be able to apply this knowledge to develop research---based instruction in their classrooms.

AUTHOR BIO'S

Chris Cain, Ph.D., Coordinator of the Mars Hill University Master of Education, Academically & Intellectually Gifted, and Integrated Education Programs. He is National Board Professional Teaching Standards (NBPTS) certified and a NBPTS assessor. He has licensure and teaching experience in general, AIG, and Special Education settings. Dr. Cain is a Mathematics consultant to the NC Department of Public Instruction.

Penny Hatch, Ph.D., is a Research Assistant Professor at the Center for Literacy and Disability Studies, in the Department of Allied Health Sciences, School of Medicine, University of North Carolina at Chapel Hill. Her research includes language and literacy development for students with significant cognitive disabilities and complex communication needs. Prior to earning her Ph.D., Penny worked as a school-based speech-language pathologist, specializing in augmentative and alternative communication and assistive technology.

AGENDA

		Content	Activity
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Section 2	Overview of Counting and Cardinality and the Research Around Human Learning of These Skills 27 minutes	Introduction to counting and cardinality as it relates to the Common Core and information about how the brain learns mathematics.	Activity 1: Participants will order the trajectories of human learning around counting and cardinality for the typical child as outlined in the activity.
Section 3	Making Connections to the Classroom 22 minutes	Application for instruction of counting and cardinality for students with significant cognitive disabilities.	Activity 2: Participants will develop /share their own research based classroom activities that can be used to teach the skills of counting and cardinality as outlined in the activity.
Section 4	Example Lesson and Application 4 minutes	Watch a teacher teaching the skills of counting and cardinality to a student with a significant cognitive disability.	
Section 5	Wrap-up 3-4 minutes	Closing information	Dismissal