Renaissance Teacher Work Sample Consortium

A Teacher Work Sample Exemplar

Submitted by: Western Washington University

Grade Level: 2nd

Subject: Mathematics

Topic: Place Value Number Sense

Teacher Work Sample

Second Grade - Mathematics

Place Value Number Sense

Western Washington University
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Contextual Factors

Community, District, and School Factors

Nestled in Northwest Washington State is the small school of ABC Elementary, where I am teaching my Teacher Work Sample. The rural town surrounding ABC Elementary is surrounded by many agricultural lands and farms. The average socio-economic status of the town's residents is low to middle class.

The school district which ABC Elementary is a part of, has 1,680 students enrolled (OSPI, 2007). ABC Elementary's school demographics are representative of the larger town and school district's demographics. Of the 234 students at ABC Elementary's K-5 school, the major ethnicities are American Indian (17.5%), Hispanic (35.0%), and White (44.9%) (OSPI, 2007). The low socio-economic status of the surrounding town is represented at ABC Elementary school as well, as 63.5% of students receive Free or Reduced Priced Meals (OSPI, 2007).

Since many families are employed through the town's surrounding rich agriculture industry there is a high mobility of Hispanic migrant students at my school. ABC Elementary has a high population of Hispanic students and large populations of Migrant students (6.6%) and Transitional Bilingual students (27.8%) (OSPI, 2007).

Classroom Factors

My second grade class is comprised of 7 boys and 11 girls, 18 students in all. Approximately 57% of the students are White, 32% are Hispanic, and 10% American Indian; percentages which are representative of the school and district.

There are three languages spoken in my classroom. English is the primary language, 7 students speak Spanish as their native language; and 1 student speaks Miskito (an aboriginal language of Mexico).

When students walk into the classroom each morning they follow a morning routine, including checking books out to read for homework. A parent volunteer stays for the first fifteen minutes of class each morning to help with this process; freeing my cooperating teacher and I to continue preparing for the day and helping students get settled.

Share circle is a morning ritual that begins each morning at 9:05am. At 9:15am each morning three second grade students from the 1st/2nd split class join us for math. These students are only with us for 1 hour each morning which constricts our math time to 60 minutes. The session is often less than 60 minutes since share circle often runs over its' allotted planned time.

At the start of math each morning, around 10:30am, one of ABC Elementary's ELL teachers visits our classroom for 30 minutes to provide extra support for specific students who are learning English as a second language. A special education paraprofessional also joins our classroom for our math session, to work specifically with one student.

During work time, students spread out among six hexagonal tables, and sit in groups of four to five. Students are allowed to choose where they sit which usually allows for one hexagonal table to be open throughout the day. This table is often used as additional teaching space for individuals or small groups.

There is a large carpet area and library at the entrance to the classroom where most of the large group instruction takes place. One of the walls in the carpet area is adorned with many posters reminding students of mathematical strategies as well as strategies used for reading comprehension. Another wall in the carpet area holds the calendar where students daily tally the number of days we have been in school, and represent this number using place value straws.

A microphone system is set up in the classroom to assist students in clearly hearing the teacher's instruction. A document camera is often used to provide instruction and have students share their work. Three computers sit in the back of the room, below a number line chart (to 100) which students often reference during math. Many math manipulatives are easily accessible to students such as unifix cubes, pattern blocks, and ten-frames.

Student Characteristics

For my teacher work sample I will be teaching a small group of six students, comprised of three girls and three boys. The subject of my teacher work sample is *place value number sense.* All six students in my small group have been identified as struggling with their place value number sense (understanding numbers as comprised of 10s and 1s) and would benefit from further instruction before they begin an upcoming place value unit focusing on addition of two-digit numbers.

The students in my small group have a range of abilities across content areas. The group is comprised of four Hispanic students who speak Spanish as their native language, Jessica*, Lindsay, Nick, and James. Jessica, Lindsay, and James are all reading

in English at levels above standard. Nick is a student from the 1st/2nd split class who joins us for math and he just recently qualified for special education services. Nick will have a special education aide in the classroom with him throughout this unit. It will be important for me to connect with her before the lessons so she has an understanding of the lesson and can help support Nick's success.

Luke just recently transferred to our school from Idaho. English is his native language and his ethnicity is White. Luke is adjusting to our math curriculum which is largely based around problem solving investigations. Luke relies heavily on math tools such as the number line and hundreds chart to independently complete math equations and facts. I believe the use of physical place value models along with place-value mats will serve Luke's learning needs throughout this unit.

Janey also speaks English as a native language and struggles with attention. It is difficult for her to follow oral directions, as well as to begin her work. It will be important for me to write down my instructions and supplement my lesson with visuals to support Janey's learning.

Instructional Implications

English Language Learners: Since four of six students in the group speak English as a second language, I will definitely need to keep this characteristic at the center of my thinking about instruction. I will need to make sure to supplement my instruction with visual aids to support students' understanding of math vocabulary as well as lesson activities. It will also be important for me to be selective in the

mathematical vocabulary I use, and to explicitly teach any mathematical vocabulary I do choose to incorporate into the unit.

Classroom Space: I will use the extra table in the back of the room as the space where I will teach my lessons. This table is near a space of carpet that is not in the way of general classroom traffic. This area could be used to teach the group of six students and provide each student with enough room to be comfortable. My cooperating teacher will be teaching at the front of the classroom, so I will need to consider what the other student will be doing throughout the hour as to minimize distractions for my small group. I will need to consider the materials I need to have prepared and accessible at the back table, as well as the noise level in which we may work as a group as to not district other students.

Learning Goals

In primary grades, essential number sense and place value concepts are developed that lay a foundation for students' further understanding and development of these mathematical concepts in later grades. Long term confusion can begin when students "are asked to work with place value concepts without the prerequisite understandings necessary in order to think of numbers as groups of tens and ones" (Richardson, 1999).

This fact is one of my purposes for teaching my TWS Place Value Unit to my selected student group. I will be teaching this unit to a small group of students who have been identified as struggling with place value number sense- thinking of numbers

as 10s and 1s. The ability to think of numbers as 10s and 1s will benefit students in the upcoming place value unit of two-digit addition and subtraction.

It is extremely important for these students' development of number sense and place-value concepts that they understand base-ten grouping (thinking of numbers as groups of tens and ones) which is the purpose of my unit.

The essential question (EQ) for the unit is: *How can base-ten grouping help us represent oral and written names for numbers?*

This essential question will guide the unit and my development of the unit's learning goals, assessment, and learning activities. The essential question targets *Washington State's Grade 2 Mathematics Standards,* specifically: *2.1 Core Content: Place value and the base ten system*. As specified in the Standards within this content, "students refine their understanding of the base ten number system and use place value concepts of ones, tens, and hundreds to understand number relationships. They become fluent in writing and renaming numbers in a variety of ways. This fluency, combined with the understanding of place value, is a strong foundation for learning how to add and subtract two-digit numbers" (OSPI, 2008).

The unit's two learning goals are not only in congruence with the essential question but also are aligned with the learning domains of Bloom's Taxonomy. Each learning goal for the unit can be classified under the Cognitive Domain, (mental skills, knowledge) of Bloom's Taxonomy. Within the Cognitive Domain there are six degrees of understanding, the first degree must be mastered before the next can take place. The two learning goals for my unit span three degrees of Bloom's taxonomy which indicate

the learning goals are significant and challenging as students will progress through these two domains beginning with knowledge moving to comprehension.

Learning Goal 1:

The first learning goal for the unit (LG 1) is: *Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.*

This learning goal is in alignment with Washington State's Grade 2 Mathematics Standard **2.1.B: Students are expected to connect place value models with their numerical equivalents to 1,000** (OSPI, 2008).

LG 1 targets this standard as students will be asked to represent numbers using their knowledge of base-ten grouping, developing an understanding of place value. Students will be working with physical place value models to represent and name their numerical equivalents. This learning goal also highlights the first level of Bloom's taxonomy, *Knowledge*, as students are asked to "name" the total number, drawing on their knowledge of base-ten grouping and naming numbers.

Learning Goal 2:

The unit's second learning goal *(LG 2) is: Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number.*

This learning goal aligns with Washington State's Performance Expectation **2.1.C: Students are expected to identify the ones, tens, and hundreds place in a number and the digits occupying them.** (OSPI, 2008). Throughout this unit students will be working with two-digit numbers, although the standard states students should

be able to identify the hundreds place as well. LG 2 still targets this standard because identifying the ones and tens place in a two-digit number, and the digits occupying them is a prerequisite skill for identifying the hundreds place and digit occupying it in a three-digit number. This learning goal targets the next level of Bloom's Taxonomy, *Comprehension,* because students are demonstrating their comprehension of base-ten grouping by having to describe what each digit in a two-digit number represents, rather than being asked to simply identify the digit in the tens and ones place.

Assessment Plan Overview

Overview

I will assess each learning goal for this unit separately, using a student interview. This interview will be used as both the pre and post assessments for each corresponding learning goal. Formative assessment will be used throughout the unit and developed in alignment with the learning goals and specific student tasks; outlining the specific performances I am looking for to demonstrate students' understandings.

Pre-Assessment and Post-Assessment

To assess LG 1 I will administer a student interview developed by Kathy Richardson, *The Grouping Tens Assessment* **(Appendix A).** The interview will assist me in determining students' thinking of numbers as 10s and 1s, as well as their ability to use a place value model to represent a given number.

Students' responses to questions will be recorded and evaluated according to the rubric outlined by the interview. The rubric outlines clear criteria to determine if a

student: I – needs instruction, P – needs practice, or A – is ready to apply, place value concepts **(Appendix B).**

I will use this assessment to post-assess LG 1 as well. This will enable me to easily track students' growth in their understanding of numbers as 10s and 1s, as well as enable me to identify areas where students would benefit from even further instruction.

To pre-assess LG 2, I will interview students using the "Show It/Write It" activity, adapted from *Elementary and Middle School Mathematics, Teaching Developmentally* (Van De Walle, 2007). To begin the interview, I will say the standard name for a number, "seventeen", and students will use their base ten models to show the number, and then write it. Students will be given a record sheet **(Appendix C)** with ten frames where they will build their base ten model, and write the number. Students will be asked to identify the tens place and ones place in the number they write, which will assess their ability to identify the 10s and 1s place in a two digit number. Finally, I will point to the first digit in the number and ask students what the digit stands for, and then point to the second digit asking the same question.

I will take notes on students' responses and thinking. Students will be evaluated using rubric criteria to determine their instructional needs. The rubric consists of two categories: I – needs instruction and A – Ready to Apply. The specific criteria for each of these categories may be found in **Appendix D.**

Formative Assessment

Teaching a small group of six students, seated around one table, enables me to be very intentional in formatively assessing each individual student. I plan to formatively assess the students in my group during every lesson of the unit through the use of: technology, clearly defined anecdotal notes, interviews, and discussion. This will be an essential part of my unit as formative assessment is the best indicator of students' understanding and misconceptions. I will use formative assessments to make appropriate adaptations and changes to my instruction.

I will use an anecdotal note sheet **(Appendix E)** based upon the unit's two learning goals, to guide my observations during the unit. The note sheet will include categories aligned with the learning goals' pre-assessments, to measure students' understanding of place value concepts.

If students are still struggling with these categories by the third lesson, I may need to adapt my instruction to include teacher-directed activities during the third and fourth lessons.

The accessibility of a small group will enable me to make use of technology for formative assessment. I will use a digital camera to capture a visual of students' place value mats. I will also use a tape-recorder to interview students about their place value models. Interview questions will be based upon the unit's learning goals, a list of interview guiding questions can be found in **Appendix F.** Capturing students' thoughts on a tape recorder will ensure I will be able to reach each student and capture their thoughts verbatim.

I will also make use of a video-camera during the unit to formatively assess students' understandings as well. I will review the lesson to observe students' thinking, responses, and independent work.

Lastly, I will use discussion to assess students' thinking and understanding of the learning goals. I will record these discussions on a chart labeled, *'Our Thinking'* which will help students make approximations since we are just 'thinking' and accepting every response.

Assessment Plan Table

Learning Goals	**Assessments**	**Format of Assessment**	**Adaptations**
Learning Goal 1 *Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.*	Pre-Assessment	Student Interview: *Grouping Tens Assessment* Analyze the data from the interview to determine students' thinking of numbers as 10s and 1s. Assess students as either: needing instruction, needing practice, or ready to apply, the concepts of numbers as 10s and 1s.	I will use the "Going Back" or "Going On" questions during the interview according to students' responses, to appropriately assess students' understanding of numbers as 10s and 1s.
	Formative Assessment	Anecdotal notes Tape-recorded teacher-student conferences Digital photographs Review of video-taped lessons Examples of Student Work Discussions (recorded on *'Our Thinking'* chart)	I will record students' thinking on a chart so ideas that are orally presented will be visually reinforced, to benefit all students especially Janey. The use of a tape recorder and video-camera will allow students to verbally express their thinking, rather than be required to write. Students' worksheets and record sheets will be clear and supplemented with visuals to support all students' success.

	Post-Assessment	Student Interview – *Grouping Tens Assessment* Compare the pre-assessment and post-assessment data, to determine students' growth as well as additional needs.	I will use the "Going Back" or "Going On" questions during the interview according to students' responses, to appropriately assess students' understanding of numbers as 10s and 1s.

Learning Goal 2 *Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number.*	Pre-Assessment	"Show It/Write It" Interview	Students verbally explain their thinking rather than being required to write out their answers, which is a time consuming task for certain students. I will provide students' with ten-frames to help scaffold the building of their place value model.
	Formative Assessment	Anecdotal Notes Tape-recorded teacher-student conferences Review of video-taped lessons Examples of student work Discussions (recorded on '*Our Thinking*' chart)	I will record students' thinking on a chart so ideas that are orally presented will be visually reinforced, to benefit all students especially Janey. The use of a tape recorder and video-camera will allow students to verbally express their thinking, rather than be required to write. Students' worksheets and record sheets will be clear and supplemented with visuals to support all students' success.

	Post-Assessment	"Show It/Write It" Interview	Students verbally explain their thinking rather than being required to write out their answers, which is a time consuming task for certain students. I will provide students' with ten-frames to help scaffold the building of their place value model.

Design for Instruction

Results of pre-assessment

Grouping Tens Assessment: In relation to LG 1 it is most important to consider the, *Determines Quantity,* section of the interview. For this section students were asked to group 34 single cubes into groups of 10s (students did not know the actual amount of cubes at this point). After students created their place value model they were asked, "does this give you an idea of how many there are?" Students' responses to this question were scored based upon Kathy Richardson's interview criteria **(Appendix B)** to determine their instructional needs.

If a student received an: **I – Needs instruction.** He/she does not see numbers as tens and ones and relies on counting by ones to determine the total number. **P – Needs practice,** indicates a student is able to count the groups by tens to determine the total, but needs practice to efficiently see the relationship between the tens and ones and the total number. **A – Ready to apply** indicates that as soon as the student knows the total number of tens and ones they automatically know the total number without having to count. The following table illustrates the results of this pre-assessment.

Table 1
LG 1 Pre-Assessment Results

Student	Number of 10s	Reaction to Estimate	Determines Quantity	Going Back	Going On + 10	Going On - 10
Nick	**I**	**I**	**I**	**I**	**-**	**-**
Lindsay	**I**	**A**	**P**	**-**	**I**	**A**
Jessica	**A**	**I**	**P**		**P**	**I**
James	**A**	**I**	**A**	**-**	**P**	**I**
Janey	**A**	**P**	**P ***	**-**	**A**	**A**
Luke	**A**	**I**	**P ****	**I**	**P**	**P**

***** Janey determined the quantity by counting the three groups of 10, but did not count the single cubes, which indicates although she counted by groups, she did not see all of the cubes as part of the total quantity.

****** As I observed Luke counting, he did not have one-to-one correspondence. He counted the cubes by groups of 10s and 1s, yet he only had 9 cubes in each group of 10. He also counted the 7 single cubes by one and arrived at 6. He stated the total quantity as 36.

When examining the *Determines Quantity* section it is evident that 5/6 students need instruction and more practice in thinking of numbers as 10s and 1s. These students were unable to immediately see the relationship between the number of 10s and 1s in their place value model, and the total number. James scored a *ready to apply,* in this category, although when I asked him the 'Going On' adaptation questions he received scores of *needs instruction* and *needs practice*. Since James was unable to automatically add ten more and ten less to the given number I am confident more instruction and practice in thinking of numbers as 10s and 1s will benefit him. Through these lessons he will be able to build his thinking of numbers as 10s and 1s to develop a concrete understanding of place value number sense that will aide him in the upcoming place value unit of two-digit addition.

From the results of this pre-assessment I plan to begin the unit by providing students with a variety of opportunities to build place value models and state the

number. I will use place value mats throughout the four lessons to provide students with a scaffold for the relationship between the groups of tens and ones in a number and the respective place value digit. All of the students will benefit from instruction in thinking of numbers as 10s and 1s, and throughout my instruction it will be important to monitor James' thinking to determine if he will need more challenging adaptations of the learning activities.

LG 2: Pre-Assessment: "Show It/Write It" Interview

The results of the "Show It/Write It" interview provided very clear insight into students' thinking of numbers and place value. All six students were able to successfully build a place value model representing the number "17" and then correctly write the number 17. This demonstrates that all students have had practice with building place value models and then representing the amount in a written numeral. The question that followed, demonstrated that while students are able to write the number, they are unable to explain what the two digits stand for. 0/6 students correctly identified the tens and ones place in the number 17. Many students stated they believed the ones place was the first digit because it had a one. This answer provides me with further reasoning to teach place value concepts as students do not recognize that there is 1 group of 10 in the number 17, represented by the 1 in the tens place. Since students were unable to even identify the tens and ones place correctly, they do not even have a scaffold for the relationship between the number of groups of 10s and 1s, and the digit occupying the tens and ones place in a number.

It will be necessary to directly teach students to identify the tens and ones in a two-digit number correctly. I will connect each place value model with its' written number, to represent for students the connection between the groups of 10s and 1s in a number, and the digits occupying the tens and ones place in the written number symbol. The table below illustrates the pre-assessment results of Learning Goal 2.

Table 2
LG 2 Pre-Assessment Results

Student:	Written Number:	Identifies Tens and Ones Place in the number 17:
Nick	A	I
Lindsay	A	I
Jessica	A	I
James	A	I
Janey	A	I
Luke	A	I

A – Ready to Apply
I – Needs Instruction

Unit Overview

Each learning activity in the unit is connected to the unit's Essential Question: *How can base-ten grouping help us represent oral and written names for numbers?* The essential question frames the unit's learning goals and each lesson activity will require students to use base-ten grouping, to promote their understanding of place value concepts, including the oral and written names for numbers.

Design for Instruction Table

Learning Activity	Learning Goals	Instructional Activities/Adaptations	Assessments

A This activity will happen every day of the unit.	LG 1: *Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.* LG 2: *Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number.*	**Think About the Symbols:** - Identify the 10s and 1s place in a two-digit number for the group - Build a place value model together - Write the number to represent the model - Discuss how the numbers represent the groups of tens and ones in the number **Adaptations** I will provide a friendly definition of "tens place" and "ones place" and write the definition on the chart as well to support all students. I will build a place value model and 'think aloud' about how the groups of 10s and 1s are represented in the written number. I will record students' thinking on a chart so ideas that are orally presented will be visually reinforced, to benefit all students especially Janey.	**Formative Assessment:** - Discussion: Record ideas on *'Our Thinking'* chart. - Anecdotal notes on students' thinking about the symbols **(Appendix E)**
B	LG 1: *Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.*	**Rearrange-It: Arranging Loose Counters into Tens and Ones** - Students are asked to build a given number and arrange counters into groups of 10s and 1s on their place value boards - Students state the number of cubes they have all together, and estimate how many more are needed to make the next ten. **Adaptations:** I will post the thinking chart from the previous activity for students to reference.	**Formative Assessment:** - Digital picture of students' place value models - Tape recorded student/teacher interview **(Appendix F)**

		I will continue to record students' thinking and responses on the thinking chart, to represent information visually as well as orally. I will be purposeful in the numbers I ask students to build. I will not ask Nick and Luke to build a place value model larger than fifty, so they can focus on the groups of tens and ones rather than possibly struggling to count out the large quantity.	
C	LG 1: *Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.* LG 2: *Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number.*	**Groups of 10** - Continue arranging counters into groups of 10s and 1s on place value board - Record number of groups of 10s and 1s, using numbers - Write the total number **Adaptations:** The student record sheet will be labeled 'Number of Tens' 'Number of Singles' with a box next to it where students record the number. This will limit the amount of time students have to spend writing on their record sheets. The record sheet will also have a visual of the contents of each mystery bag, so students will be able to clearly record their findings of each bag	**Formative Assessment:** - Video tape the entire lesson, to review - Collection of students' record sheets - Discussion: record thoughts on *'Our Thinking'* chart
D	LG 1: *Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.*	**Grab and Add:** - Continue arranging counting cubes into groups of tens and ones on place value boards - Add a given number of counters and record the new total amount of counters, using a written	**Formative Assessment:** - Teacher/student tape recorded interviews **(Appendix F)**

	LG 2: *Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number.*	number **Adaptations** I will explain the record sheets to students and provide a demonstration of how to record during the activity. We will then practice using the record sheet as a group before students complete the activity independently.	
E	LG 1: *Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.*	**Give and Take With Tens and Ones** - Students continue to develop their place value number sense and thinking of numbers as 10s and 1s - Students record the equation and their prediction of the outcome of the cover-up activity **Adaptations**: I will explain the record sheets to students and provide a demonstration of how to record the equation during the activity. We will then practice using the record sheet as a group before students complete the activity independently. This will benefit all students, especially Nick and Janey who work well when oral directions are supplemented.	**Formative Assessments:** - Collect students' record sheets - Anecdotal notes **(Appendix E)**
F **Post-Assessment**	LG 2: *Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the*	**"Show It/Write It" Interview** - Students hears the standard name of a two-digit number - Students build a base ten model to show that number - Students write the number **Adaptations:**	

	second number.	The record sheet will include ten-frames to scaffold students' thinking. Students will physically build the number and say the number out loud before they are asked to write it.	

Learning Activities

Activity 1: Think About the Symbols

The learning activity is adapted from, *Developing Number Concepts: Place Value, Multiplication, and Division* (Richardson, 1999). This activity will occur at the beginning of each lesson throughout my unit and is connected to both of the unit's learning goals.

During the activity I will first ask students to represent and name a given number using place value mats and unifix cubes as their place value. Students will break the given number into groups of 10s and 1s, and represent these groups on their place value boards. The place value boards provide a visual scaffold for students' understanding of place value in a written digit, the groups of 10 are grouped on the left and the single ones are grouped on the right. This task aligns with LG 1: *Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.*

After students build their place value model, I will ask them to write the number they built. This task is part of LG 2: *Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number.* My pre-assessment of LG 2 shows that all 6 students in the group are able to write the number representing a place value model. The pre-assessment results also show that students were unable to

correctly identify the 10s and 1s place in a two-digit number and did not have an understanding of the relationship between the groups of 10s and 1s and the written number. This activity is designed to move students towards achievement of LG 2.

I will begin each lesson of the unit with this activity. The first lesson will begin by explicitly teaching students the connection between the place value boards and the tens and ones place in a given number. I will provide a friendly definition for students of "tens place" and "ones place", specifically to support the understanding of English language learners in the group and the student who has qualified for special education. The students need to be explicitly taught where the tens and ones place is to scaffold their thinking during this activity, and throughout the unit. Identifying the 10s and 1s place in a two-digit number is a *skill;* the students need to be explicitly taught. Explaining what the digits in the 10s and 1s place in a number *represent* or stand for, is the big understanding of LG 2. This activity will move students towards comprehension of LG 2.

I will not need the use of technology in this activity as I will be teaching a small group and all students will be able to clearly see the writing on our discussion chart, as well as examples of other students' work.

I will formally assess this activity through recording students' responses and thoughts during our discussion, on '*Our Thinking*' chart. This will serve as a chart we can reference throughout the unit's other activities. Also, I will take anecdotal notes of students to assess how students are grouping the cubes, how students create and count

their groups of tens and ones, as well as students thinking of the number symbols. I will use the anecdotal note sheet found in **Appendix E,** to keep track of my assessment.

Activity 2: Rearrange-It: Arranging Loose Counters into Tens and Ones

This activity is also adapted from *Developing Number Concepts: Place Value, Multiplication, and Division* (Richardson, 1999). The results of my pre-assessment for LG 1 clearly show that students need instruction and practice representing a number as groups of 10s and 1s, and seeing the relationship between those groups and the total number. To fully understand the relationship between the groups of 10s and 1s and the total number, students should be able to look at the groups of 10s and 1s and automatically know the total number without having to count. This activity is aligned with LG 1: *Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.*

During the activity students are asked to start with a given number of cubes, twenty-six, for example. Students are asked to snap together one ten, and state the number of leftovers, then identify the total amount. I will formatively assess students by asking the students to raise their hand when they have figured out the total number. As they figure out the total number I will take anecdotal notes of their levels of thinking on my anecdotal note sheet (**Appendix E).** When students are trying to determine the total quantity if they have 1 ten and 16 leftovers (26), some students may raise their hand quickly because they automatically know how many, other students will begin counting on from 10, and still other students will count each cube by one. Noting these actions

and having each student state their answer and explain how they arrived at it, will help me to assess students' thinking of numbers as 10s and 1s.

When starting with a number such as 26, I will then ask students if we are able to create another 10 from the leftovers. I will continue questioning students as to how many they have and if there is enough to make another ten. Once we divide a number into as many groups of 10s as we can, I will ask students to state the total number. I will write the number in base ten language and the written symbol: two groups of ten and six singles = 26. This will help students to see the connection between the place value digits in a number and the groups they represent.

During this lesson I will use a digital camera to take a picture of the place value models students build on their place value mats. Using this technology enables students to continue building physical place value models, and not record their groups of tens and ones on a record sheet for me to collect. I will take one picture of students' work during the lesson and will do a quick interview with the student asking him/her to explain the grouping to me. I will use a tape recorder to record the interview. This will help me be efficient in meeting with each student, as I will not have to take the time to write out the students' responses. Taking digital pictures will enable me to capture students' grouping of 10s and 1s in a visual form. When I load the pictures onto the computer I will be able to look at each student's place value board and group patterns I see in their work all in one document, instead of having to sort through worksheets. I believe taking pictures of the students' place value boards will also serve as motivation

for students to complete their base ten grouping of the given number, and will ensure that I check in with each student to tape record their thinking.

Activity Three: Groups of Ten

This activity was adapted from *Elementary and Middle School Mathematics, Teaching Developmentally* (Van De Walle, 2007). For this activity I will prepare bags containing counters of different types, for example, beans, erasers, tiles, or counting cubes. The students will work in pairs to dump out a given bag and count the contents. Students will record the numerical amount on a record sheet and then the counters will be grouped in as many tens as possible. The record sheet will have a place for students to record the number of groups of tens and singles they have made from the contents of their mystery bag. After this process is complete students will repeat it with a different mystery bag.

This activity provides students with an additional way to group objects into tens and ones to see the relation between the groups and the total amount of objects. *Elementary and Middle School Mathematics, Teaching Developmentally* (Van De Walle, 2007) suggests that students who need instruction in developing place value concepts should have many opportunities to sort and group a variety of objects. Since students will be making place value models of groups of 10s and 1s to help name the total number, this learning activity aligns with LG 1: *Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.* Additionally this activity aligns with LG 2: *Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many*

1s are represented by the second number. As students will be required to write the number of objects they found and then record the number of groups of tens and ones they discovered.

I will formally assess this activity through the use of a video camera. I will record the entire lesson and review it after I teach to assess students' understanding and document our discussion and sharing. I will ask students to share their record sheets at the end of the activity, to discuss their findings and explain any connections they have made. I will ask students to share the total number they counted and the number of groups of tens and ones they sorted. I will record the number and the groups on a chart and ask students if they see any connections or if they can tell me why the number of groups of tens and ones are the same numbers in the total amount. As I watch the video I will assess students' responses. I will also ask students during sharing to identify the tens and ones place of the two-digit number I write their responses on the chart as a way to formally assess the first part of LG 2.

Instructional Decision Making

First Modification

My first instructional modification of the unit was adapting the way in which I structured the discussion following the *Thinking about the Symbols* activity, which happened each day of the unit. I made this modification following the discussion after my first lesson.

In the *Thinking about the Symbols* activity students created a place value model of a given number, and then recorded the number of groups of tens and ones, and the total

number, on their record sheet. I began the first discussion by asking students to examine their record sheets and offer any thoughts or observations they had about the numbers we recorded from their place value models.

Only two students offered non-specific responses such as, "They are all the same." When an answer would come up like this, I would question the specific student, "What do you mean by that?" "Can you show us what numbers are the same?" I soon realized the discussion turned into a conversation between me and one specific student, as I tried to draw out the student's thinking. The other students were not engaged in this conversation, even though I was asking them to examine their record sheet and listen to what their peer was sharing and thinking. Overall the other students seemed uninterested and I was having trouble helping them to focus. I decided to call for attention and move the students onto the next learning activity; for I felt the purpose of the discussion was not being fulfilled.

The purpose of the discussion was to move students towards the understanding of LG 2, that in a two digit number, the first digit represents the number of groups of 10s, and the second digit represents the number of ones, in the total number. I really wanted the students' voices to be the ones guiding these connections required of LG 2.

My instructional decision was two-fold. First, I changed the way I facilitated the discussion, I posed questions to the students rather than openly asking for their observations. Secondly, I changed how the students responded. I decided to allow each student to choose a colored marker at the beginning of the lesson which I would use to record the specific student's thoughts during the discussion.

As I dumped out my bag of markers on the desk during the following lesson, I had to suppress a chuckle as the six students clamored for their choice of color. I began the second discussion by posing a question to the students, "what is the total number of cubes on our place value boards?" With a marker sitting in front of them, the students were excitedly waving their hands for me to call on them, so they could be represented on the chart. The questions I posed during this discussion guided students through looking at the total number (24), the groups we created, and then thinking about the number symbols; what the digit 2, and digit 4 represent. This created a scaffold for attaining understanding of LG 2, rather than asking students to make observations and arrive at these understandings on their own.

During this discussion all students answered a question. I was able to take each student's marker and record their thinking on *"Our Thinking Chart."* Even students who were unsure of how to explain their thinking chose to share. **Appendix G** shows the student's responses to my guiding questions from the second discussion. **Appendix H** shows an additional chart we created during the unit, and the colors in the boxes correspond with the students who shared those thoughts.

The participation and attention from all students helped the quality of the lesson improve. Allowing each student to choose a marker validated their thoughts and students were excited to be represented on the chart. I believe this simple move also helped to boost the status of all the students in the group, especially those students who usually are more reserved with their thinking and sharing of answers.

Second Modification

A second instructional decision I made during the unit happened as a result of contextual factors influencing my second lesson. My second modification to the unit was a decision to spend two days on the *Groups of Tens* activity, and leave out the *Grab and Add* activity, a change to my original plan for instruction.

I chose to spend two days on the *Groups of Tens* activity for many reasons. The first reason was caused by contextual factors out of my hands, the morning of our second lesson; *Share Circle* took longer than anticipated, so my math lesson began five minutes later than planned. Also, my lesson had to end fifteen minutes early because the students from the 1st and 2nd grade classroom had to leave at 10am. A total of twenty minutes lost.

I continued with my original plan anyway and in our shortened time, we were able to complete one of the counting bags from the *Groups of Tens* activity together, but students were only able to complete one counting bag independently before we had to clean up. Students were very engaged and excited to be counting and sorting objects during this activity, which served as one reason that lead me to continue the same activity the next day.

Their engagement provided me with a lot of time to interview each student as a way of formative assessment, since I wasn't focused on redirecting students to keep them on task. As I interviewed and observed James during this activity, he consistently stated the number on his place value board without counting and he could quickly construct a given number with the unifix cubes. I knew from James' pre-assessment that the learning activities would provide him with needed practice to continue building

place value number sense, but also that he may need adaptations to make the learning activities more challenging.

I knew the *Grab and Add* activity would be too simple for him, as students would build a place value model and then add a number of cubes and record the result. I felt that if we continued with the *Groups of 10s* activity, I could make sure to adapt his learning experience by asking him extension questions such as; "how many would you have altogether if you added another 10? How many would you have if you took away a ten?" These questions would be appropriate adaptations for James and since I was able to check in with each student during this second lesson; I was confident I would have time to check in with James during the third lesson. Choosing to continue with *Groups of 10s* for the third lesson was a decision that benefited all students in the group and helped provide them with an appropriate and enjoyable learning activity, progressing towards both of the learning goals.

Analysis of Student Learning

Group Analysis

I chose to analyze data from five of six students in my small group, even though I represented all six students' pre-assessment data. I chose not to analyze Nick's data because he was pulled into the special education classroom the day of my post-assessment and other classroom factors have since kept me from sitting down with him to conduct the post-assessment interviews.

I chose to do my math unit on place value number sense because all six of these students were struggling with thinking of numbers as 10s and 1s, which will be an

essential understanding for the upcoming unit on two-digit addition. Even though all the students were struggling with this understanding, there was a range between the students in their mathematical abilities. Luke usually relies heavily on the number line to complete math equations or facts, and sometimes struggles with one to one correspondence while counting. Janey often struggles to attend to directions and begin her work. She often requires redirection or re-teaching from the teacher during independent work time. James, Lindsay, and Jessica are ELL and can all independently read grade level text in English. All three students sometimes struggle to accurately solve math story problems, which may be due to the content vocabulary and language of the story problem.

In this analysis I looked at how well students achieved both of the unit's learning goals. LG 1: *Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number,* and LG 2: *Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number.* I looked at the pre-assessments, formative assessments, and post-assessments to analyze and interpret the data to determine how my teaching may have impacted student learning.

Assessment Data

To evaluate how well students met LG 1 and LG 2, I examined the assessments I gave before, during, and after the unit. My pre-assessment of LG 1 was an interview created by Kathy Richardson **(Appendix A).** The purpose of this interview was to determine if a student could tell the total amount if he/she knew the number of groups

of tens and ones in the number. The interview also provided important information about the students' thinking of numbers, which is represented in the different categories of the interview rubric. I used some of these categories from the interview rubric, such as how a student determines the quantity of the total number, and students' estimation, as a structure for my formative assessments of anecdotal notes and student interviews. Using a structure similar to the pre-assessment for my formative assessments allowed me to track how well the students were developing in each of these areas as they progressed towards understanding LG 1. For the post-assessment of LG 1 I used the same interview form as the pre-assessment. This provided me with the same questions and context to which I could compare my pre-assessment data to easily and accurately determine students' growth according to the same rubric.

The second learning goal for this unit involved students being able to identify the tens and ones place in a two-digit number, and explain how many groups of 10 are represented by the first digit and how many ones are represented by the second digit. To pre and post-assess LG 2, I conducted an additional interview. In this interview I asked students to build a place value model, and then write the number to represent the model. I then asked students to place a label under the *tens place,* and another label under the *ones place.* Next, I pointed to a digit in the number and asked, "What does this number stand for?" Throughout the unit I interviewed students and held discussions around the written number symbols. I asked students the same question, "what does this number stand for?" when pointing to the digit in the tens or ones place. I took notes

on students' responses as well as recorded students' responses on "*Our Thinking Chart.*" This data aligned with both the pre and post-assessments.

Analysis of Learning Goal 1

To begin my analysis I examined the pre and post interview assessment data for LG 1. The most important category of the interview data was the *Determines Quantity* section. In the pre-assessment, 5/6 students were unable to immediately see the relationship between the number of 10s and 1s in their place value model, and the total number. The rubric for this section **(Appendix B)** outlined *how* the student determined the quantity of the total number, by either counting each cube by one, counting by groups of 10s and 1s, or knowing the total quantity without needing to count – showing an understanding of the place value relationship between the number of groups of 10s and 1s and the total number.

The pre-assessment data is represented in the table below.

Pre-assessment data of LG 1

Student	Number of 10s	Reaction to Estimate	Determines Quantity	Going Back	Going On + 10	Going On - 10
Lindsay	**I**	**A**	**P**	-	**I**	**A**
Jessica	**A**	**I**	**P**	-	**P**	**I**
James	**A**	**I**	**A**	-	**P**	**I**
Janey	**A**	**P**	**P ***	-	**A**	**A**
Luke	**A**	**I**	**P ****	**I**	**P**	**P**

***** Janey determined the quantity by counting the three groups of 10, but did not count the single cubes, which indicates although she counted by groups, she did not see all of the cubes as part of the total quantity.

****** As I observed Luke counting, he did not have one-to-one correspondence. He counted the cubes by groups of 10s and 1s, yet he only had 9 cubes in each group of 10. He also counted the 7 single cubes by one and arrived at 6. He stated the total quantity as 36.

The white spaces in this table illustrate the students who were successful and ready to apply these concepts, receiving an **A** on the assessment rubric **(Appendix B)**.

Students who received an, **I** in any section were in need of instruction, and a **P** indicated they needed more practice, according to the assessment rubric **(Appendix B)**. The data in this table can be compared to the post-assessment data represented in the following table.

Post-assessment data for LG 1

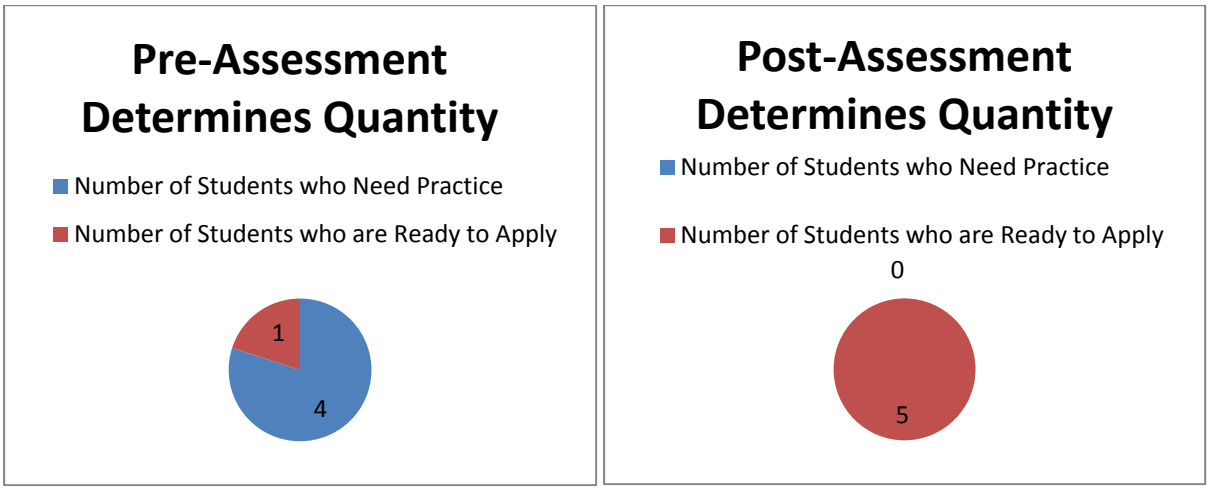
Student	Number of 10s	Reaction to Estimate	Determines Quantity	Going Back	Going On + 10	Going On - 10
Lindsay	**A**	**I**	**A**	**-**	**P**	**P**
Jessica	**I**	**I**	**A**	**-**	**P**	**P**
James	**A**	**I**	**A**	**-**	**A**	**A**
Janey	**I**	**I**	**A**	**-**	**P**	**P**
Luke	**A**	**A**	**A ***	**-**	**A**	**A**

* Once again while forming the groups of 10s; Luke made two groups of 10 and 1 group of 8. This left 6 leftovers, instead of 4; to which he stated the total number as 36 instead of 34. This was correct although his one-to-one correspondence interfered with his accuracy?

When the data in these tables is compared, the students made considerable progress between the pre-and post assessments in the *Determines Quantity* section. In the pre-assessment, only 1 student was able to successfully tell the total number when the groups of tens and ones was known.

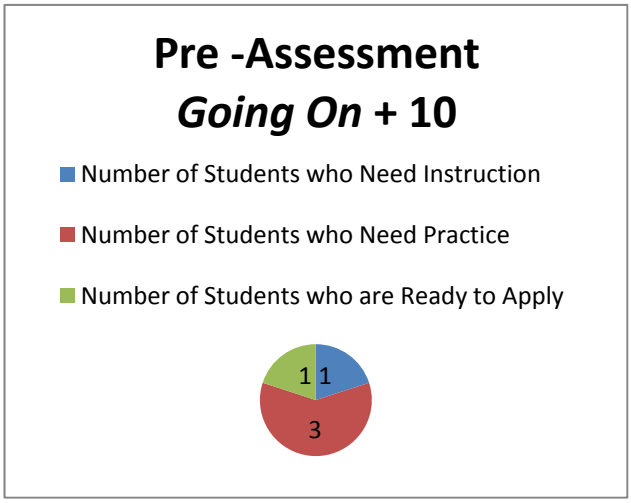
The post-assessment table shows that 5/5 students were able to successfully state the total number without needing to count, using their knowledge of the groups of 10s and 1s. This information is represented in the graph below.

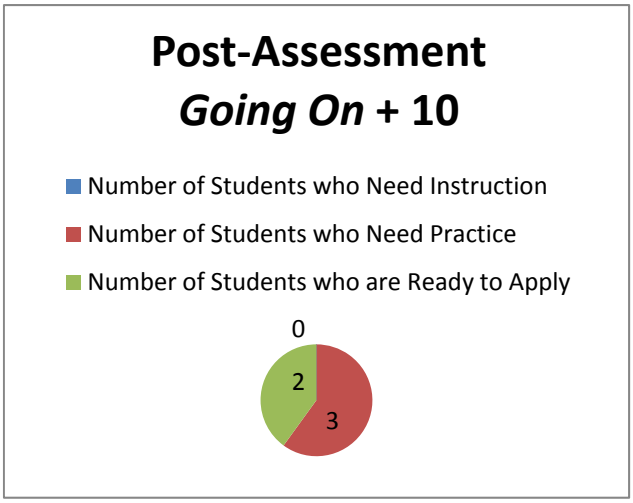
LG 1 Pre and Post Comparison of the: Determines Quantity Section



These graphs represent the growth of all the students in my sub-group throughout the unit. Each lesson in the unit provided students with the opportunity to build a place value model and state the total number. As students became more familiar with building the place value models, they became more fluent in realizing the number of groups on their place value boards corresponded with the total number of cubes. The pre and post assessment interviews measured this ability, and as shown here, all students were successful in achieving LG 1, as they were able to *automatically* state the total number, using their knowledge of the number of groups of 10s and 1s represented by their model. The next step to continuing to develop place value number sense and understanding numbers as 10s and 1s, is to be able to automatically add *10 more* and *10 less* to a given two-digit number. The *Going On* section of the interview, assessed this skill. The following graphs represent the pre and post assessment data in students' abilities to add 10 more, to the given number, 34.

LG 1 Pre and Post Comparison of the Going On +10 Sections



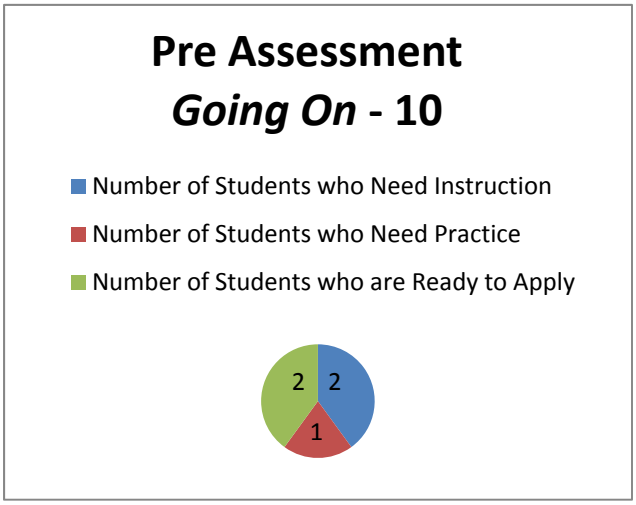


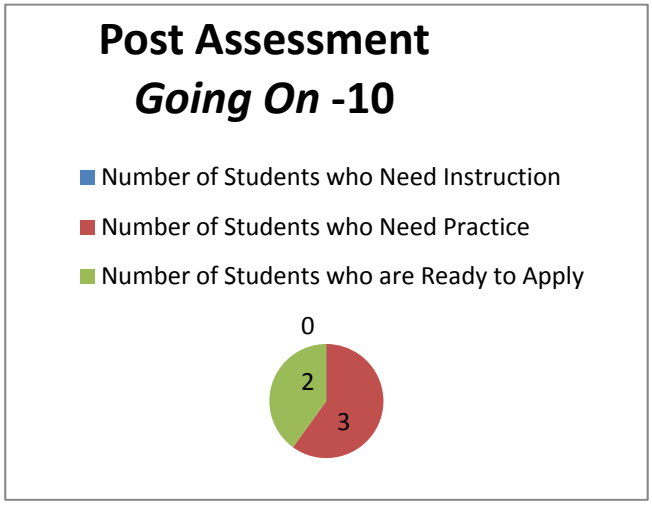
The pre-assessment data for the *Going On* section shows that three of the five students needed instruction in figuring out *10 more* than the given number, 34. Only one student in the pre-assessment successfully figured out *10 more* accurately without counting.

In the post-assessment *Going On* section, two of the five students were able to add *10 more* to the given number accurately, without counting. The other three students successfully figured out the correct answer to *10 more* by counting.

The following graph compares students' abilities to tell *10 less,* than the given number, 34, in the pre and post assessments.

LG 1 Pre and Post Comparison of Going On -10 Sections





These graphs represent students' growth in telling *10 less* than the given number. In the pre assessment two students needed instruction in figuring out *10 less* as they guessed or gave an incorrect answer. The post assessment shows growth as no student gave an incorrect answer or estimate. Two students automatically stated *10 less* than 34, and two students were able to successfully figure out *10 less* by counting.

All of the previous graphs illustrate a growth in students' thinking about numbers as 10s and 1s. All five students in the post-assessment were able to *automatically* tell the total number from looking at the groups of 10s and 1s, and all students in the post-assessment were able to at least accurately *figure out 10 more* and *10 less* than the number. This satisfies the second half of LG 1, that students are able to state the total number from a place value model.

In my analysis of LG 1, I have also taken into consideration my formative assessments. Throughout the unit I took anecdotal notes of whether the students were able to *build* a place value model, the first part of LG 1. All of the students were

successful at this piece of the learning goal, each student was able to build a place value model and name the total number (see **Appendix G** for an example of the place value boards students used to build their place value models). As students worked throughout the various learning activities, I went around and interviewed each student to formatively assess both of my learning goals. While these formative assessments helped me to observe students' understanding of LG 1, my greatest formative assessment came from an unexpected source.

The four lessons of my teacher work sample did not occur on four consecutive days. The days in-between my lessons my cooperating teacher was instructing the whole class using the math curriculum. On one of the days in-between my second and third lessons, my cooperating teacher sent home a packet of optional math homework which consisted of extra pages from the unit my teacher work sample was supplementing. Four of my six students brought back multiple pages from this optional homework packet, and their work demonstrates a transfer of their building numbers as groups of 10s and 1s, to breaking a number into groups of 10s and 1s and drawing and labeling this representation. All of the students were successful in drawing and labeling their representations, two students even completed a page that asked them to break apart the number 46, in more than one way, using groups of 10s and 1s. These examples of student work can be found in **Appendix H.** I realize these pages were homework assignments which mean students may have received assistance from others at home. Although, two of the ELL students in my group who brought back homework are the oldest children in their families and have parents who only read in Spanish. For these

reasons I believe it is reasonable to accept these homework pages as a true reflection of these students' understandings.

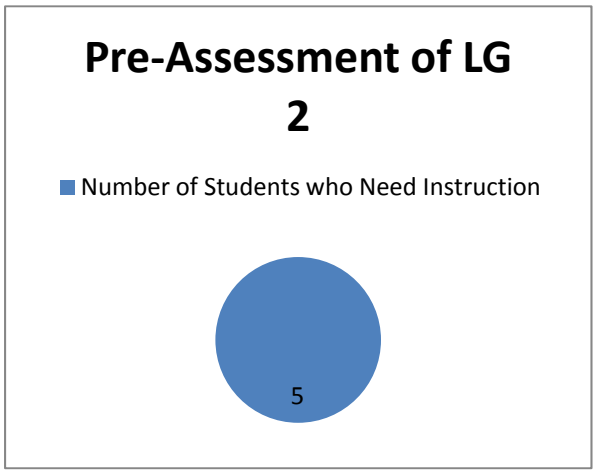
Overall, my pre and post assessment evidence along with my formative data (including unexpected homework data), demonstrates that all five students in my subgroup developed in their place value number sense, thinking of numbers as groups of 10s and 1s. To achieve understanding of LG 1, I structured each learning opportunity in this unit to incorporate students building place value models and separating a number into groups of 10s and 1s. I feel the practice of physically building a place value model and seeing the number visually represented in groups of 10s and 1s was a large piece of students' success. I also made sure to focus on my formative assessment of LG 1 and interview students, as well as take notes on their ability to state the total number on their place value board. This enabled me to closely monitor students' understanding to determine if it was necessary for me to adapt my instruction to meet their needs, or address confusion.

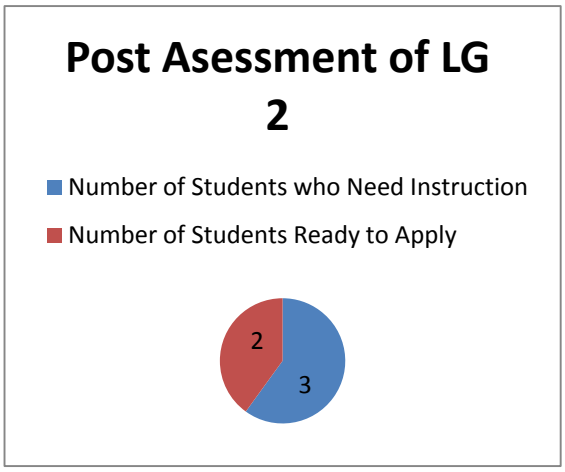
Analysis of Learning Goal 2

The next learning goal I analyzed was LG 2 which concerned the written symbols of a two digit number. In the pre and post assessment of LG 2 students were asked to write the given two-digit number, 17. Students were then asked to place a label stating "Tens Place" and "Ones Place" under the respective digits. Lastly, I pointed to a digit and asked the students to tell me what the digit stands for, to assess their understanding of the written place value symbols of two digit numbers.

All five students in my subgroup were successful in writing the given number 17, in both the pre and post-assessment. The following graphs represent students' results of the *second* part of LG 2 from the pre and post assessments, whether students were able to correctly label the tens and ones place and say what each digit represents. The rubric for this assessment can be found in **Appendix D.**

LG 2 Pre and Post Comparison

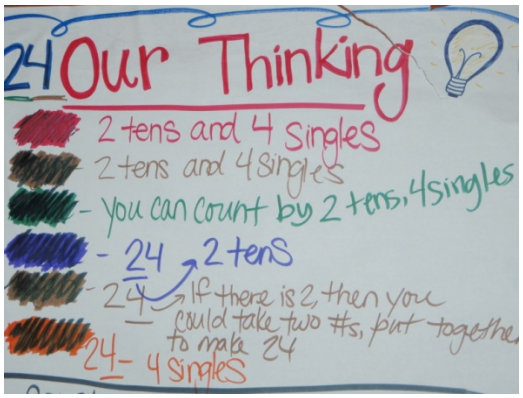




As these graphs illustrate none of the students were able to identify the tens and ones place in a two digit number, or tell what each digit represented in the pre-assessment. In the post-assessment, two students were successful in both of these areas; they were able to correctly identify the tens and ones place and describe what each specific digit represents.

I was surprised by this post-assessment data though, because before the post-assessment I felt the students had a fairly strong understanding of LG 2.

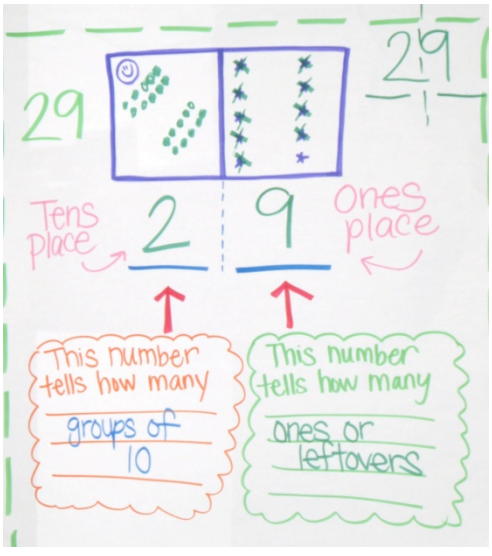
Throughout the unit I began each lesson with an activity targeted at LG 2, where students were asked to examine a place value model and its' written symbol. "*Our*



Thinking Chart" **(Appendix I)** which can be viewed to the left, records two students who made a connection between their place value boards and the written symbol. Janey's thoughts are in purple marker, she stated that the 2 in the symbol 24, stood for "2 tens", which were on her place value board. Lindsay stated the 4 in 24, stood for "4 singles", which were also represented on her place value board.

This chart was one way for me to formatively assess students' thinking. Two other students began our discussion on this chart by answering how many groups we found in 24. These students shared that 24 was made up of "2 tens and 4 singles;" although they were stating the number of groups of 10s and number of singles found on their place value mats, rather than making a direct connection of those groups to the written symbol.

As a group, we constructed the chart to the right as well, (also found in **Appendix J).** This chart includes a visual of students' place value mats; they had all constructed the number 29. I left spaces for the written symbols under each side of the place value mat, and asked students to tell me how many groups of 10 there were, and how many singles we had. I recorded their answers and we arrived at the number 29. I then asked students to help me fill in the bubbles on the chart which said, "this number



tells how many…" The colored markers on the chart correspond with a specific student. James told me that the 2 in 29 tells how many "groups of 10s" there are. Jessica told me the 9 in 29 tells how many "ones or leftovers" there are.

These responses from students led me to believe students had a good understanding of what each digit represented in a two-digit number. My formative assessment interviews also gave me reason to believe this. The following are transcribed interviews with three students, from my assessment of LG 2.

Interview with Janey:

Teacher	**Student**
"See this number right here? What number is that?"	"60"
"And what does this number mean right here?"	"6"
"It means 6?"	"It stands for 10s"
"So how many tens?"	"6"

Interview with Luke:

Teacher	**Student**
"What is this number?"	"54"
"What does this number mean?" (pointing at the 5)	"That it's in the tens place."
"It's in the tens place, and how many is in the tens place?"	"Five"
"Five what?"	"Tens"
"How much is five tens?"	"Um five towers of 10"

Interview with James:

Teacher	Student
"What does this number mean?"	"2 tens"
"How much is 2 tens?"	"20"
"And what does this number mean?"	"9 ones"
"How many are there altogether?"	"29"

In the moment of these formative assessments I felt students were able to successfully explain to me what the digits represented. Although, now that I look at this data I see how students demonstrated a partial understanding that is still developing; especially Janey and Luke. Janey originally told me that the 6 in 60, stood for – 6. Then I said, "It means 6?" She then immediately told me – "it stands for tens." Examining this interaction now I see how Janey may have said that in response to my question, and not out of a true understanding. Luke's example illustrates this as well. I asked him to tell me "how many is in the tens place? [in the number 54]" to which he replied, "5." I then said, "five what?" to which he said, "umm, five towers of ten." This example to me illustrates how my questions may have gotten in the way of students' understanding. In these two examples I was not very explicit with my language, I did not use the language we had used as a whole group – "what does this number *stand for"* and I also feel that my questions did not help to elicit students' thoughts. My questions could have been rephrased along the lines of, "tell me more" or "what else can you say about

the 5 in the number 54?" These questions may have been more successful in allowing students to share their thinking rather than simply respond to my question.

Another interesting aspect of analyzing these transcribed interviews is Luke's response of "five towers of ten." His response led me to evaluate the use of language within the math curriculum. As I stated before, my teacher work sample was supplementing the unit being taught out of the curriculum and in-between my lessons students were receiving instruction from my cooperating teacher. The curriculum gave specific labels for the 'groups of 10s' and 'ones.' One of sets of labels was "towers of 10" for groups of 10, and "leftovers" for ones. The curriculum also created many work pages about a 'sticker store' where students could purchase "sticker strips" consisting of 10 stickers, and "singles."

When I began to plan my teacher work sample, my cooperating teacher and I had difficulty estimating where she would be in the curriculum at the time I would teach my unit. It just so happens that a few of my lessons coincided with the curriculum's tens and ones unit which used these different labels. I knew it would be important for my instruction to use consistent vocabulary so I did not incorporate the curriculum's labels into my lessons. My language stayed consistent to "groups of 10s" and "ones" as I felt these were true labels that could be applied to the understanding of the tens and ones place in a number and LG 2.

The language used in the curriculum though provided many labels for the same content, and this may have been a contributing factor in the lower achievement of two of the ELL students in relation to LG 2. The inconsistent vocabulary of the curriculum

may have made content less comprehensible for students, since there were many labels referring to the same content of 'groups of 10s' and 'ones.'

These factors may b the reasons for the discrepancy between my perceived student understanding during the unit, and the actual post-assessment results. Another reason for this discrepancy could be the amount of time I spent on teaching students to identify the "tens place" and "ones place." As shown on the chart in **Appendix J**. I identified the "Tens Place" and the "Ones Place" for students on this chart during the third lesson. I had this chart posted during the fourth lesson, yet I didn't go over the "tens place" and "ones place" labels again.

I felt that it was important for students to understand the relationship between the written symbols and the number of groups, before they should worry about the place value labels. I figured that with an understanding of what the digits represented, students would be able to correctly identify the tens and ones place in a two digit number. Although this may have been a flaw in thinking, and only being formally introduced to the formal labels of "tens place" and "ones place" once throughout the unit, may have been a big factor in the three students' struggle to correctly label the places in the post assessment.

Overall I feel the assessment data for LG 2 demonstrates that three of the five students in the group are still developing their understanding of the written two-digit number symbols. My instruction could have been more explicit and my questioning more succinct and focused on eliciting students' thinking during this unit to help more students achieve this learning goal.

Next Steps

Since students demonstrated an ability to add ten more and ten less automatically in the post-assessment of LG 1. I feel the next steps would be to help students transfer this understanding to other math contexts. As my next step, I would incorporate 'groups of tens story problems' into these students' instruction. I would have students build place value models to represent the initial number in the story problem. Then students would either add groups of 10s, or take away groups of 10s, based upon what happens in the story. The place value board would serve as the visual representation of the numbers, and we could once again examine the written symbols' relationship between the initial number, number of groups of 10s we added or subtracted and the final product.

Also, I would provide students with exposure to the labels of "tens place" and "ones place" and make more explicit connections for them between what the digits in a two-digit number represent. I would also provide more opportunities for students to complete tasks that would provide a hard copy of their thinking and understanding, rather than relying so heavily on my anecdotal notes and interviews.

Individual Analysis

I chose to analyze Lindsay's progress over this unit. I chose Lindsay because she was one of three ELL students in the group and I wanted to analyze how well she developed these conceptual place value concepts with the differences in vocabulary terms. I also chose Lindsay because I had gathered sufficient formative assessments from her throughout the unit.

Analysis of Learning Goal 1

Lindsay made growth her thinking of numbers as 10s and 1s throughout this unit. In Lindsay's pre-assessment of LG 1 she estimated there were 100 cubes on the table. When asked how many groups of 10s she could make, she replied, 100. I asked her again, "if you have 100 cubes, how many groups of 10 could you make with them?" to which she replied, "If there's 100? 100." Lindsay's estimate of the number of 10s was not related to the total number she estimated. This may be contributed to language, possibly she was unsure of what the question asked, yet the rest of her pre-assessment data shows that she did not automatically know the connection between the number of groups of 10s and 1s and the total number. She determined the total number by counting by groups of 10s and 1s. In the post-assessment however, the number of tens Lindsay estimated *did* correctly match her overall estimated number. In the post-assessment Lindsay knew the total number of cubes *automatically*, from looking at the groups of 10s and 1s. Additionally Lindsay's post-assessment shows growth because she was able to figure out *10 more, and 10 less* than a given number, where in the pre-assessment she stated the incorrect answer for *10 more* than a number.

Lindsay's pre and post assessment data is represented in the tables below, the rubrics for which can be found in **Appendix B**.

Lindsay's Pre-Assessment LG 1

Student	Number of 10s	Reaction to Estimate	Determines Quantity	Going Back	Going On + 10	Going On - 10
Lindsay	**I**	**A**	**P**	-	**I**	**A**

Lindsay's Post Assessment LG 1

Student	Number of 10s	Reaction to Estimate	Determines Quantity	Going Back	Going On + 10	Going On - 10
Lindsay	**A**	**I**	**A**	-	**P**	**P**

Additional formative assessments of LG 1 demonstrate Lindsay's transfer of building place value models to represent groups of 10s and 1s, to breaking apart a given number and drawing and labeling the groups of 10s and 1s. Out of my group, Lindsay returned the most optional homework pages, given by my cooperating teacher. These work pages demonstrate her thinking of numbers as 10s and 1s. I believe these work samples are a true representation of Lindsay's thinking even though they were homework assignments; as Lindsay is the only one in her family who reads in English and her parents often request Spanish copies so they may help her. Examples of her thinking can be found in **Appendix K.** Another formative assessment used to evaluate Lindsay's understanding of LG 1 was the following transcribed interview.

Teacher	Lindsay
"How many do you have here altogether?"	88
"88, how did you know that?"	Because there was 8 tens and 8 ones.

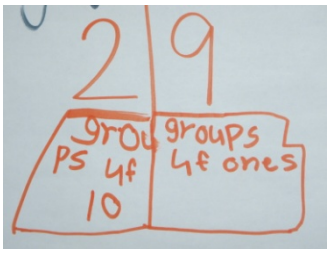
This interview shows that Lindsay was using her knowledge of the groups of 10s and 1s to state the total number on her place value board. Using this knowledge shows growth from her pre-assessment when she had to count her place value model by 10s and 1s. Overall I feel the experience of creating place value models and stating the

number provided Lindsay with important experience that led to her success in LG 1, as well as her success in completing her work pages.

Analysis of Learning Goal 2

In both the pre and post assessment of LG 2 Lindsay was able to correctly write the number 17. When I asked Lindsay to describe what the 1 stood for in 17, she said, "it stands for one." When I asked her what the 7 stood for in 17, she said, "it stands for 7." In the pre-assessment Lindsay was unable to correctly label the tens and ones place in the two-digit number.

In the post-assessment, I asked Lindsay to first label the tens and ones place in the number 17. She labeled the 1 -'ones place' and the 7 - 'tens place.' I then asked Lindsay to tell me what the 1 stands for, to which she replied, "It stands for 1 ten", I then asked her to tell me what the 7 stands for and she said, "it stands for 7 ones, oh wait." She then proceeded to *re-label* the tens and ones place. She switched the labels to correctly label the digits. I then asked, "Why did you change that?" She stated, "Because there is one ten and seven ones." Lindsay's understanding of what each digit represents prompted her to re-label the digits, which shows her growth in LG 2 throughout the unit. At the beginning of the unit she was unable to say what the digits in a two-digit number stood for, and by the end, she could successful self correct her labeling because of her understanding of what each digit represents. This understanding will greatly help Lindsay as she enters into the upcoming unit on two-digit addition.



Lindsay's post-assessment is in alignment with the formative assessments I gathered from her on LG 2 throughout the unit. Lindsay wrote in her own words on *"Our Thinking"* chart (shown at the left) that in the number 29, the 2 stands for "groups of tens", and the 9 stands for "groups of ones. " An interview I had with Lindsay is represented below, which also shows evidence of her understanding of LG 2.

LG 2 Interview with Lindsay

Teacher	**Student**
"Okay, what does this number mean?" (pointing to the tens place in the number 88)	"How many tens there are"
"And how many tens are there?"	"8"
"What does this number mean?"	"Ones"
"How many ones are there?"	"8"

This interview also shows Lindsay's success with LG 2, she was able to tell that the first digit in the two digit number represented how many tens there are, and the second digit represented how many ones were in the number. Her language also conveys that she was not incorporating the specific curriculum labels for the groups of 10s and ones, and those labels did not interfere with her understanding. Overall this unit was very important for Lindsay's understanding of place value.

Next Steps

The next steps I would take with Lindsay are the same steps I would take with the group, to transfer this understanding to a different context. I feel that it will be

important to scaffold Lindsay's learning in the upcoming unit on two-digit addition and to reinforce her understanding of what each digit represents in a two-digit number. Continuing to build place value models to physically represent addition of groups of 10s and 1s would help to make the process of two-digit addition more comprehensible for Lindsay. Explicitly defining and using consistent vocabulary to help make the content comprehensible will be important. It will be important to teach Lindsay and all the students to use the actual mathematical terms – and make the synonyms for these terms explicit.

Reflection and Self-Evaluation

Reflecting upon this unit I feel that LG 1 was the most successful because it is the learning goal in which all the students in my subgroup showed the most growth. All students at the end of the unit were able to *automatically* tell the total number when they knew the number of groups of 10s and 1s, in the number. This shows that students can now immediately see the relationship between the number of tens and the total number. I feel that the success of LG 1 is due in part to the fact that students were building place value models and stating or writing the total, during each lesson activity. Additionally, I feel this LG was successful because it was observable and measurable, it was easy for me to assess students' understanding of the LG, thus I knew how to proceed with my instruction.

The least successful learning goal of the unit was LG 2, simply because I feel most of the students only have a partial understanding of it at this point. The students' partial understanding can be contributed to the fact that I only taught the "Tens Place"

and "Ones Place" labels during one lesson and did not reference them again. Also, I know I was not consistent with my questioning surrounding this learning goal, and the language of the curriculum may have interfered with the students understanding of the actual concepts. Also, I know place value is developmental. Students have to wrestle with factors such as the *ones place,* representing *more than one* – singles; and students have to learn that one number can be represented several ways. For example, *seventy* may be represented as 7 tens and 0 ones, or as 70 but not as 7 or 07 (Richardson, 1999).

In response to my teacher work sample as a whole, I have created specific goals for my future professional development. The first goal is to continue to learn about how to pose questions that will help to elicit students' thinking and understanding- and not simply invite them to answer a prompt. To accomplish this goal I will access *Teaching Children Mathematics*, in the Mathematics Library at Western Washington University. This journal often has articles which speak to questioning such as, *Questioning Your Way to Standards.* Additionally I will read the book, *Choice Words, How Our Language Affects Children's Learning,* by Peter Johnston. I will also continue to tape record my teaching of mathematics to analyze how my language and questions may help or hinder students' learning. I will then be able to address and change my language to better elicit students' thinking and support their leaning.

Another goal I have for my future is to continue to learn about best practices for teaching and assessing vocabulary. Vocabulary instruction is often overlooked or assumed to be embedded within curriculums, yet it is important to have specific structures for explicitly teaching vocabulary. Next quarter I am enrolled in a course at

Western for my reading endorsement. In this course I know we will be covering specific ways to explicitly teach vocabulary, I will implement the knowledge I gain through this class in my own teaching. Also, I plan to learn more about specific GLAD strategies from my peers who incorporate these strategies in their everyday instruction. I want to implement these GLAD strategies as an additional way to improve vocabulary instruction and assessment for not only students acquiring English, but for *every* student.

Appendix A Pre and Post Assessment, LG 1

"Grouping Tens"

Name: Date:

Concept 8: Numbers As Tens And Ones

Student Interview

S.I. p.1 C.S. A.W.

YOU NEED: 34 connecting cubes, all one color

GOAL: To determine if the child can tell "how many" in a quantity if the number of tens and ones is known and to determine if the child can add ten and take away ten without counting.

PROCEDURE: Present the child with 34 connecting cubes. Ask the questions below and circle the indicators for each question.

PART ONE: ORGANIZING INTO TENS AND ONES

PRESENT THE CHILD WITH 34 CONNECTING CUBES

Ask: ***"How many do you think there might be?"*** _____ Doesn't estimate Estimates: _____

Ask: ***"How many groups of ten do you think you can make?"*** Says:

NUMBER OF TENS IN A NUMBER
- I Tens and ones not related to the estimate
- A Tells correct number of tens

Say: ***"Check and see how many tens you can make."*** (piles, not trains)

While the child is counting out tens, notice and mark child's reaction and/or new estimate.

REACTION TO ESTIMATE
- I No reaction
- P Reacts, no new estimate
- A Spontaneously makes new estimate

After the child has made all the tens possible, ask: ***"How many groups of ten did you make?" "How many leftovers?"*** Tens_____ Leftovers_____

Ask: ***"Does this give you an idea of how many there are?"*** If necessary, ask: ***"Can you find out?"*** Says:

DETERMINES QUANTITY
- I Counts all by ones
- P Count by tens, and then counts the ones
- A Knows the total quantity without needing to count

- If the child counted all by ones, ask the following question and then use the **Going Back** column.
- If the child counted by tens or knew the quantity without counting, ask the following question and use the **Going On** column.

Push the cubes back into a pile and ask: ***"Now, how many are there? ...How do you know?"*** Says:

GOING BACK

Remove some cubes, leaving a pile of 17. Ask the child to find out ***"How many are in this pile?"*** Says:

Ask: ***"How many trains of ten do you think you can make?"*** ***"Go ahead and make a train."***

As the child begins to make a train of ten, ask, ***"How many leftovers do you think there will be?"*** Says:

ONE TEN AND LEFTOVERS
- I Guesses or gets wrong answer
- P Figures out accurately
- A- Knows, but checks
- A Knows without counting

GOING ON

"How many will there be if we add 10 more?" Says:

PLUS 10
- I Guesses or gets wrong answer
- P Figures out
- A Knows without counting

"What if we take 10 away?" (refocus on 34 if necessary) Says:

MINUS 10
- I Guesses or gets wrong answer
- P Figures out
- A Knows without counting

Put back the cubes previously removed. If necessary, remind the child that there are 34 and go on to page 2.

If the child adds and subtracts 10 without counting, ask the EXTENSION questions. (If the child counted to get the answers, skip these questions and go on to pg. 2.)

EXTENSION: Use the indicators as above.

Say:		Says:	I	P	A		Says:	I	P	A
"What if we..."	***added 20 more?"***					***had 7 tens and we added 12 more?"***				
	took 20 away?"									

SUMMARIZING INSTRUCTIONAL NEEDS

GOING BACK: ONE TEN AND LEFTOVERS
- A Knows without counting
- A- Knows, but checks
- P Figures out accurately
- I Guesses or gets wrong answer

NUMBER OF TENS
- A Tells the number of tens
- I Unable to tell the number of tens

DETERMINES QUANTITY
- A Knows without counting
- P Counts by tens
- I Counts by ones

GOING ON
- A Knows without counting
- P Figures out
- I Guesses or gets wrong answer

+10 **-10**

EXTENSION:	+20			-20			7 TENS + 12		
	I	P	A	I	P	A	I	P	A

Concept 8: Student Interview Form Page 1 of 2

Appendix B

Rubric Criteria for Pre and Post Assessment

Learning Goal 1*: Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number*

Instructional Needs	**Number of 10s**	**Reaction to Estimate**	**Determines Quantity**	**Going Back**	**Going On**	
					+10	**-10**
I Needs Instruction	Number of 10s is not related to estimated number.	No reaction while the student is counting the cubes	Counts all cubes by ones	Guesses or gets wrong answer	Guesses or gets wrong answer	Guesses or gets wrong answer
P Needs Practice	N/A	Reacts to counting by hesitation or comment, no new estimate is made	Counts by tens and then by ones	Figures out accurately	Figures out accurately	Figures out accurately
A Ready to Apply	Tells correct number of 10s in the estimated number	Spontaneously makes new estimate while counting	Knows the total quantity without needing to count	Know without counting	Knows without counting	Knows without counting

Appendix C

Student Record Sheet for Pre and Post Assessment

Learning Goal 2: ***Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number.***

Name _____

Appendix D

Rubric Criteria for Pre and Post Assessment

Learning Goal 2: ***Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number.***

Instructional Needs	Written Number:	Identifies Tens and Ones Place in the number 17:
I **Needs Instruction**	Student does not write the correct number to represent the place value model.	Student incorrectly identifies tens and ones place. Explanations may include reasoning such as: "This is the tens place because it has a 1. The seven is in the tens place because 7 is closer to 10 than 1."
A **Ready to Apply**	Student writes the correct number to represent the place value model.	Student correctly identifies the tens and ones place. Explanations include reasoning such as: I know this is the tens place because in the number 17 there is 1 group of 10. This is the ones place because there are 7 single ones in the number 17 when you break 17 into tens and ones."

Appendix E Anecdotal Note Sheets

LG 1: Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.

Student	Determines Quantity - Is the student able to form groups of 10s and 1s? - How does the student determine the total number? (counts by 1s, counts by 10s and 1s, knows automatically)	Names the Total - Is the student able to name the total number represented on their place value mat?	Estimation -Will student estimate how many groups of 10s and 1s can be formed from a given #? - Estimation related to the digits in the #?	Challenge - Is the student able to correctly answer 10 more than a given number? 10 less?	Other
Janey					
Jessica					
Lindsay					
Nick					
James					
Luke					

Anecdotal Note Sheets

LG 2: Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number.

Student	**Written Number** - Is the student able to write a given two-digit number? - Is the student able to write a two-digit number representing their place value model?	**Identify 10s and 1s Place** - Is the student able to correctly identify the 10s and 1s place?	**Tens Place** -Is student able to describe digits in the tens place as a number of tens? Such as: "50" or "5 tens", rather than just "5"?	**Ones Place** - Is the student able to describe the digit in the ones place as representing singles, or leftovers?	**Other**
Janey					
Jessica					
Lindsay					
Nick					
James					
Luke					

Appendix F Guiding Questions for Student Interviews

***LG 1**: Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.*

Luke	Nick	James	Lindsay	Jessica	Janey

- ✓ "How many tens do you think you can make?" "How many leftovers do you think you may have?"
- ✓ "Now that you have this many 10s, do you have another idea of what it could be?"
- ✓ "I see you have organized these into tens and ones. How many do you have so far?"
- ✓ "Now that you know how many 10s and leftovers there are, does that help you know how many altogether?"
- ✓ "Can you find out? How did you count, will you could out loud so I can hear?"
- ✓ "Anything else?"

***LG 2**: Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number.*

Luke	Nick	James	Lindsay	Jessica	Janey

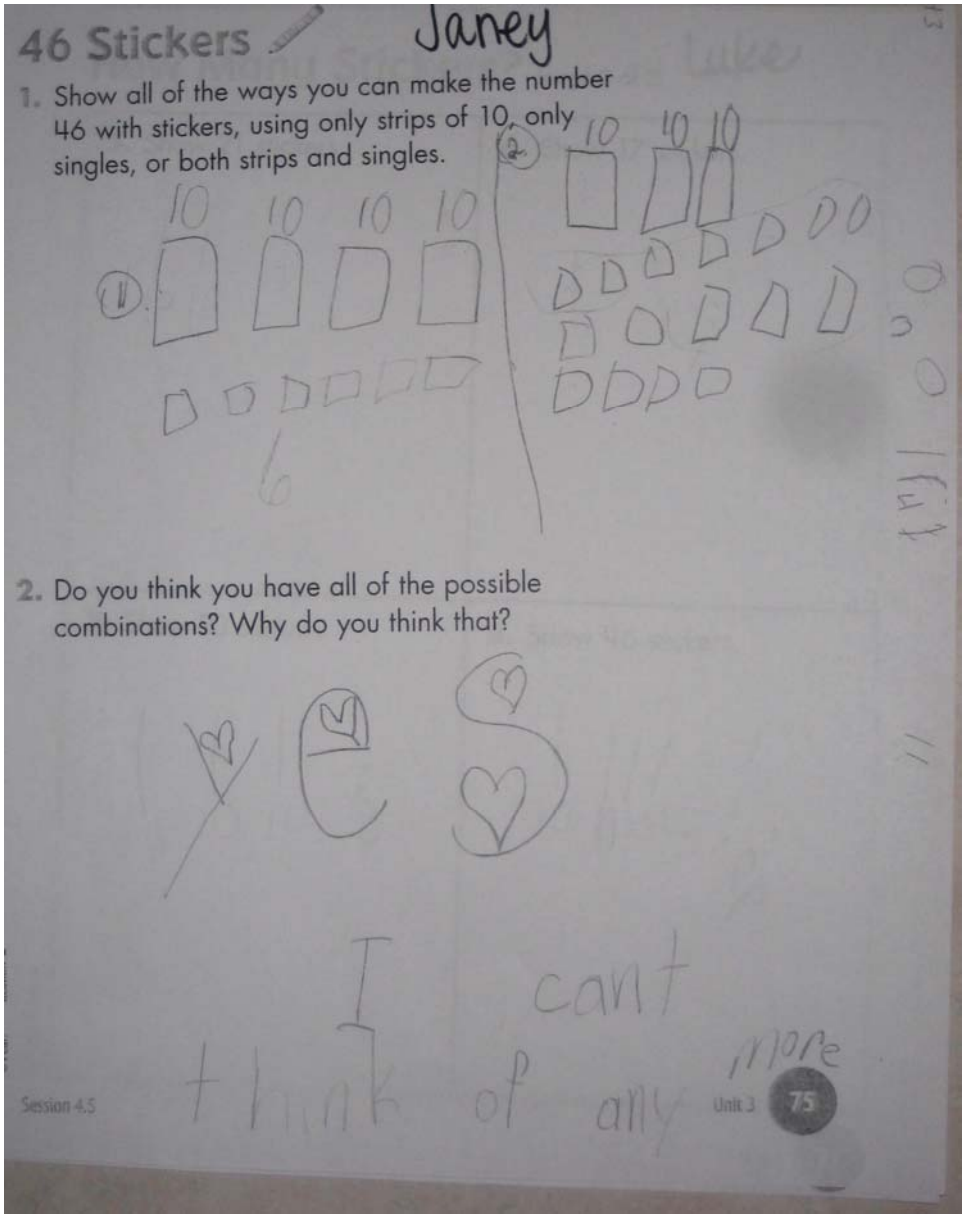
- ✓ "Wow! Will you write the number that shows how many you have on your place value mat right now?"
- ✓ "What is the number you wrote? How did you know to write that number?"

- ✓ “Show me which digit is in the tens place? How do you know/why do you think so?”
- ✓ “Show me which digit is in the ones place? How do you know/why do you think so?”
- ✓ “What do you notice about the objects on your place value board and this written number? What does that make you think?

Appendix G: Example of Place Value Board

Appendix H: Examples of Student Work

These examples of student work were used as formative assessment of the transfer of students' thinking regarding Learning Goal 1: Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.



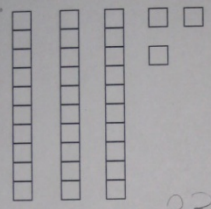
How Many Stickers?

Janey

NOTE Students use place value (tens and ones) to identify and represent numbers.

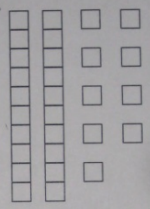
SAMPLE 28, 29

1.



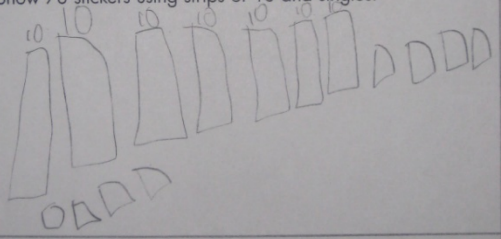
How many stickers? 33

2.



How many stickers? 29

3. Show 78 stickers using strips of 10 and singles.

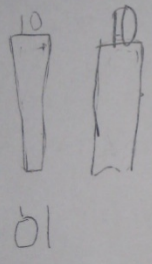


4. Show all of the possible ways to make 45 with stickers (strips of 10 and singles). Use the back of this page.

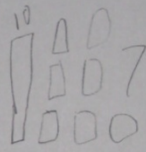
How Many Stickers? (page 2 of 2)

Janey

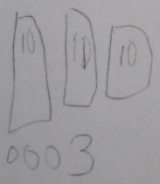
5. Show 21 stickers.



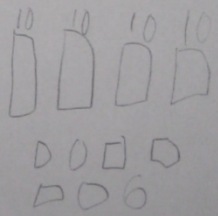
6. Show 17 stickers.



7. Show 33 stickers.



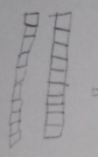
8. Show 46 stickers.



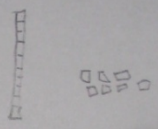
How Many Stickers? (page 2 of 2)

James

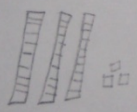
5. Show 21 stickers.



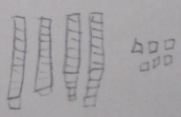
6. Show 17 stickers.



7. Show 33 stickers.



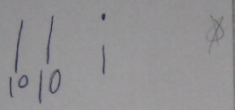
8. Show 46 stickers.



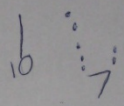
How Many Stickers? (page 2 of 2)

Luke

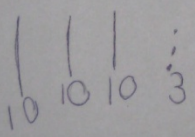
5. Show 21 stickers.



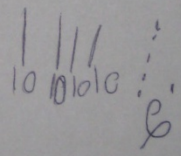
6. Show 17 stickers.



7. Show 33 stickers.

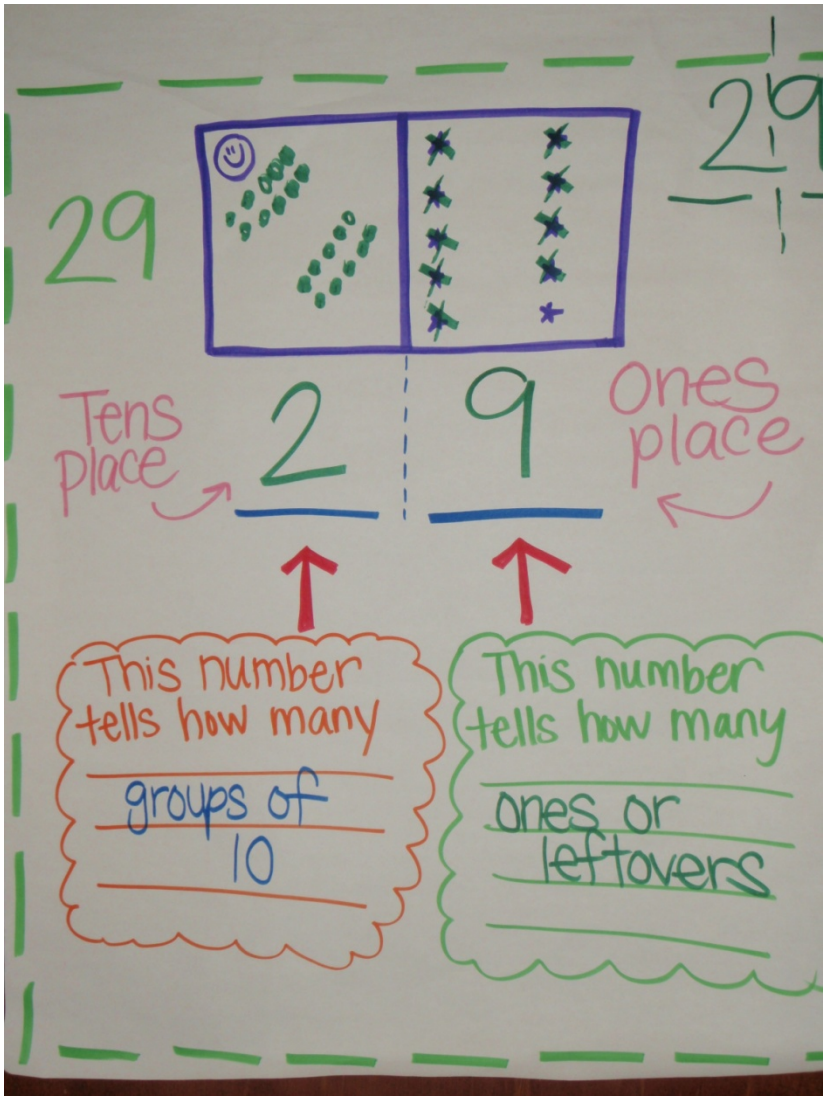


8. Show 46 stickers.



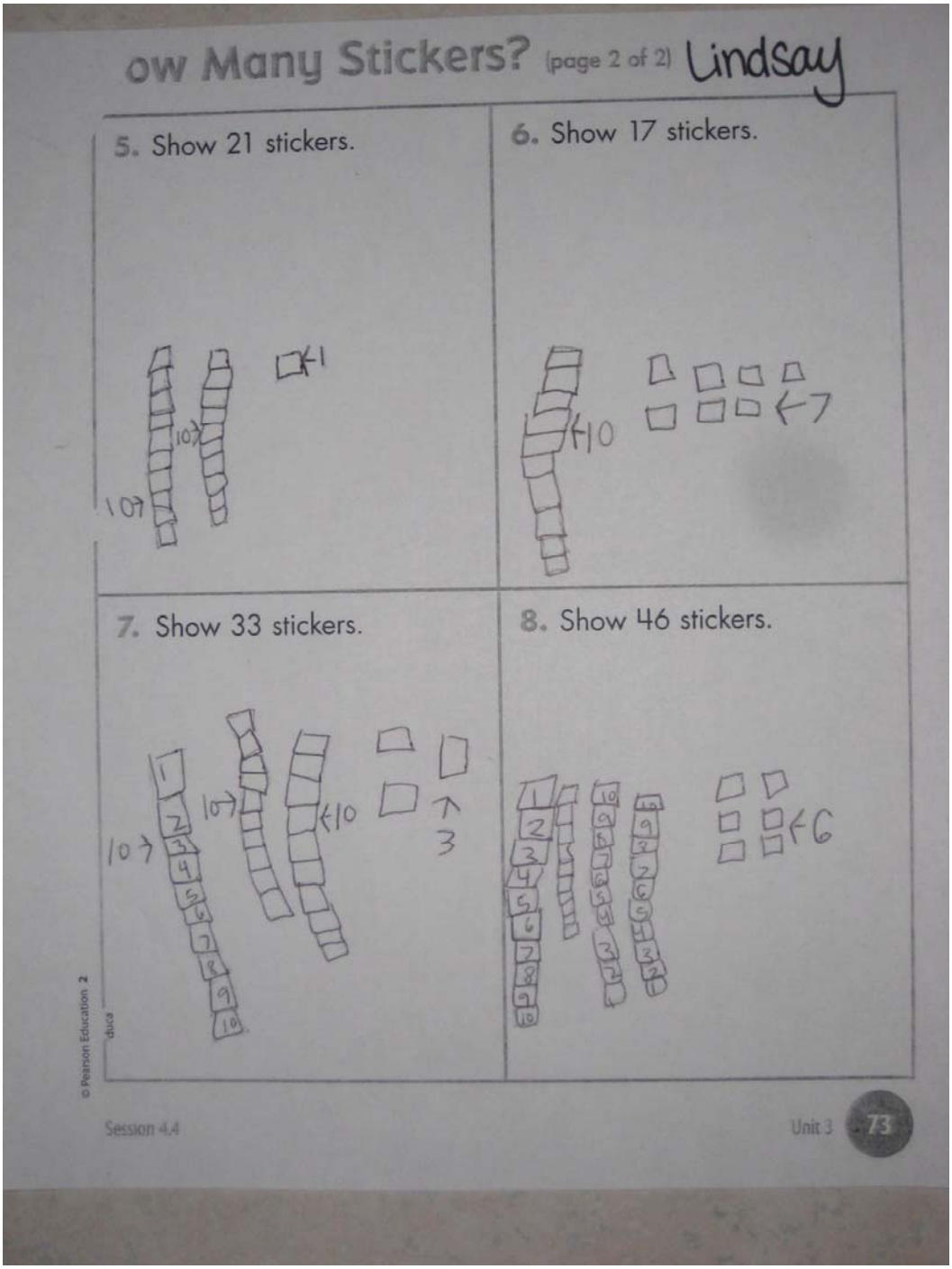
Appendix J: Additional Place Value Chart

This place value chart was created in the third lesson, during a discussion after the "Thinking about the Symbols" activity, which was targeted at LG 2: Students will be able to write a given two-digit number, identify the 10s and 1s place and describe how many groups of 10 are represented by the first number, and how many 1s are represented by the second number. The colors on the chart correspond with a specific student's thoughts (with the exception of pink, which was the teacher's color).



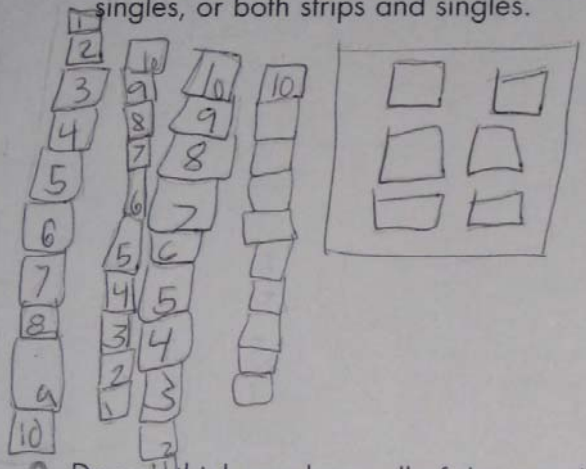
Appendix K: Examples of Lindsay's Work

These examples were used to formally assess Lindsay's ability to transfer her understanding of LG 1: Students will be able to use a place value model to represent a number as 10s and 1s, and name the total number.



6 Stickers Lindsay

1. Show all of the ways you can make the number 46 with stickers, using only strips of 10, only singles, or both strips and singles.



2. Do you think you have all of the possible combinations? Why do you think that?

I think yousig by tans and owns. Because you yus 4 tens and 6 owns.

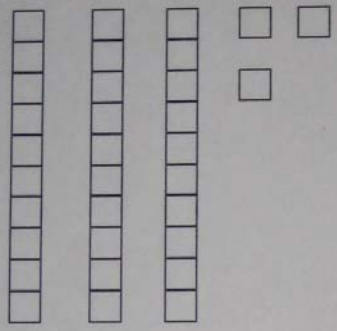
ow Many Stickers?

Lindsay

NOTE Students use place value (tens and ones) to identify and represent numbers.

SMH 28, 29

1.

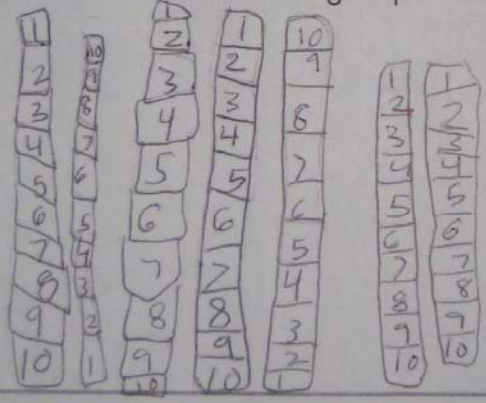


How many stickers? 33

2.

How many stickers? 29

3. Show 78 stickers using strips of 10 and singles.



4. Show all of the possible ways to make 45 with stickers (strips of 10 and singles). Use the back of this page.

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