

Stewardship of Trees and Forests for Environmental and Human Health

Land and Tree Based Learning: Connecting with the Land

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Context

This curriculum is primarily designed for my 7th grade math class in which I attempt to inculcate students with their rich culture while learning the different concepts of mathematics since our school and community are also geared toward the preservation of the native language, history, and culture of the Apache tribe. Moreover, our school provides students with opportunities to honor, learn, and celebrate their culture. Furthermore, I would also like my students to gain more insights about their connection to the land as well as how to wake their inner steward in themselves for the preservation of the environment they live in. In addition, our school is proud of their rich cultural heritage which is why I have been encouraged to create a culturally responsive curriculum for my Math 7 class at the Dishchii'bikoh Community School to help them remember and understand their identity while at school.

Since 1991, the Bureau of Indian Affairs has financed Dishchii'bikoh Community School, also known as Cibecue Community School, as a K–12 Title I Grant school. It is a 501(c)3 Non-Profit organization that is registered with Cibecue Community Education Board, Inc. Our school takes great pride in emphasizing academic success as well as the preservation of Apache language and culture. Additionally, the school was established on the White Mountain Apache Reservation to benefit the students and families in Cibecue and the nearby areas. The Cibecue Community Education Board, Inc. has run the school under the name Cibecue Community School in the past. The Apache language and culture, which form the foundation of our community, are honored by the name Dishchii'bikoh (“Dishchii'bikoh Community School- School Profile,” n.d.).

Approximately four hundred Native American students between the ages of four and twenty-one attend Dishchii'bikoh Community School, which is situated southwest of the neighborhood's center and offers Kindergarten through 12th grade. Ninety percent of the students, most of whom are Apache, are thought to be proficient in their native tongue. The start of our fiscal year, which includes the start of school, is July 1 and ends on June 30 (“Dishchii'bikoh Community School-School Profile,” n.d.).

The town of Cibecue is located in the Fort Apache Indian Reservation, also known as the White Mountain Apache Reservation, in the northwest of Whiteriver, the primary tribal capital. According to the 2010 Census, there are approximately 1,700 tribe members enrolled in the community. The White Mountain Apache Tribe runs a few businesses and tribal facilities that are dispersed around Cibecue. These include the Commercial Center, a gas station, a tire store, and the Cibecue Complex, which has a number of tribal programs and a police station. The community's medical needs are met by the Indian Health Services Clinic, and the tribe and the community stage numerous sporting events in the Cottonwood Gym (“Dishchii'bikoh Community School-Cibecue Community,” n.d.).

Additionally, there is a post office drop station that uses the Show Low Post Office to pick up and distribute mail. All policies, guidelines, and laws established by the White Mountain Apache Tribal Council regarding the usage of tribal lands—such as those governing fishing, hunting, camping, and hiking—apply to all citizens (Dishchii'bikoh Community School-General Information, n.d.).

Rationale

“Because culture strongly influences the attitudes, values, and behaviors that students and teachers bring to the instructional process, better teacher preparation is a major factor in solving the problems of underachievement. Reasonably, teachers can only be held accountable for student outcomes if they are adequately prepared to be culturally responsive to their students’ learning styles and needs.” (Basha Krasnoff, 2016)

“Inadequate preparation can create a cultural gap between teachers and students” (Ladson-Billings, 2009, Krasnoff, 2016). Through this seminar, I would like to delve deeper into my students’ culture and acquire the knowledge required to be an effective and culturally responsive teacher. I am creating this curriculum unit to ensure that students from diverse backgrounds have meaningful opportunities to experience quality instruction that consistently incorporates cultural components to support learning (Gay, 2010).

Numerous studies have demonstrated that minority students do not find mathematics instruction to be "user unfriendly" because of the inattentive student-teacher contact, classroom setting, and subject delivery (Tobias, 1990). As cited in (Ukpokodu, n.d.), Peterson (2005) also discusses "number numbness," which is the phenomenon in which students lose interest in learning mathematics due to a pedagogical strategy based on rote calculations, drill and practice, unending reams of worksheets, and a desire for the correct response.

Mathematics is composed of multiple but interrelated and interdependent concepts and structures which students can apply beyond the mathematics classroom. It is essential to everyday life, science, technology, and engineering. Learning math is also necessary for students to obtain financial literacy and most forms of employment. Students with higher mathematics education develop a strong foundation to be able to understand and survive in the outside world. While learning mathematics, I would like students to also build an appreciation of their culture. They might love mathematics once cultural knowledge is integrated into each lesson. I believe that both mathematics and students’ cultural essence play an important role in the growth of students, which is the reason I am creating this curriculum.

Integrating culturally relevant content into mathematics teaching may be challenging but as I delved deeper into this seminar, I gained a lot of insight into how mathematics should not just be about worksheets and trying to come up with the right answers, but can also be a great tool to talk about my students’ social issues that are relevant to the community they live in. Culturally literate students frequently have a strong sense of belonging to their local community. Building a student's personal investment in their capacity to utilize math to address social problems as well as integrating math into their reality through community links can be extremely effective. Younger students may be asked to examine images of their neighborhood (grocery stores, houses, the mailbox areas inside apartment complexes, and inside of local establishments) in order to find price markings, signage, and other communal locations containing numbers. Following that, students can utilize these images to recognize numbers and connect the messages or meanings of the numbers to the surroundings they are familiar with. This method enables young, culturally diverse students to perceive math's abstract character as an essential component of their everyday lives. Older students can use neighborhood resources like the carryout menu in

the neighborhood and recent or local ads from a car dealership. Local math problems can be solved using math concepts found by students. Local math challenges in student communities can involve creating a playground or remodeling a residence. These kinds of exercises allow students to use mathematical formulas to solve problems.

Through the TLSI program, I have come to agree that implementing culturally relevant content into the mathematics curriculum constitutes culturally responsive teaching. With this, we must remember that as educators, when integrating our students' cultures and perceptions, we must make sure to avoid stereotyping.

The goal of this entire curriculum is to inculcate teaching mathematics in a way that is culturally sensitive which will include all students as active participants because everyone has valuable perspectives to contribute. It involves making sure that each student not only succeeds in mathematics but also develops an understanding of mathematics as a tool to analyze the outside world. I intend to help students enhance their understanding of key mathematical relationships, concepts, and abilities while recognizing individuals' individuality, community, and prior experience in order to engage their identities. I would also share with them the authority in mathematics and help them realize that they can actually utilize mathematics to investigate real-world situations and problems.

I would like my students to remember, be proud of who they are, and encourage a classroom environment that supports and builds up each other's strengths and weaknesses by developing an understanding of each other's cultures and differences while learning mathematical concepts. In this course, students will be able to build connections to the land through lessons that will inculcate applying mathematical concepts to find out tree heights, dimensions, and land measurements and also to bring out their internal steward of natural resources to preserve what they have and know.

Content Objectives

Teachers need to be well knowledgeable about both math methodology and subject in order to effectively teach mathematics. According to studies, the knowledge required for teaching mathematics in classrooms "is not just knowledge of subject, on one hand, and knowledge of pedagogy, on the other hand, but also a kind of amalgam of knowledge of content and pedagogy" (Ball et al., 2008). In this curriculum, having mastery of the subject content and having strategic expertise aren't the only things a teacher must have. A teacher should also be knowledgeable of students' cultural backgrounds in order to integrate culture in the classroom effectively without stereotyping.

The idea that students' cultural backgrounds should be taken into consideration is fundamental to culturally responsive education. Students' learning can benefit when their teachers use background knowledge. This could be in the form of a cultural belief that this is accurate, planning learning experiences that validate students' life experiences, teachers being responsive to their students' reality, cultural identity, and heritage. Although school districts and schools generally choose formal curricula, culturally responsive instructors think about all the textbooks and instructional materials they use to make sure they don't reinforce stereotypes or fail to reflect

various populations. In addition to the standard curriculum, they supplement it with real-world examples, newspaper clippings, articles, song lyrics, plays, comic books, video games, and other materials that depict situations, people, settings, and themes that their students can identify with. They use cultural scaffolding by creating connections between academic ideas and the students' lived experiences (Muñiz, 2019). Although this unit has a variety of math learning objectives, I also want students to interact with the concepts of identity, belonging, home, and place. I have created inquiry-based lessons with reflective prompts to encourage students to make connections between the math lesson and elements of their values, homes, and characteristics they may identify with.

Indigenous Knowledge is based on an understanding of and relationship to the earth. "Connection to the land is an important part of physical, mental, social, and spiritual wellness" (Cherpako, 2019). Land affords a secure environment for communication and education and gives people a sense of community. Community connection is facilitated by learning about the land, including its uses and history, and conserving and caring for the land together. Indigenous-led, place-based education focuses on this. Being a part of an Indigenous culture requires having a spiritual connection to the land because we are all descended from Mother Earth. The land provides food, which is subsequently distributed among community members as a means of encouraging togetherness (Cherpako, 2019).

Giving students a chance to engage with the land is one method to include indigenous ways of knowing into a mathematics lesson. I would also like my students to know how mathematics is helpful in many professions, but I would like to focus my unit on the professions that deal with plants, trees and where they are grown. Gardeners need to be knowledgeable about a variety of topics in order to create stunning landscapes. Before a gardener can create a landscape, they must know how many soil beds are needed by measuring the land perimeter, the area, and estimating how many truckloads of mulch are needed. Foresters also should be knowledgeable of some mathematical concepts for them to accurately measure a tree's height, diameter, and circumference. These are some of the things that I would like students to learn in this curriculum unit.

Perimeter

A two-dimensional shape's perimeter, or, as my students would put it, "the total length of a shape's outside borders," is the space surrounding it. In the classroom, students will be required to use a ruler to measure rectangular items to show that they comprehend perimeter. I will also have my students measure and sum the length values of shapes with numerous edges to demonstrate to them that perimeter also applies to any planar shape. For instance, they can determine the perimeter of a hexagon or other polygon with more than four sides. Students will choose whichever approach feels most natural to them for this activity.

Ideas about linear measurement are still being developed during the perimeter activity. It is expected at this stage in the class that students are aware of the value of standard units and are able to operate tools that measure according to conventional systems. Students will understand that a two-dimensional shape's perimeter is the measurement around its outer edges by the end of the lesson. Students will be given polygons, or more complex shapes, if they have mastered

finding the perimeter of rectangles. They will then be instructed to calculate the area of each shape by measuring the sides with an inch ruler.

Area

We frequently need to know the size of our gardens. Simple rectangles can be calculated by multiplying the length (in feet) by the width (in feet) to get the squared feet. Since most yards aren't rectangles, we occasionally need to utilize different shapes, like circles and/or triangles, to compute the area most accurately. A circle's area (A) equals where " r " is the radius and " π " is 3.14 (half of the diameter or the distance from the center to the edge). Keep in mind that the raised 2 indicates that you should multiply the radius by itself twice rather than twice. The most common area unit to use is square feet. In case you are interested, an acre is equal to 43,560 square feet. As a result, if your lawn is 10,000 square feet in size (10,000/43,560), you have 0.23 acres of land (Tancig, 2022).

Conversions and Volume Estimation

Calculating volume is necessary for determining how much mulch or soil is required for a vegetable or raised bed. When calculating the quantity of pesticide product required to make a mixture, conversion of one unit to another is particularly crucial (Tancig, 2022).

To determine how many bags or truckloads of mulch or dirt are required, the cubic feet (cf) or cubic yards (cy) must be used. The majority of bulk goods are offered by the cubic yard. We need three measurements—the length, width, and depth—because we are working with volume. A 500 square foot garden needs three inches of mulch, therefore we multiply 500 by 0.25 feet ($3"/12"$ is 0.25 inches), giving us 125 cubic feet. That equates to 62 bags of mulch, which are typically sold in 2 cubic foot bags at the hardware store. We can convert the answer to cubic yards by multiplying 125 cubic feet by 27 ($3' \times 3' \times 3' = 27$), and we discover that we require roughly 4.5 cubic yards of mulch. About half of a full-size pickup truck bed is one cubic yard (Tancig, 2022).

Tree Diameter or Circumference

Diameter of a tree is measured at breast height, which is defined as $4\frac{1}{2}$ feet above average ground level. Note that this measurement standard differs from what everyone else uses because diameter is not based on a measurement taken only from the uphill side of the tree. Tree diameter measurement problems are often related to the phrase "above average ground level." When trees are growing on a slope or uneven ground, the rule is to measure $4\frac{1}{2}$ feet from both the uphill and downhill sides, find a point halfway between the two (this is the midpoint), and measure diameter there. A steel diameter tape should be used to measure diameter rather than something that stretches. Despite the fact that you can wrap some twine around the tree to estimate its circumference, you would still need to remeasure the diameter with a steel tape (Powell, 2005).

The new and enhanced method of environmental education is land-based learning. It possesses all the positive aspects of our "old" and preferred educational method, but it is carried out with greater intention and care for the natural environment. It gives us a chance to make some little

but significant amends for some of colonialism's detrimental effects. We may show how much we cherish the wisdom and respect that Indigenous peoples have for the land by treating it as the first teacher and developing relationships with it. It is widely accepted that we take students outside for four primary purposes: to improve their physical and mental welfare, to connect them to nature, to engage them with their larger community, and of course, to teach the curriculum. All of these significant justifications for land-based learning are included, but with one crucial addition: it also elevates Indigenous knowledge of the land and ways of knowing (Barnes, 2021). As Robin Wall Kimmerer states, "The land is the real teacher. All we need as students is mindfulness" (Barnes, 2021).

In 2005, a number of people collaborated with students at our school, Dishchii'bikoh Community School, and initiated the project "Ndee bini' bida'ilzaahi: Pictures of Apache Land" to achieve the project's many goals. First, the project set out to teach local youngsters about traditional Apache values for the land by recognizing places by their Apache names and corresponding legends passed down from their ancestors that explain their moral, social, and historical significance. A second objective was to document and interpret changes in the land using traditional ecological knowledge and scientific approaches. A third goal was to foster in the young people a sense of connection to the land that would motivate them to pursue higher education and participate in efforts to restore their local land and rivers (Terralingua, 2015). Similarly, this curriculum is also geared towards reconnecting students with their land and also imparting to students the traditional land values of the Apache.

Teaching Strategies

Teachers utilize teaching strategies, often called instructional strategies, to present course information in a way that keeps students interested and that exercises various skill sets. Depending on the unit topic, grade level, class size, and available resources in the classroom, a teacher may choose a variety of teaching methods. Various instructional tactics are used to support various student types and accomplish teaching and learning objectives. Strong connections are made between classroom lessons and the various student backgrounds through culturally responsive education. Teachers can more effectively engage different learners and foster success for all students by developing techniques to plan and deliver culturally sensitive classes.

Great teachers are quick, perceptive, and flexible, always maintaining an open mind about how to best engage their students and get them enthused about learning, which may include contemplating experimenting with various interactive teaching philosophies in the classroom. Interactive teaching methods are based on the straightforward premise that students frequently struggle to understand the depths of the study topic without actual application. In contrast to lecture-style teaching, which frequently results in students losing interest, interactive teaching methods encourage participation and attention. They also create some intrigue, add some excitement, and funnel it out. As we say, telling is not teaching, and listening is not learning.

Because there are many different ways that students might learn, teaching methods should be flexible and varied. Activities that require students to share, discuss, dispute, and think both individually and collectively should be given to them in whole-group instruction, partnered

activities, and small group settings. There should be a wide range of opportunities for students to participate and show that they understand the material. Some of the strategies I will use in the classroom to implement this curriculum include:

Activating a Student's Prior Knowledge

This will encourage my students to think of what they already know about the topic I am about to teach them for the day. Because it enables and aids in their ability to draw connections between the new material, activating prior knowledge is crucial to students' learning. It also gives teachers an understanding of what students already know and what they still need to learn, utilizing what students already know aids students in their learning of new subjects. Simply using prior information will enable comprehension of the text's meaning. According to schema theory, students create a schema as they learn about the world and are then free to connect that schema to a variety of other things. Using prior knowledge before reading is crucial, according to Piaget's schema theory, since, as his research suggests, when we can relate something "old" to something "new," it improves our comprehension of the new (Cherry, 2022). Students can access their schema as they read, grasp the content, and apply their experiences to the text.

Tapping into a Student's Cultural Capital

This strategy will encourage teachers to look for opportunities for students to put their knowledge, abilities, and personal strengths to work in the classroom. To do this, teachers must make a commitment to know about their students' backgrounds to promote a culturally relevant and inclusive classroom. This might entail creating a secure environment for students, incorporating social and emotional learning, and enabling classroom conversations about students' prior learning experiences. For instance, teachers could start a lesson on ratios or proportions with an activity comparing the ratio of teachers to students before moving on to the usual material. Analyzing diverse data or data patterns for various racial, socioeconomic, and gender groups could serve as another practical example. This kind of knowledge offers a mirror for some students, a window for others, and a sliding glass door for everyone in a varied classroom. Even if students are not yet familiar with the necessary mathematics, "Notice" and "Wonder" activities with real-world links can be an effective technique to capture their interest and pique their curiosity at the start of a unit.

Differentiated Instruction

This allows teachers to give flexible lessons to the range of ability levels present in their class while also fostering advancement. Being a teacher is difficult for a variety of reasons, including the fact that every student learns differently and at a different rate. Teachers must cover specific material in order to meet district and state requirements, but they also need to properly adapt the pace and content of their courses to meet the needs and learning preferences of each student. Meeting the requirements of every student in class can be difficult, as many teachers discover. Fortunately, diversified education may offer a remedy. Differentiated education is a tactic to guarantee that each student, regardless of learning preferences, fully grasps any given idea. In order to ensure that class experiences can be appropriately modified to individual skill and ability

levels, teachers should observe students and employ formative assessment techniques (Study.com, 2022).

Active Learning

This teaching strategy will allow teachers to integrate components of project-based and inquiry-based learning to enable students to follow their own learning paths. This increases student agency in the learning process. Students who are taught using an active learning strategy perform better than those who are taught using a standard (passive) method. Teachers are viewed as the origin of information and comprehension in passive learning. In contrast, teachers support students in active learning environments as they create their own knowledge and understanding. Here, the emphasis is on the students' active participation in their learning. Think-pair-share exercises and kinesthetic learning environments are both examples of active learning activities that teachers can also try to use in their teaching.

Project - Based Learning

The experiences under this strategy will allow students to engage in learning about a topic over a period of time and may help the development of deep understanding. Project-based learning can also incorporate a variety of skills and strengths as students work independently or together to make a video, book, or website.

Cooperative Learning

This encourages structuring classes into groups to foster communication and working together in smaller units. Cooperative learning is a kind of instruction that divides courses into smaller groups so that students can complete tasks together. In order to ensure that each group contains a variety of talents, abilities, and learning styles, students are frequently selected carefully. This makes it easier for students to learn from one another, which is one of the main advantages of cooperative learning. According to the cooperative learning theory, this kind of education encourages student cooperation and respect while also assisting in the development of their interpersonal and communication skills. Teachers of many grade levels can use this teaching strategy. Instructors can strategically form groups around students with varying skill levels and learning styles to promote collaboration, communication, and social skills.

Teachers have a special ability to change the lives of their students. Use of intelligent, inclusive instruction can benefit students in ways that go well beyond what happens in the classroom. Implementing culturally sensitive teaching methods is a first step toward making real changes in the educational system. Culturally sensitive methods for instruction in the classroom can provide significant advantages such as improving students' sense of self, engaging students with the course topic while promoting fairness and inclusivity in the classroom, and fostering critical thought.

Classroom Activities

Students gain knowledge by actively participating in the process of learning, which includes receiving information, processing it, applying it to situations, and communicating what they have learned. There are many different approaches to instructing your students. But one of the best methods to teach students is via engaging classroom activities if you really want students to engage with the lesson and not just memorize facts or statistics.

Interactive classroom activities encourage student participation and engagement with the teachings or material by eschewing one-way communication or independent learning. The classroom experience can be made more successful and satisfying by using interactive classroom activities that help students understand what they are learning on a deeper, more integrated level.

Each of the tasks listed here offers students the chance to apply concepts and articulate new information, and many of these activities also give the instructor feedback on the students' learning.

Week 1: Measuring Soil Beds (Area)

I. Arizona Standards:

7.G.B.6 Solve mathematical problems and problems in a real-world context involving areas of two-dimensional objects composed of triangles, quadrilaterals, and other polygons. Solve mathematical problems and problems in real-world context involving volume and surface area of three-dimensional objects composed of cubes and right prisms.

II. Learning Objectives:

At the end of the lesson, students will be able to:

- a. apply multiplication strategies to solve;
- b. find area of assigned soil beds; and
- c. design their own community gardens.

III. Teacher Inputs/Activities

A. Warm - Up

Activate students' prior knowledge on multiplication of integers through a drill.

B. Lesson Proper

- a. Outside of our school, students will congregate around a rectangular soil bed. Get students' attention by giving them ownership of the soil and asking them what kinds of plants they would grow, how many vegetables they could grow, and how they would calculate it. The teacher will then remark that locating the soil bed's area will provide the response to the latter query. Review the location and how to get there.

- b. Students will work in groups to calculate the area of each soil bed in our school's miniature garden. Using the tools at their disposal, they must cooperate to find the areas of each bed.
- c. Students will present their findings to the group and have a collaborative discussion.
- d. The teacher will demonstrate multiplication using the measurements the students have.
- e. The teacher will provide more varied examples regarding area measurements aside from soil beds.

IV. Student Assessment

- a. Each group will present their findings and explain to the class how they arrived at their measurements.
- b. Students will design their own community gardens using what they know about multiplication and area.

Week 2: Volume

I. Arizona Standards

7.G.B.6 Solve mathematical problems and problems in a real-world context involving areas of two-dimensional objects composed of triangles, quadrilaterals, and other polygons. Solve mathematical problems and problems in real-world context involving volume and surface area of three-dimensional objects composed of cubes and right prisms.

II. Learning Objectives

At the end of the lesson, students will be able to:

- a. calculate the volume of soil in the soil beds at our school campus; and
- b. create their own raised soil bed.

III. Teacher Inputs/ Activities

A. Warm - up

An activity will be given for students to complete that will serve as a review on area and perimeter.

B. Lesson Proper

- a. Challenge students in small groups to determine the volume of a raised bed (how many cubic square feet can fit into the raised bed) in order to determine how much soil would be needed to fill it. Provide students with a tape measure and with unifix cubes.
- b. Guide students in calculating the volume by calculating the surface area (in square feet) then multiplying it by the depth of the bed to find the cubic feet.

- c. Model for students how to create a model of the bed using unifix cubes with the scale being 1 inch (the side of a unifix cube) equaling 1 foot (on the raised bed). In this way, students can double check their calculations of the volume of the raised bed.
- d. Challenge students to determine the total volume of all of the raised beds using the concept that volume is additive.

IV. Student Assessment

- a. Students will be asked to create their own raised soil bed and measure its volume in their backyard, document it through a video and present it to the class for discussion and grading.

Week 3: Tree Measurement (Diameter)

I. Arizona Standards:

7.G.B.4 Understand and use the formulas for the area and circumference of a circle to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

II. Learning Objectives:

At the end of the lesson, students will be able to:

- a. apply mathematical concepts to measure the diameter of a tree;
- b. elaborate the significance of tree diameter measurement in determining a tree's value and health;
- c. identify the importance of mathematics in their everyday life aside from measuring things.

III. Teacher Inputs/Activities

A. Warm - Up

Organize a conversation regarding measurement standards. Point out that not all of the display measuring tools, such as rulers (standard & metric), cups and spoons (ounces, teaspoon), etc., have the same measurement standard. Encourage students to assume that each measurement tool has a specific purpose. Start a discussion on what it would be like if workers used an unconventional tool. Consider the scenario where one home builder uses a tree branch to gauge his lumber requirements and another uses cardboard. Add the responses from the students to the established list.

B. Lesson Proper

- a. Ask students why they believe foresters measure trees by writing "Why Foresters Measure Trees" on a whiteboard or chart and describe their replies. Direct the conversation to center on how measuring a tree's size and value is a crucial first step. Describe how foresters keep track of a tree's dimensions and state throughout time. The health of the tree and its rate of growth are important

considerations for foresters when determining a tree's worth since they show how the tree is interacting with its surroundings. Foresters measure trees to determine timber yield, plan harvesting, and make management decisions. Include every justification on the chart, then store it for later. Inform students that future courses will cover more of the importance, advantages, and health of trees.

- b. Students will be informed that foresters follow a consistent procedure when measuring trees and that they will measure their trees the same way foresters do. They will measure their tree's circumference and convert it to diameter. They will gauge its height, crown spread, and condition before entering the data in their worksheets.
- c. The teacher will discuss the definition of circumference and demonstrate how to measure, record the circumference and convert it to diameter. Demonstrate in the class with circular objects (a column) or with the student's body, head, etc.
- d. Students will be provided with measuring tools. Students will be given a chance to go outside and locate a tree to measure its diameter.

V. Student Assessment

Answer the following questions:

- a. What are the steps you took to measure your trees?
- b. In your own words, elaborate the significance of tree measurement in determining a tree's value and health.

Student Assessment Plan

A crucial component of the teaching and learning process is student assessment. It is crucial for teachers to proactively assess the success of their instruction by gauging the degree to which students are actually learning the course material. A balanced assessment system with possibilities for skill-specific interventions and extensions is crucial to ensuring that students get the most out of their learning. Additionally, create tests and use them to encourage the development of 21st century abilities. Lastly, encourage each learner to set their own objectives, keep track of their progress, and receive frequent, useful feedback.

It is well acknowledged that students construct meaning and comprehension by referencing their families, communities, and cultural experiences. Teachers can engage students' past knowledge, expose and restructure their information, correct misconceptions, and increase motivation to study when the curriculum is created to build on students' experiences. Students are more likely to increase their understanding if they can use their cultural, social, and historical experiences when solving problems. This can be achieved by planning structured activities that, in a real-world or simulated setting, give students the opportunity to practice problem-solving and inquiry in contexts that are relevant to their own experiences (“National Research Council,” 2002).

Each student's unique learning needs are taken into consideration in this curriculum and instruction. Education professionals have access to ongoing, authentic, formative, summative, and culturally sensitive assessments of students' skills and abilities that tell them what is and is not working for certain students. However, without a deliberate and thoughtful approach, assessment may be subject to problems such as unclear objectives, ambiguous standards, poor

feedback, inaccurate or unreliable results, injustice in student evaluations, and insufficient or even unmeasured learning. Hence, the following assessment methods will be utilized in this curriculum unit.

A. Performance Assessment

Through a group effort to solve a difficult challenge, students can show what they have learned and how to overcome problems. They learn how to brainstorm and combine their various knowledge bases to advance the group rather than just working as a team.

B. Short Investigations

A brief investigation typically begins with a simple math problem that the student can use to show that they have mastered the fundamental ideas and abilities (or can be modified to apply to any other academic subject). Asking the students to interpret, calculate, explain, describe, or predict the subject of their analysis is the responsibility of the teacher. Have students prepare questions they have in mind before or during lessons and then have them prepare to use these to interview their classmates for exchange of information after each lesson.

C. Open - response questions

Open-ended inquiries demand more information from the respondent than can be expressed in a simple "yes" or "no" response. As you receive feedback from students in their own words rather than pre-written responses, open-ended inquiries help you see things from their point of view. Starting every lesson with motivational questions will also assess what they already know about the topic. Students will be able to share a bit of their mind with the group with confidence.

D. Project - Based Assessment

Students will also be assessed through a project like the community garden plan they are to make after the lesson on finding an area of soil beds.

E. Formative Assessment

The evaluation of student learning over time is a component of formative assessment. Its primary goal is to gauge students' levels of accomplishment in order to improve learning while they are still in the learning process. Before discussing every lesson in this unit, essential questions will be raised for students to think through until the end of the lesson. During the lesson proper, students will be assessed formatively through probing questions. Here, students will be able to explain their answers or confusions of the lesson through an engaging question and answer portion while trudging through each lesson. With this in mind, worksheets will not just be the source of their assessment but in class participation as well. Thus, student attention will be drawn from beginning to end of each lesson.

Students will be assessed using varied forms of assessment because the dependability of the assessment data is increased by using different assessment techniques, including multiple assessors when practical. Additionally, it guarantees that students with a range of aptitudes and skills can be appropriately assessed and given equal opportunity to succeed. A student has multiple intelligences which cannot be assessed by mere worksheets and quizzes. The

restrictions on what can be offered as an evaluation tool are as diverse as the subjects and abilities we try to instill in our students. In this case, we should also set clearly defined goals in our assessment.

Alignment with Standards

Understanding what standards are, what curriculum entails, what assessments are, and what alignment means in the context of curriculum and assessment are all necessary to comprehend standards alignment in the context of curriculum and assessment.

The curriculum determines how students will acquire the knowledge, skills, and abilities outlined in the standards. Standards explain what students should know and be able to do in a given academic area. Evidence pertaining to student learning can be gathered through assessments. Summative, benchmark, or interim tests may be used in assessments, or a formative assessment process may use more informal means of data collection.

It is crucial to comprehend that as students advance in their academic careers, the knowledge, skills, and abilities outlined in standards documents should build upon one another from grade to grade (vertical alignment), and that the curriculum linked to the standards should also be logical and coherent within grade levels (horizontal alignment). Making sure that students have a variety of opportunities to acquire the knowledge, skills, and abilities demanded by the standards should be the aim of a well-designed curriculum. Standards outline what students should learn, whereas curriculum outlines how they should acquire the knowledge, skills, and abilities that the standards provide. The process of aligning a curriculum is done in order to make sure that students can achieve the standards-based milestones. A curriculum that is standards-aligned guarantees that students have access to the knowledge and abilities defined in those standards.

Educators can determine how well students are learning through the administration of exams that are closely connected to standards and curriculum. In order to determine whether or not a student has acquired the information, skills, and abilities outlined in the standards, assessments must be linked to content and to grade-specific standards. It is crucial to keep in mind that if the curriculum is in line with standards and assessments, then assessments—including large-scale summative tests, classroom formative exercises, and any other exams that might be given—must also be in line with the curriculum. This thorough alignment guarantees that teachers will be able to collect data regarding the particular area(s) of the curriculum that students are interacting with.

This unit will address the following Arizona State Standards:

7.NS.A.2.a: Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world context.

7.G.B.4 Understand and use the formulas for the area and circumference of a circle to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

7.G.B.6 Solve mathematical problems and problems in a real-world context involving areas of two-dimensional objects composed of triangles, quadrilaterals, and other polygons. Solve mathematical problems and problems in real-world context involving volume and surface area of three-dimensional objects composed of cubes and right prisms.

The stakes associated with standards remain high and will do remain so in the future, despite the fact that their function in education has changed over time. Standards are a crucial part of education. With standards, teachers will be able to set clear and measurable goals for every student. Additionally, teachers can also identify the precise information and abilities that are being evaluated and specify the standard of rigor that students must meet in those areas. Furthermore, teachers are also able to measure the achievement of every student. Lastly, having standards also helps teachers to achieve better results. With these, aligning standards with the curriculum is indeed necessary.

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