Unpacking Place Value

"Solving Math Problems and Making Sense from Concrete to Abstract"

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Introduction

Without mathematics, there's nothing you can do. Everything around you is mathematics. Everything around you is numbers. –Shakuntala Devi, Indian writer and mental calculator

Numbers are in our everyday lives. Just about everything we do or see involves numbers. The way of life is with numbers. For example, using an algorithm to solve a problem. There are steps used to follow in working out a problem. In the Native American way of life, our culture involves numbers too. Mind you that while formal mathematics was established from other cultures, it is used across all cultures and time. So learning and knowing numbers is an essential part of everyone's life. The simple things we do in life are represented by numbers which are quantities of objects or actions. Numbers represent quantities that are visible such as how many people appear or exit out of a room, gathering materials or supplies, exchanging money, shape of objects, and even in our daily population. Students tend to take numbers for granted because they really don't see or understand the concept of how they get to a certain solution or number of a problem. Most of the calculation is mentally or use of calculator. Math can be challenging for those who struggle with numbers, so mathematics may not be a favorite subject for some. Students come to grade level classrooms at different levels of how they perceive numbers or varies in their level of knowledge of numbers.

The history of how numbers came to be is very interesting. In every culture, numbers do represent for quantities of something. "Native American cultures had their own systems of mathematics long before Europeans arrived. Unfortunately, we know relatively little about these systems. Along with many other parts of Native American societies, lots of traditional mathematical knowledge was lost through the colonization of the hemisphere. Still, we know that math was part of their lives", says Christopher Muscato (2017) in his online class regarding Native American history and mathematics. As for the Diné, it interests me to know how numbers were used back so many decades. Muscato (2017) claims that Native American definitely used mathematic in their culture; it was represented in architectural structures, symbols in weaving and planting. It is unknown at what point did the Diné learned how to count things and kept track of how numbers are represented, especially when it comes to place value, but we do know mathematics played a large role in their daily lives.

In today's society, numbers are represented different than in the past. It makes one wonder how or what was used in the Diné culture to count animals or items. How was base 10 or base 5 substituted? As I recall as a young child, I observed my grandparents when they used to count objects. My grandmother used her fingers to represent base 10, base 5, or 4s. Muscato (2017) also mentioned that Native Americans used their fingers to count up to 1000. In representing place value, I remember my grandfather counting his livestock and he would put a specific amount of animals in each corral or in section of a corral by a base five because Diné people resort to their fingers by ones, fives and tens. Diné people understood that all can be grouped by ones if the amount was less than five. Five was based on one human hand. Ten was based on two hands. I believe this was one way to keep track of how many he should have in each corral. He would know if one was missing. I also was told by my mother and aunts that my grandparents had a lot of livestock. My grandfather would sadly share his story, "I had over one thousand sheep, and over 300 horses and cows." He lost most or reduced due to livestock reduction that was mandated by the government. Now that I can think back on it, I'd question them, "Hw did you know that you had over a thousand, or how did you keep track, what was a

hundred represented with?" These is an example that numbers are a part of everyone's life in all cultures. It is also an example of how numbers are important.

Context

The unit is developed for students at Tsaile Public School. Tsaile Public School is located in the heart of the Navajo Nation. It is in a rural area of North Eastern Arizona. Tsaile Public is one of the schools with Chinle Unified School District. It is approximately 25 miles east of the other 6 schools. Tsaile Public School is an elementary school and a Jr High combined, from preschool to eighth grade. The school's yearly enrollment ranges from 420 to 450 pupils. There are several other schools outside the district where students can also enroll in. This is sometimes a concern for the teachers because students who hop between schools are not stable academically because they do not always acquire all standards and skills. They show gaps. The ethnicity of the students is primarily Diné people or a descendant of another tribe. The school provides free meals for all students enrolled through a grant that it qualified for.

The community of Tsaile is small and peaceful. An estimated number of 1,200 people live in Tsaile. Tsaile is located at the base of Chuska Mountain. It is unique and very beautiful. It is unique because it is partially located in the forest where tall pine trees grow and partially located in the open rocky land towards Chinle. On the weekends, families often go fishing at a nearby lake or basically stay home. The nearest big town or city would be about 75 miles. There is only one convenient gas station, and a community college, known as Diné College, which is considered the main campus throughout the reservation. The Diné people that live in and around Tsaile live by the traditional values and beliefs of the Diné culture. Some of the children are engaged in learning their own Diné language and practicing the culture of Diné involving tending to livestock, especially sheep, hunting, fishing, and family events. Others choose to live in a more modern culture of the western civilization such as watch movies and be on the internet or video games. Culture remains in a typical family but the religion has changed for most. Many Diné attend church. Older generation families practice ceremonies to maintain harmony in their household. They often gather for ceremonial purposes or casual get together, for trips or social activities and events in the community. Younger generation families are not home. Grandparents often take care of their children. The young parents have to work or live off the reservation to provide for their families. Some live out in the cities or town and do not come home as often as they should. But the people in Tsaile seem to know each other very well. Extended families live nearby or by cluster by each other to support one another. Unfortunately, the town has also been hit hard by the COVID-19 pandemic. The pandemic does not allow gathering to continue. Family outings or events are prohibited due to safety reasons. Grandparents or parents are isolated to protect and stop the spread of the virus. Children are encouraged to stay inside their homes. Prior to the pandemic, families would have big social gatherings for celebration or hold ceremonies. Due to the belief of a "village" setting, it has affected many to spread the virus. Unfortunately, school must continue and a lot of students are learning in stressed setting. The parents are just as stressed to take on the role in helping with instruction.

Rationale

As students are promoted into the next grade level, teachers often find the students to be at different levels of understanding what numbers are and how numbers work. Some struggle basic number concept and cannot grasp the numbers or the number sense. When teachers observe or

work with students, they display frustrations, low grade marks, unmotivated when it is math time. Furthermore, teachers find themselves analyzing students to see exactly why the students are not comprehending. Students learn to count at an earlier age such as preschool and use 1-1 correspondent to represent the symbol with an object. Basically, numbers are learned up to ten at an early aged, then up to twenty and then three hundred, and so on. The fact could be students learn these numbers as a drill. They learn that numbers are always in the one's place even if they are in ten's or hundred's. This then becomes students' knowledge on number concept and place value. Unfortunately, we lose students somewhere in either the way a teachers' teaches numbers or the understanding of what numbers look mentally to the students. The foundation is not set strong. Students should be able to see the process or the algorithm of a math problem as they get into third grade. This is demonstrated through explaining the steps. Another insight is students who are not fluently with the academic vocabulary for math, find it hard to explain the steps involved in a math problem. This is a crucial area that needs to be addressed by educators on the Diné Nation. Simply because the way a question is asked on a state assessment is with the use of high terminologies, or what is known as academic language. I was very fortunate to work at a professional staff development with Robert Marzano. He stresses the importance of student learning to read and speak the academic vocabulary. This will help the students comprehend the question and be able to answer it (Marzano, 2005).

Math is related to science. Science involves hands on, investigation, and working with numbers. For math, it is a little similar, it deals with structure of counting, measuring, and describing shapes of objects. Both has logical reasoning, problem solving, representation, and connections through calculation that one must process of quantities. Today, learning mathematics in school is based on history of the Europeans and new developments as time goes by from North America. On the Diné Nation, students seem to learn through concreate rather than abstract. Most Diné learn through hands on and are visual learners which makes sense to teach math through concrete approaches rather than solely abstract approaches. Abstract has no physical representation as one would basically work the process mentally to solve a math problem. This is seen through cultural connection, such as rug weaving, traditional winter games, and traditional songs of how the Diné came to be. The Diné people may be strong in creativity and mentally keep track of numbers, but one of the obvious struggles is explaining the process of calculations. Calculations involves one to provide the algorithm of how the answer was found. This leads into the focus of this unit involving number sense and place value.

One of the main reasons to focus on number sense and place value is each year, according to our Arizona Merit State Assessment, from grades K-12, students do not do well in the Number Sense Standards. This standard is described as a procedural fluency skill to be able to carry out procedures flexibly, accurately, efficiently and appropriately. Student should be making sense of numbers of how they work together. Although some students do well in other areas of math, such as in geometry or data and measurement. Unfortunately, most students at third grade basically struggle when they are coming from second grade to my classroom. Although students should strongly have a solid foundation in counting, adding and subtraction, it becomes one of their weaknesses. At third grade, students should be learning multiplication and division, but we find that they are struggling with adding and subtracting 2 or 3 digit numbers. Furthermore, they do not grasp the concept of carry overs or borrowing. I believe that numbers get too big for them, but in reality, they are only working with numbers from 0 to 9. What they don't know is how numbers are represented at the next place value level and how place value builds on itself with

repetitive powers of 10 as one moves up in place values. In short, they struggle with understanding that a 0 represents nothing in that value column and that multiplying by a power of 10 (or adding a zero at the end of a number) represents the next value.

Content Objective

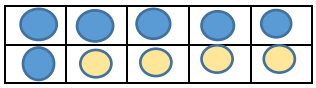
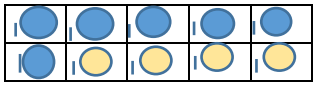
Mathematics

Today and in the past, the concept of working with numbers is and has been a part of our everyday lives just as much as reading. Reading is also a part of one's daily life not just when reading a text but also by simply reading environmental signs to be able to do things or function. This means that our actions are carried out daily, but without thinking about the words, signs, symbols, etc. Although in today's world, we have to learn to live with corresponding our actions or objects to symbols when written. But, working with numbers or understanding the concept of numbers is not that easy for many. On the Diné Nation, this seems to one of the struggles. Diné culture consist of the people working with their hands to solve mathematical problems relating to objects or count by correspondence 1-1 or providing evidence. So when it comes to counting from concrete to abstract, for older generation, it seems inappropriate and many do not understand why one would put numbers or symbol on paper and learn the algorithms. As the Diné people continue to assimilate into the western civilization, everything is written by symbol in a text. In the working field today, numbers are represented in symbols and abstract as well. This is done in order to keep records of what has been counted. This is one of the wonders of why many Native American children are having a rough time understanding numbers. In addition, most are taught to use their hands, handle manipulatives and that is how it is understood.

I was raised to count sheep in the Navajo language myself. When counting, I connected my oral counting to objects. It made sense to me. On the other hand, it was rough for myself, to work with numbers without the representations. I could not picture the process mentally without seeing objects. So how do get the Native American, or here the Diné children at Tsaile Public School, who are in third grade, to understand the concept of math? This unit I hope will have students understand how to work with students who depend on manipulatives or concrete to solve their math problems. The main goal is to ensure that the students grasp the concept of algorithms for addition, multiplication and the inverses of the two. Furthermore, being able to solve math problems at the level of abstract for school and work purpose.

So for a teacher to teach mathematics, he or she must consider the best effective instruction to help students understand numbers. Numbers involves action or activity which involves objects or materials that increases or decreases. Having the students basically knowing that will help the students understand how numbers work. Numbers go up and numbers go down. The quantity of objects changes as someone does something with that object. This can be done physically and mentally. Depending on the level or depth of knowledge of each students. This teaching methods is referred to as teaching from concrete to abstract. I want my students to get to work visually in their mind at an abstract level. So I am working again towards getting the students to think at an abstract level. At a young age students rely on manipulatives to understand the concept. Below is a chart that shows a way to remember as a teacher to get students from concrete level to abstract level. This is known chart is known as Concrete, Representational, Abstract (CRA) instruction and is a process for teaching and learning mathematical concepts (Concrete, R. 2017). It explains it well and shows how the process is transition for each stage. "When students are allowed to

first develop a concrete understanding of the math concept/skill, they are much more likely to perform that math skill and truly understand math concepts at the abstract level." (Concrete, 2017). When teaching math, the transition from counting and working with numbers from concrete establishes the connection to real world situation. As students progress with each stage, they begin to understand the symbolic form of numbers.

Stages	Key Elements	Sample Problems	Explanation
Concrete State	Use of Chips, Unifix cubes, base ten blocks Manipulative- showed with objects.		Here, a ten frame with colored counters is used to show the equation 7 + 3 = 10.
Transition to Representational	Use of concrete and representational materials together- one shows object then to symbols on a texts without objects.	 	Once the concrete materials have been used, students begin to draw their own ten frames using the concrete model as a guide.
Representational	Tallies, dots, circles, stamps		At the representational level of CRA, the student is comfortable using pictures to solve the problem
Transition to Abstract	Use of representational and abstract materials together	 6 blue + 4 yellow 10	Students now start using abstract symbols (numbers in standard form) with their drawing to explain their reasoning. Each is mark with "1" for counting.
Abstract State	Numbers, mathematical symbols- this is done mentally. Student able to see the steps or process.	6 +4 10	Students at the abstract level of CRA no longer need pictures or manipulatives to solve the problem

As students begin to count higher into the 100's to 1000's, students can't grasp the counting and the representation of numbers. In a school setting, place value is then introduced to the students to help them understand the representations of 10's, 100's or even 1000's. It is a concept one

must understand to put a value on an object or activity. We perceive numbers as counting objects and represents a 1-1 representation. Place value is introduced to help students to understand that numbers are regrouped as the numbers go up. Place value can be taught as a set given in bases of 10's or base 5's or even in 100's. Understanding place value has made more sense since the "zero" has been added. Which again is the representation of bases. Young children can learn to represent other figures, or symbols to make the connected of place value. Furthermore, students still struggle with understanding how place value is set especially when students have to add or subtract as it would need to be borrowed or carried over, which is known as regrouping. In addition, multiplication is another concept, I like the idea of working with numbers, especially the properties of multiplication. I love the properties because it allows students to solve and manipulate numbers to solve a problem. I especially like distributive property because I am able to use base 10's and add numbers to solve multiplication problem.

As I was growing up, mathematics was not my best subject, but I have learned to work and understand numbers as I see the rules, the strategies, and having to make connections with real world situations and applications. Teaching math should be connected to real situations on every level. Setting the "why" concept to the student through question. Such question as, "Why do I need to know this? How is it going to help me? Where will I use this?" One misconception about learning mathematics was that it was all about numbers and basically just learning the rules, rather than how a problem can be solved from many different strategies. This basically connects to solving a problem to make sense.

A majority of the students at Tsaile Public School show that they do not understand basic number sense because it involves one to explain the steps or process. It is much harder to do mental math, the abstract of solving math problems. Especially visually seeing what the amount one is talking about. Robert Howe, a professor at Yale University, believes that this is one concept that is not strengthened in our school system.

> "One of the first such ideas I identified was place value, or to be more precise, the base ten place value notational system for whole numbers (and later, decimal fractions.) This is the bedrock of school mathematics, and it is use in almost everything that is done day-to day with mathematics. We ought to try to get this as right as possible, and to have students learn it as well as possible. Yet, mathematics education research indicates that we fail rather badly at to do so" (R. Howe, 2019).

In support of Howe, we see evidence as students struggle in the concept of number sense when they take the Arizona State Assessment. This is seen across the Diné Nation. Why? As many Diné philosophers, such as Wilson Aronith, Lorenzo Max, and Avery Denny stated in a recent lecture at Diné College, "Numbers should not be a problem for Diné people because mathematics is one skill that the Diné uses in their daily life. But numbers are not written out, but it is all in the mind, in songs, in prayers. Mathematics is used in a cultural perspective of the way of life, such as weaving, planting, sacred games are a part of math skills." (Wilson, Spring 2019). The issue here for many Diné students is that numbers are seen in the mind, kept in the mind, but as one is asked to write and show, it becomes difficult. Another reason that supports the reason is that Western Civilization teaches almost in reverse of the Diné people. For example, the language itself. Students who are fluent in their language say a sentence, when translated, the noun phrase or verb phrased is reversed.

"Nizhonigo nighan si'a (Navajo translation to English would be "Nicely your house sits" but it makes sense when another Diné would be able to understand what is said. Instead of in a standard form in English such as, "your house sits nicely." In turn, this maybe the reason why it is hard for Native people to grasped to understand the Number Sense in reference to Place Value. Unfortunately, numbers have never been written in the Diné culture to actually see how counting was used and

Native American History in Math

Native American's conception of numbers has always been there. As for the Diné culture, numbers are in our song, in our chants. The number 4 is a number that is sacred and used to represent the culture itself, for example, the four direction, the four colors (Black, white, yellow and turquoise), four chants in a song, the fourth world, and many other representations for the number 4. Similarly, patterns play a big role in Native American history and culture. Patterns are seen in art work and the creation of household goods. So mathematics has been a part of the Diné Culture for many years. The only problem is how numbers were used in Native American culture; most of what was used was undocumented so we did not know how the number of animals, live stocks, plants were counted. Science as in the Greek culture was a significant perception to Native American as well. Numbers was applied to calendars and time keeping, but were not written, and contributed to understanding stars and astronomy.

Numbers was undocumented on paper, but their symbols were used to represent objects or possessions. Petroglyphs' are seen in caves and rocks that tell a story of history that may have been a part of counting. Many elders today do not ever recall having to count by writing. Their counting system involves mental action, or either in songs, or through the own fingers. The hands and fingers were used for many purposes such as counting, measuring, and grouping with a representation of 10s or even 20's.

Teaching strategies

Teaching mathematics involves active students participation and is more effective if taught with manipulatives to develop the transition from concrete to abstract. This is one of the best ways to teach students, which is through hands-on so they can grasp the concept or skill that is being taught. Students seeing and manipulating objects to connect with what is being counted or represented by numbers and symbol helps them understand when solving a problem. Problems with numbers are around us. Teaching the students that learning to solve a problem involves steps and it involves numbers. For example, the structure that involves building a home, a bridge, keeping count of belongings is working understanding the concept of math. Even in the Native American understanding of numbers and their relationship, it has its' purpose and interdependence, "There are basic relationships, patterns, and cycles in the world that need to be understood; this the proper role of mathematics" (Cajete, 2000). Especially, at a young age, students will need to know how to count accurately. Not only understanding accurately, but also understand the underlying reason to why one should know Math. Students that are young need practice counting one on one so they can represent number with symbols. In order for students learn through best practice, here is a list of teaching strategies to implement with young students.

Visual aids or Manipulative

Providing visual aids and using visual aids when teaching helps support learning for the students. If students cannot grasp the concept through auditory, then visual aids support them to make connection. Researcher supports that using visual aids provides interest, motivation, provides and establishes learning through thinking and ensures long term memory or knowledge through experience. Students will remember the concept of what is being taught and make the connection. In this unit, manipulative like base ten block might help students comprehend the value of numbers.

Connect real word situation or problems

Making real world connections will be more meaningful when learning a concept. Teachers need to make the connection of what skills or objectives they are teaching and give the "why?" to make it relevant and meaningful. In mathematics, students are learning to use operation and formulas, but often do not understand where they will apply it and why they need to find a solution to a problem. When teaching math, it is always good to remember to state why and where they will use the math skills that is being taught. For example, multiplication, it will be applied to help count faster as well as grouping or dividing objects into groups. Building is another reason one would use multiplication when thinking of arrays, rows and columns. As for teaching place value, teaching students to grasp real world objects and counting will be need to know how many there are. What happens when you have objects of 10 or more? Teaching the students to understand that one has to count and learn to regroup to making counting easier. Objects such as plants in rows and columns need to be group to be counted.

Explaining ideas or solutions to problems

Providing a time to have students explain the steps and explain their mathematics thinking process helps the teacher see what the students' thoughts are. Furthermore, asking for and providing student examples helps the teacher see where exactly the students misunderstand or mistakes are. It also helps other students peer teach each other. That is one of the factor that helps eliminate fear or uncomforting feelings from the students. In fact it makes it more motivating for the students.

Graphic Organizers

Using graphic organizers is very helpful for students. Using graphic organizers provides steps and organizes thoughts as students can see and better grasp. Providing graphic Organizers also provides a similar experience as hands-on. Place Value charts, ten frame, grouping charts will be used in this lesson.

Grouping and Cooperative Learning

Using grouping or organizing students into groups ensures students to be actively involved, especially when student that have a hard time grasping a skill. Some students feel more comfortable relying on their own peers when they share and talk. Teachers also need to be aware on how to group students so they have to preplan on how to group students.

Differentiated Instruction

Students most often need differentiated instruction on a lesson because not all students learn the same way. Student that English Language Learners or students that are Exceptional are better

instructed by modifying lesson in different ways. Differentiating instruction will meet the eeds of students and students will comprehend what is being taught by the teacher.

Technology

Now more than ever, schools are relying heavily on technology as they went to on-line learning (Virtual Learning). Basically just about every School Districts assigned or provided a laptop or table to students with many software programs that have been download for learning purposes. Students should feel comfortable, have access and learn to navigate the tools on the computer. Many students and teachers are familiar, but with this new way of learning, both ends will be confronted with new knowledge of programs, features, and curriculum that will test the ability of teachers and students.

Gradual Release of Responsibility

Gradual release is a good method to use for teachers to use. It involves teacher to first model, then work with students together by helping them, and to finally releasing students to work on their own based on the demonstration that was shown. This model also referred as I Do, We Do, You do. This model or strategy helps students to become independent after teacher models the expectation. In math, teacher has to show and model what changes occur when number operation is applied. Using manipulatives helps students see firsthand what happens with object, or what math means. It also releases the students of fears or misunderstanding by doing alone.

Classroom Activities

Introduction to Activities

In this lesson, there will be three activities each week. Teaching place value and numbers depends on the level of the students. This can be based on the students' pre-assessment at grade level. An assessment will be administered. The quiz is a simple multiplication/division as well as addition with subtraction worksheet that should demonstrate at the concrete level and the abstract level. The objective for this assessment is to see the steps and process a student will apply to solve a problem. One way is also to have students explain and talk through the steps. The teacher will observe and have students share out orally how they got their answer. If the students can write, it would be another great way to see how they explain in a written format. Each student should receive a math journal to write and explain the process.

The math activity will cover at least a month. Thereafter, a continuation of grounding the foundation of mixed operation will be taught throughout the year. These activities are basically learning the concept of understanding numbers and how they work in real world situation. These activities will focus on learning and understanding the number concept and apply it in multiplication properties. The distributive property is basically the essential backbone to a lot of the understanding in place value and multi-digit operations. Most students that come up from second grade and into third grade should be able to comprehend place value. Most students, though, struggle with the concepts of the vocabulary and explaining itself. Key words will be introduced and repeated at each math lesson. Some of the activities below will require materials. Before each activity, it is best to have it prepared with manipulatives or materials for making the connection of math. It is also important to focus on vocabulary so students hear and learn to use the vocabulary with they are speaking and working on math.

Vocabulary words that will be used consistently throughout the lessons are:

Place Value	Division
Multiplication	Dividend, divisor, quotient
Ones, Tens, Hundreds, Thousands	Addition, subtraction
Factor, product	Carry over, regroup
Materials, Base ten blocks, units, associative property, and distributive)	properties (identity, zero, commutative, Key word list for multiplication
Represent	

Prerequisite skill review

The unit will start with a review of numbers. Informing students that there are only 9 digits plus the zero is all the numbers students need to know. This helps the students feel at better knowing that as number are going from 1 digit to the next digits, they can handle the numbers better. Students should review numbers such as learning the pattern, identifying numbers of odd and even, and then placing those 1-9 numbers in a place value as you teach them about 1 to 4 digits number by using the zeros to increase the quantity of a number. I will be making connection about how place value is understood using these examples.

1000,2000,3000, 4000,5000,6000,7000 8000,9000	100,200,300,400 500,600,700,800, 900	10,20,30,40,50,60, 70,80,90	0,1,2,3,4,5,6,8,9

fig.1

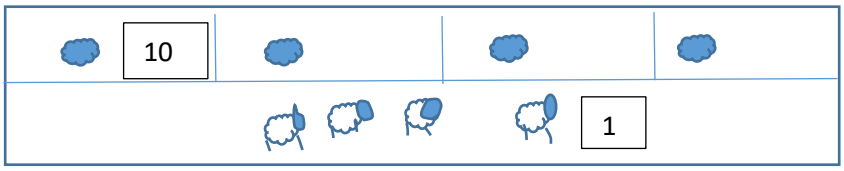


fig.2

43 sheep

Place Value: Each number have a home, so teacher will demonstrate a row of house conjoined together, One's home, ten's home, hundred's home and thousand's home. I use the acronym HTO as a part of the vocabulary language.

In addition, the teacher will use the corral to further help students understand place value. Especially when students can make the connection in their own environment. So in the figure 2, a colored sheep demonstrate to show that it is a representation of 10's. For each colored sheep, the value is 10 and separated from the ones. This is shared so students can make the connection to how object are counted.

Understanding Counting Activity

There are many wonderful books and stories within children's literature that focus on multiplication. These will be also used to reinforce several of the activities from class. This is integrated so that students can connect with the concept of basic and advanced to help students understand how multiplication works through literature. This helps students recall events or motivates how it connects to real life situation. To begin this lesson on learning about multiplication, students will watch, *Amanda Bean's Amazing Dream* (C. Neuschwander) on You Tube. This is to help make the connection on why we need to learn multiplication. Teacher will have a discussion while viewing video. Teacher will also stop at certain points of the video to explain how counting is organized and students can be involved by telling analyzing. The other book that can be shared as well and use the same activity will in a discussion. The book is title, *The Grapes of Math* by Greg Tang. These two books will be shared with students, and these books are amazing! Two literary text will be shared from the Diné Nation perspective on how numbers are used. The next two books are culturally relevant to count objects. The books are; *Counting Sheep* (M. Egnew) and *Knots on a Counting Rope* (B. Martin Jr.) that teacher will read to the students. A discussion will continue on objects to be counted.

Potential books to be included as part of our work in counting and place value include:

1. Amanda Bean's Amazing Dream, Cindy Neuschwander

2. The Grapes of Math, Greg Tang

3. Each Orange Had 8 Slices, Paul Giganti

4. The Doorbell Rang, Pat Hutchins

5. One Grain of Rice, Demi

6. Sea Squares, Joy Hulme

7. The Hershey's Multiplication Book, Jerry Pallotta

8. The Lion's Share, Matthew McElliot

9. The Best of Times, Greg Tang

10. 7 x 9 = Trouble, Claudia Mills

11. 2 x 2 = Boo!, Loreen Leedy

12. Math Attack!, Joan Horton & Krysten Brooker

13. The King's Chessboard, David Birch & Devis Grebu

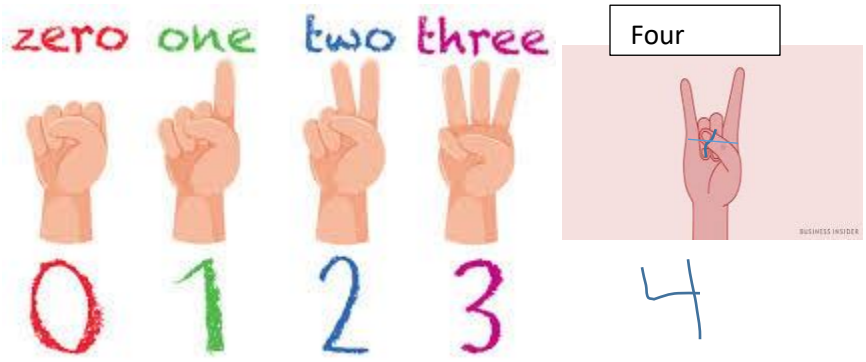
14. Ten Times Better, Richard Michelson

Understanding Multiplication

Students will begin the lesson on how to put things in multiple objects such groups of 10s, or 5's.To begin this, the teacher will ask questions on how to count many multiple objects and find an easier way to count. Discussion can be held in groups in school or virtually. Since this COVID-19 pandemic, students will be using ZOOM and getting into groups using break out

rooms. Our school is utilizing ZOOM and Schoology Apps. The teacher will set up a discussion on Schoology discussion board, or even use Jamboard, to encourage student to share their thoughts. Teacher will use a literary book to help the students understand how math works within the environment. Objects are counted to find the total. Teachers can read a book or watch the video, "Amanda Beans Amazing Dream." The strategies that are used for the lesson are arrays, repeated addition, and groups. Students will need to learn and understand how multiplication works. The story helps with counting objects found in their environment. Students will have a discussion on what they could count and draw pictures of objects on their journal.

The multiplication properties will be introduced. The teacher will used her hand to help students recall the properties. Here is the property introduction that I created on my own so students can remember and it is sort of hands-on.



Zero property- (fist clinch like a zero then open to a zero- ). This property shows that any factor times a zero, the product will be zero.

Identity property- (index finger up). This property has a one that acts like a mirror. When a factor times a one, the number sees itself and the product will be that number.

Commutative property- (two fingers up) This property shows two factors that it can switch or does a flip flop that the product will equal to the same value even if they switch or flip flop.

Associative property- (Three fingers up- the middle can move back and forth to the other fingers to show other factor to multiply). This property shows when three numbers are multiplied. The factors hug the other (parenthesis) to be multiplied together. No matter which side the middle partners with, the product will be the same. This also shows that factor can be broken down to a small factors and multiplied to get the product.

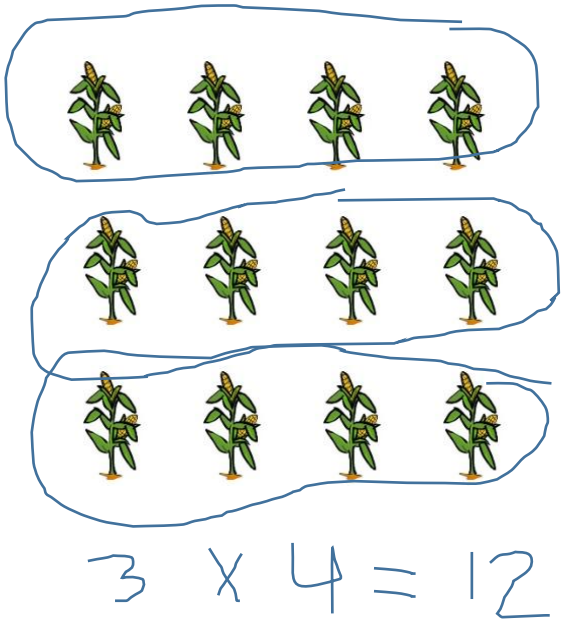
Distributive property-(All fingers go up, but the thumb holds the middle finger down to show a plus sign). This property allows you to break down a number that is too big to multiply and be able to add to the end to find the product.

These property allows students to know that numbers can be managed to show that students can understand that mathematic is grouped or can be represented in a different way. They just have to identify which algorithm is used. Students for the first week will be introduce to the vocabulary list and the multiplication properties which will be reviewed on a daily basis.

Applying Multiplication

Corn Field Planting

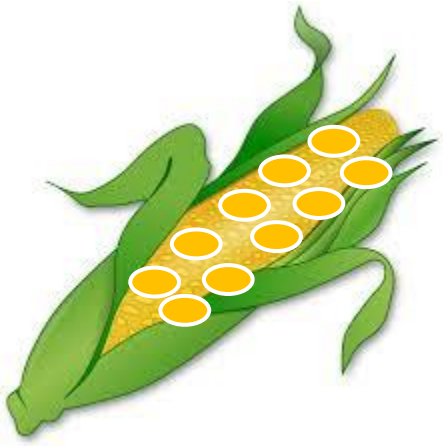
To give more students practice on visually understanding multiplication, students will be given a scenario that they will be planting a field of corn. They will be given a bag of seeds in any amount. In this case, they will not be seeds, but a drawing or colored green strips because of COVID -19. Students will put them in rows and columns and count how many seeds they have planted. Students will know that it will need to be in equal groups in rows and columns. Then they will report their total number of corn planted. This activity will be reinforcing a visual aid to help them start counting by base 10, base 5 or the number the student chooses. Students will then be put into groups using break out room and they will explain and show each other how they organized their field.



Corn Activity

This activity is also to reinforce rows and columns. Students will create a corn array using kernels, or yellow squares. Students will put the kernels in rows and columns. Students will again find the product of each equation. Each student will be given the chance to different ways to organized their kernels and share in a group. This is teaching the base value. They can choose 5, 8, or any number up to 12. Since students need to learn multiplication up to 12. This provides students a hands on fun way to learn as we will lead the activities in learn to multiply larger numbers.

Since many students are familiar with counting in Navajo language, other activity can be involving students to count in the Navajo language. A fun way to make place value fun is to have students name an object as they get to the next place value. This well ensure that students know when numbers changes to the next value. For example: Students count their kernels to 9, then they would say, “naadáá” or “al’kaad” (Corn or Navajo cake). They can relate to corn food or objects like corn pollen.



2 X 5 =10

Student Assessment Plan

The assessment of these strategies that student complete will be done through daily observation, explaining the process orally by each student, and having students demonstrate their understanding on a whiteboard. Since school has gone virtually, whiteboard and other interactive activities are one way that students can be assessed. The most important level is to have students explain the process of each math process so you can see where the student has his or her strength or where he or she needs improvement. Students will take a weekly assessment using Beyond Textbook, a curriculum the district has purchased. Each week, The District Formative Assessment (DFA) will be administered on Multiplication strategies and properties. In addition, students will take the benchmark end of the quarter, as well as the Arizona Merit Assessment in April. One assessment to administer is the assessment used at the beginning of the lesson activity so the teacher to be see growth. Teacher may reteach some strategies to reinforce prior to the Arizona State Assessment.

As students are assessed, we as teachers or instructors need to remind ourselves that students developed these foundational skills and must have a direction or goal to reach which is students begin to make connection with solving and understanding mathematics.

Alignment with Standards

The following standards are addressed throughout this unit:

Operation and Algebraic Thinking (OA)

3.OA.A : Represent and solve problems involving whole number multiplication and division.

Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models.

3.OA.B : Understand properties of multiplication and the relationship between multiplication and division.

Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors.

3.OA.C : Multiply and divide within 100.

By comparing a variety of solution strategies, students learn the relationship between multiplication and division. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By working with arrays, students connect area to multiplication and justify using multiplication to determine the area. By the end of 3rd grade, students are fluent in multiplication and division within 100.

Number and Operations in Base Ten (NBT)

3.NBT.A : Use place value understanding and properties of operations to perform multi-digits arithmetic.

Resources

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