Honoring Ancestors, Shaping Our Future: Indigenous STEM in Early Childhood

Sacred Geometry: The Language in Indigenous Arts and Engineering of the White Mountain Apache Tribe

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Indigenous Early Childhood Educators Institute

2025

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"To all the ancestors that lived before us thy their Indigenous knowledge be passed on,"
DT (2025)

Topic and Context

This curriculum is student-centered and is based on viewing each child as unique and strong with full potential. The child's role in the classroom is to construct their knowledge and develop skills through the exploration of their environment and its surroundings. Thus, concentrating not on what young children think but on how they think. Many educational approaches were based on allowing children to explore and develop critical thinking skills. Providing relevant learning opportunities to make sense of the world and develop language and literacy skills. Furthermore, it explores opportunities for young children to make decisions, learn from mistakes, and solve problems. Students need to be in learning spaces where they can be introduced to new concepts of thinking, learn how to process these concepts through a variety of learning opportunities, communicate these activities in every possible language of learning, make reasonable responses to stimuli, and acquire multiple forms of knowledge.

Given that classroom activities can be communicated in a variety of ways, integrating culture and mapping them out to different subjects will provide holistic accommodation to learners, especially when delivered in creative ways, considering different learning styles and the pace of young children. Apache students are naturally inquisitive and should be able to have a cultural connection with both mainstream education and traditional cultural teachings. Thus, educators should be able to provide creative ways to engage them in new scholarships and nurture this curiosity with good and meaningful knowledge and experiences.

White Mountain Apache Tribe (Dził Łigai Si'án N'dee)

"We believe that we come from the Earth and that we belong to the Earth". The White Mountain Apache Tribe is a beautiful home that was given to us by our Creator. It is a home rich in tradition, resources, wildlife, and outdoor recreation. The White Mountain Apache Reservation is a unique place, situated approximately 2,600 feet above sea level on the southwest side. It ranges up to 11,400' on the peak of Mt. Baldy on the eastern border, which is known to be the most sacred mountain, providing year-round recreation activities, and experiencing all four seasons. It includes some of the richest wildlife habitats in the state and more than 400 miles of stream. It is home to the Apache trout, a species that was brought back from the brink of extinction through the efforts of the tribe and many partners, including the tribe's wildlife and outdoor recreation division.

It became the home of the Bureau of Indian Affairs' Theodore Roosevelt Indian Boarding School in 1923 after the army abandoned it in 1922. Initially, the school had been intentionally designed to serve Diné (Navajo) children, but by the 1930s, most of the students were Apache.

There are many different Apache nations, including the Chiricahua, Mescalero, Jicarilla, Lipan, and Kiowa Apache peoples. The White Mountain Apache Tribe now comprises approximately 15,000 members, who primarily reside on Tribal lands, while others live and work throughout the United States and the world. The majority of the population resides in and around Whiteriver, which serves as the seat of Tribal government, with others living in the communities of Cibecue, Carrizo, Cedar Creek, Forestdale, Hon-Dah, McNary, East Fork, and Seven Mile.

Cibecue, Arizona

Cibecue is in the heart of the White River Apache Reservation. It is a small town surrounded by breathtaking mountain scenery and lush forests. Given its elevation of 6,322 ft. above sea level, it is a place where residents and visitors enjoy hiking, biking, camping, and simply exploring the area on horseback. Cibecue is a peaceful place where everyone knows each other, creating a strong sense of community spirit. Its primary industries include tourism and healthcare. It is in eastern Arizona, 50 miles south of Holbrook and 160 miles northeast of Phoenix.

Cibecue is a city located in Navajo County, with a population of 1,423 as of 2024. It has an area of 6.0 sq mi.

Dishchii'bikoh Community School

Also known as Cibecue Community School, which offers public education operated by the Indian Education Division of the Bureau of Indian Affairs. It provides K-12 education, along with accommodation for preschool education and Family and Child Education (FACE) Programs, starting in the 2024-2025 academic year. It is located northwest of Whiteriver on the Fort Apache Indian Reservation. The White Mountain Apache Tribe operated businesses and facilities situated in Cibecue, Arizona. It is home to 298 students (as of the 2022-2023 academic year), ranging from kindergarten to 12th grade.

Dishchii'bikoh Community School is not just a school of learning for the community but a safe home for all its students and families. The community comprises a diverse range of backgrounds rooted in the homes of every Cibecue family. It is now joined by individuals from all over the world, coming together "for the students, a way to learn, grow, and succeed."

The Early Childhood Education Program

The Early Childhood Education Program in my school context is a combined effort of two funding supports. The program has partnered with Family and Child Education (F.A.C.E.) and First Things First-Quality First. FACE is a program that is provided by the Bureau of Indian Education, which focuses on kindergarten readiness of preschool learners (3-year-olds) and prekindergarten learners (4-year-olds) through the collaboration among families, local resources, and schools. The program includes parenting education to support all learners' development from the earliest years until they can transition to kindergarten. The program provides developmentally appropriate resources that guide each participating family in their child's learning and development at home and in school. FACE supports two components, namely Center-Based Services, such as preschool and prekindergarten, and Family Enrichment Services that are from prenatal to 3 years of age (FACE Portal, n.d.) On the other hand, Quality First is a program working with childcare and preschool providers, which is about 1,100 across Arizona. The program aimed at helping institutions to improve the quality of early-stage learning, and aid from a team of early childhood experts, and funding to improve early learning classroom facilities and learning materials (Quality First, 2023).

Both FACE and Quality First have provided continuous support to the Dishchii'bikoh Community School's early childhood education program. With FACE as the primary source of funding for professional development and coaching side by side, the school has been getting early childhood experts to support each child and family enrolled to thrive. With Quality First offering quarterly coaching and rating support, learning resources were enhanced and made available.

Currently, there are 28 center-based learners accessing the early childhood program provided. The learners come from different economic and Indigenous backgrounds, with about (Percentage of Apache students for incoming school year enrollment) being Native Americans. There are two classrooms for preschool and prekindergarten. Although the age level varies from three- to four-year-olds, both classrooms use Creative Curriculum and Teaching Strategies/ Smart Teach to provide learning objectives, resources, documentation, and assessment of each child's progression. The developmental milestones of the learners are measured through observation, documentation, and assigning levels through color bands. In the early days after enrollment, center-based learners are assessed to provide a current, solid baseline for each child in five components, depending on their age at the time of assessment. It pinpoints developmental progress in children between the ages of one month and 5 ½ years. These five components encompassing the ASQ-3 or the Ages and Stages Questionnaires, Third Edition are communication, gross motor, fine motor, problem solving, and personal-social, where each component provides different descriptive questions depending on the ages of learners (ASQ-3, 2025).

Rationale

Background Information

Growing up in a culturally rich community like the Philippines, where geometric patterns are almost an integral part of our culture, is evident in our clothing, homes, art, crafts, and museums. Filipino textiles and weaving traditions are rich in cultural heritage, reflecting the country’s history, beliefs, and way of life. Such Indigenous weaving techniques, intricate patterns, and vibrant colors hold deep cultural and spiritual significance, representing the identity and spirit of the Filipino people. Indigenous weaving techniques in the Philippines encompass a diverse array of intricate methods and designs. Each is deeply rooted in the cultural heritage of specific communities all around the country. While these diverse methods and designs originated from different parts of the country, the traditional weaving techniques of Indigenous textiles are a testament to the rich cultural tapestry of the Philippines as a whole. From the Bontoc community, showcasing bold geometric patterns and earthy tones that mirror the tribe’s connection to nature and the mountains, to the vibrant colors and intricate motifs of Kalinga Textiles, which speak to the community’s history and spiritual beliefs. Meanwhile, the Pia and Hablon weaves of the Aklan and Ilocano communities are characterized by their meticulous craftsmanship and delicate patterns, representing stories of their ancestors and the land. Many Filipinos rely on their spiritual beliefs, which have been passed down through generations, such as handloom weaving, a tradition associated with the Indigenous peoples' connection to spirits, believed to help attract good health and protection (Weaving Patterns in the Philippines, 2021).

Having this meaningful background, surrounded by generations of artistic tradition representing each identity of the Indigenous Filipino people, my perspective is that of a young Filipino barefoot in the land of culture and tradition, from folklore, lifestyle, and clothing. All the steps that have carried these memories with me have brought me to the knowledge and experience I have up to this point, which I can share with my learners just as I once was. This has been guiding me in exploring my country's immersed yet profound artistry. Bringing continuity to the learning of young learners from how these intricate designs and patterns from their homes, buildings, clothing, furniture, and accessories reflect their sovereign identity and aspirations to the young generations, to continuously pass these important pieces of ourselves, and keep them alive. These have been some of the factors influencing me to write this curriculum.
Many more Indigenous people from all over the world have accompanied their culture and traditions in most aspects, if not all, to the reason and purpose of everything that lies inside their beliefs. For instance, the African art patterns hold deep cultural significance of their rich heritage, such as creation (The Allure of African Art Patterns, 2023). In other countries, Indigenous Sacred Geometry has sacred symbols used in ceremonial rites and spiritual practices that aim to connect with the natural world and spiritual realm.

For more than 7,660 miles away lies another culture-rich community called Cibecue. As part of the Apache Nation, the tribe is most famous for the intricate patterns it uses in its woven textiles. Cibecue is part of the White Mountain Apache Tribe. The Native Americans used various forms of art to adorn their rugs, blankets, and other textiles. The art they applied to the textiles often used specific geometric patterns. The influence that brought all this together contributed to the development of the style of the patterns and designs over time. Cibecue is composed of Native American people, specifically, the Apache. The Apache Tribe is renowned for its rich cultural heritage and unique symbols, which hold significant meanings and aspirations. Their artworks and crafts depict significant representations of their culture, tradition, and identity. Apache art has become an integral part of the education and celebrations for those who visit the city. Their diverse population recognized this continuous striving for different geometric patterns rooted in their ancestors. As an educator to young learners and a part of the community, I believe that just as I am urged to advocate for passing on and preserving the identity of my Indigenous fellow Filipinos through the geometric patterns that symbolize different meanings, I would like this advocacy to be part of my teachings. As I teach, I acknowledge the need to bring awareness, knowledge, and experience to the young learners and that they may bring with them as they grow. Sacred geometry is not just shapes and patterns but a diverse, colorful representation of their culture, traditions, lifestyle, arts, language, and most importantly, their equivalence, identity, and oneness. The Apache Tribe does not just hold these geometrical patterns represented by different shapes, but represents a great deal with them, being Apache. To name a few, the circle represents unity, wholeness, and the circle of life; the spiral represents growth and the cyclical nature of life, as well as the continuous journey of self-discovery. The Apache believes that the universe is interconnected and that life is a constant process of growth and transformation (Hidden Meanings of Apache Symbols, 2023).

The connection among all Indigenous people and their Indigenous knowledge worldwide suggests that everything on earth is interconnected and linked. In which each atom of matter, each cell of our body, each element of the universe, and each person of the earth is intertwined in

building the meaning, the significance, and the symbolism of how everything is made. With that in mind, these are represented with a variety of art that communicates the ideals of each Indigenous group. While these arts are drawn to show the communication tested by time and changes from several factors of life, geometric patterns come alive in creative depictions, such as in textiles, structures, food, and education.

The unit is based on the diverse philosophical views of various characters, drawn, woven, pictured, spoken, written, and thought of, in forming a repetition in groups that are now called patterns. Patterns play a significant role in child development. It helps mold their critical thinking and problem-solving skills. Pattern understanding is the ability to discern the underlying structure of a sequence. Research has found a strong correlation between children's patterning skills and their understanding of patterns, which in turn is associated with their later mathematical competence in various mathematical concepts, such as numbers, algebra, and geometry, as well as their reading ability and executive function skills (The Education Hub, 2023). In the Indigenous backgrounds of the different countries mentioned above, geometric patterns have a significant impact on the creation of various Indigenous items. From points to lines, lines to shapes, colors to hue, and the beginning to the end process comprise a meaningful background that transforms these items into the entirety of the Indigenous identity of everyone.

Instructional Guide

This curriculum unit will represent the rationale of how sacred geometry lays geometric patterns built on, by a variety of characters such as shapes driven from nature or intentional deliberation guides the process of creating Art, engineering objects, and tools that explore the process of Science, Technology, Engineering, and Mathematics (STEM) among early childhood learners of Dishchii'bikoh Community School FACE Program.

Patterns involve repetition, arrangement, and sequence in natural and urban environments. In Art, patterns play a significant role in creating motifs, which can either be natural or deliberate. Patterns can also be found in other disciplines, such as mathematics, engineering, literature, architecture, and music, from all over the world, to be utilized (Art in Context, 2025). This unit explores the use of patterns in Art and engineering with early childhood learners using communicative and functional Apache language described in tools, instructions, procedures, and communication. Thus, within the unit, daily strategic conversations guided by Apache Language will be in use to communicate all instructional and social conversational content.

The unit is designed for two weeks with a scaffolding technique. I will be using the following teaching strategies that I have been effectively using, and some strategies that have been identified by the Arizona Early Childhood Career and Professional Development Network (AZECCPD) for 21st Century Early Childhood Teachers, to mirror the flow of the unit and/or some strategies that can go along with every portion of the lesson, integrated across learning activities. First, I will use the KWL Chart to gather the different ideas and thoughts of my young

learners about various shapes, which will serve as the basis for planning how to introduce the concept from their perspective. KWL charts are graphic organizers designed to activate learners' prior knowledge, which promotes higher-order thinking skills and metacognition. Then, I will involve the children in the goal-setting process to encourage them to take ownership of their learning. From there, my learners and I will set a timeline for each goal we want to achieve and incorporate some add-ons to direct/guide the lessons and activities to where I want them to head. Next would be cross-curriculum teaching, where teaching multiple subjects and components of early childhood development can help students to go much deeper in learning concepts and skills. Blending these subjects and components might be challenging, but some approaches, such as project-based learning, can result in a driven goal of the strategy. Project-based learning involves learners carrying out projects that result in concrete outputs, coinciding with concepts from different areas of perspective, such as science, math, language, literacy, social-emotional learning, fine-motor skills, gross-motor skills, and Indigenous knowledge. Learners will be encouraged to generate their own questions based on their interests and curiosity, which I will use during the creation of concrete outputs and daily activities as an inquiry-based learning strategy. According to the AZECCPD (2015), cross-curriculum teaching, project-based learning, and inquiry-based learning are highly motivating for children and encourage teamwork and collaboration among learners. I will also utilize a cooperative learning structure to help children work with their peers and in small groups during differentiated instruction.

As part of the curriculum unit, I will use documentation entailed with Teaching Strategies or Smart Teach to assess learners' developmental progression through all applicable objectives and dimensions. Moreover, for the project-based outputs that learners will create towards the end of my unit, I will include a rubric to assess the different objectives I intend to measure throughout the process. The use of functional conversation in Apache will foster the different facets of the usage of the Indigenous language from the school I serve. According to the Center for Standards, Assessment, and Accountability, Jones, B., and Sandoval, N. (2022), integrating Native Languages in schools serves a dual purpose of advancing learners' well-being as students and cultural knowledge and wellness. Functional communication, on the other hand, plays a crucial role in enabling learners to express their basic needs and wants effectively. Thus, it is the most fundamental communication skill, expressed at home, in school, and in the community (Elias, M., 2025). In early childhood education, functional communication becomes the children's means of expression, understanding others, and engaging in operational and meaningful interactions, mainly when the language used is known and familiar to them.

Teaching Plan

While the curriculum unit spreads its boundaries on the concept of shapes for pre-kindergarten learners, this section will pull all the details of the whole unit together. The unit will explore the geometric and organic shapes as part of the mathematics component of the creative curriculum

that I am using in my school. With the context of teaching shapes, I would like to explore both geometric shapes, including two and three-dimensional shapes, and organic shapes that are unstructured and abstract, but are also considered shapes with which learners also made contact one way or another in their lives, mostly everywhere. The unit will move forward by using these concepts to explore Indigenous Art and architecture, engineering, and Indigenous meanings. While these activities are built up for the learning objectives of the whole unit, I will also use Indigenous STEM during the creation of the learning activities, assessments, and outputs. The plan is designed for 2 weeks' lesson implementation with Pre-K 4-day programming from Monday to Thursday from 8:30 a.m. to 1:30 p.m., following the prescribed Family and Child Education (F.A.C.E.) lesson planning scheduling, which caters to large group, small group, music and movement, wonder-work share, outdoors, mighty minutes, Apache Language integration, and round-up. With that in mind, teaching and learning activities in this unit will be integrated in designated teaching guides from the Creative Curriculum, which is being used at the site. The following are the elements of the unit written with specific information.

a. Topic/ Subject Matter: Mathematics/ Apache Culture and Language

The unit will focus on geometric and organic shapes, exploring how these shapes are integral to the Indigenous art, culture, tradition, clothing, and architecture of the White Mountain Apache Tribe. In connection with Indigenous education, the meanings and symbols associated with these shapes in the lives of Apache people past and present will be incorporated into classroom activities, along with projects that learners will create. In particular, the unit will explore the different shapes embedded in the White Mountain Apache Tribe (WMAT) seal for a starter and then move into creating their own patterns using this sacred geometry through exposing the learners to their place, arts, communicative and functional language, culture and simulation software that they will explore during the different learning activities instore in this curriculum. While the curriculum is focused on Mathematics, the integration of different subject areas is themed into the concepts from each teaching and learning activity.

b. Age/Grade Level(s):

The unit is intended for 4–5-year-old Pre-K students enrolled in Dischii'bikoh Community School in Cibecue, Arizona.

c. Alignment to Standards/Learning Objectives

Below is the alignment of standards, learning objectives, instructional strategies, learning resources, and assessment for this unit. This section comprises the various teaching and learning activities for a 2-week implementation.

The Arizona Early Learning Standards have been developed to provide a framework for planning quality learning experiences for all children aged three to five years. The standards encompass a

broad range of skill development and provide a valuable instructional foundation for children from diverse backgrounds and with varying abilities. The standards are intended for use by all individuals who work with young children in any early care and education setting, including urban, rural, and tribal communities.

Among the standards backboned in this curriculum unit are as follows:

1. AELS: Strand 4:Geometry. Concept 1: Shapes
2. AELS: Strand 2:Operations and Algebraic Thinking. Concept 2: Patterning
3. WNLS
   Interpersonal Communication (IC)
   Interpretive
   Listening (IL)
   Cultures (CUL)
   Communities (COM)
   Presentational Speaking (PS)
   Connections (CON)
   Comparisons (COMP)

Legend: AELS – Arizona Early Learning Standards
WNLS – World and Native Language Standards
WWS – 60-minute uninterrupted play. Wonder (learners were introduced to thought-provoking open-ended questions), **W**ork (play independently or with peers to desired interest area/s with 15-minute intervals or more if applicable), **S**hare (learners share their Wonder Work experience of the day either using expressive language or in written to their individual journals through descriptive visuals and characters).

d. Instructional Strategies
e. Learning Resource
f. Assessment

The table below shows the outlined and detailed descriptions of the curriculum unit's teaching plan.

Week 1: Shapes Around Us and Simulation. This part of the unit introduces different geometric and organic shapes as they are integrated into the various teaching guides of the school's creative curriculum. This entails the language acquisition of different shapes in the Apache language counterpart to the shape names in English. While honing the skills in recognizing shapes and patterns among children and relating that knowledge to sacred geometry in Apache culture, children will use a variety of resources provided by the teacher and their environment to explore topics of the lessons in the first week of this unit's implementation. Modified simulation software will be utilized to enhance student learning through a strategic round-robin activity. Students will utilize learning resources found in the classroom, the school, and the environment, and incorporate those resources into STEM.

<u>Lessons 1-4</u>	*Alignment with standards*	*Learning Objectives*	*Instructional Strategies*	*Learning Resources*	*Assessment*
	AELS: Strand 4: Geometry, Concept 1: Shapes AELS: Strand 2: Operations and Algebraic Thinking, Concept 2: Patterning WNLS: Interpersonal Communication (IC) Interpretive Listening (IL) Cultures (CUL) Communities (COM)	Students shall be able to: • Recognize and identify geometric and organic shapes. • Compare shapes • Use shape names in English and Apache when describing objects found in a specific context and environment. • Recognize, duplicate, and create patterns in real world. Students shall be able to: • interact and negotiate meaning in space, or signed conversations to share information, reactions, feelings, and opinions. • understand, interpret, and analyze what is heard (communicated in ASL) on a variety of topics. • use the target language to	KWL Goal-setting Process Outdoor Exploration Comparing Attributes Circle Time Small Group Intentional Teaching Experiences Guessing Game Naming Attributes and name of Shapes in Apache Language such as number of sides, corners, etc.	KWL Chart Post It Cards Colored Markers Paper Pencil Glue Venn Diagram Outdoor resources (Twigs, Leaves, flowers, fruits, etc.) Slides Photos White Mountain Apache Seal Culture Area and displays (moccasins, burden baskets, clothing, camp dress, vest, cradleboard, etc.) Art supplies School murals Hard boards Visual displays Rubric	What the students Know, Want to Know Outputs Participation Class Output Observation Documentation Use of Rubric Cultural Participation

		investigate, explain, and reflect on the relationship between the practices, products, and perspectives of cultures studied. • use the target language to participate in the community			
Week 2: Apache's Sacred Geometry and Engineering: The whole unit explores the wonders of engineering and architecture. Students will explore creating different architectural designs, such as mini models of ancestral dwellings like wickiups, using various geometric and organic shapes and patterns, incorporating Apache symbolism and sacred geometry. Family engagement will be encouraged as they make their own wickiup through understanding the history, process, meanings, and architectural characteristics of their ancestors' home and how these are different from other Indigenous backgrounds, such as the Navajo's hogan and their very own White Mountain Apache Tribe wickiup. This unit will cover all necessary applications of the concept in geometry to the students' lives and apply what they have learned to their everyday lives.					
Lessons 5-8	AELS: Strand 3: Measurement and Data Concept 3:Measures	Students shall be able to: • use non-standard units of measurement for simple measuring tasks. • create two and three – dimensional shapes during play. • compare, describe, analyze, and sort two and three-dimensional objects in the	Creating wickiup mini model Apache story Making Studying Celebration Family Engagement	2-D and 3D Shapes, Organic Shapes Art Materials Sticks Glue Glue gun Hard board Story books Pencil Coloring materials	Performance-based projects Mini wickiup model Murals tour My Apache wordless story book Participation

	WNLS: Presentational Speaking (PS) Connections (CON) Comparisons (COMP) Communities (COM)	environment using formal and informal mathematical language with prompting and support based on their attributes. Students shall be able to: • present information, concepts, and ideas to inform, explain, persuade, and narrate on a variety of topics using appropriate media and adapting to various audiences of listeners or viewers. • build, reinforce, and expand knowledge of other content areas and evaluate information and diverse perspectives while using the target language to develop critical thinking and creative			

		problem solving. • use the target language to participate in the community			

In this unit, a thematic approach was employed, which demonstrates the integration of different dimensions and objectives of Early Childhood developmental progression into the teaching and learning activities. The following diagram illustrates the interconnected 10 learning areas present in this curriculum unit, which are equally emphasized in every learning activity to support the developmental learning of PreK learners through the determination of progression of objectives and dimensions for each learning area.

Social-Emotional
*regulates own emotions and behaviors
*establishes and sustains positive relationships
*participates cooperatively and

Physical
*demonstrate gross-motor manipulative skills
*demonstrates fine-motor strength and coordination

Literacy
*demonstrates phonological awareness, phonics skills, and word recognition
*Comprehends and responds to books and other texts

Social Studies
*demonstrates knowledge about self
*shows basic understanding of people and how they live
*explores change related to familiar people or places
*demonstrates simple geographic knowledge

The Arts
*explores the visual arts

Mathematics
*explores and describes spatial relationships and shapes
*Demonstrate knowledge of patterns
*Compares and measures

Language
*listens to and understand increasingly complex language
*uses language to express thoughts and needs
*uses appropriate conversational and other communication skill

Cognitive
*demonstrates positive approaches to learning
*remembers and connects experiences
*Uses classification skills
*Uses symbols and images to represent something not present

Science and Technology
*demonstrates knowledge of the physical properties of objects and materials
* uses tools and other technology to perform tasks

English Language Acquisition
*demonstrate progress in listening to and understanding English
*demonstrates progress in speaking English

Detailed Lesson Plans

The entire unit will primarily focus on the teaching guide for Buildings, in compliance with the required utilization of the site's creative curriculum. However, the integration of the focus of this curriculum unit will tackle shapes in general and the cultural integration of shapes within Apache culture, specifically the White Mountain Apache Tribe, reflecting a culturally responsive education among the early childhood learners of Dishchii'bikoh Community School. The lessons below provide parts of the day where the unit is integrated into the schedule.

<table>
<tr><td colspan="2">Week 1 (Monday-Thursday)
Focus: Shapes Around Us
Timeframe: 30 minutes (large group, small group)

Day 1 (Monday) September 15
Question of the Day: What shapes do you see? In the classrooms, school buildings, playground/outdoors etc.
Assessment: Use indicator 1-3 from the rubric below.</td></tr>
<tr><td colspan="2">Procedures:</td></tr>
<tr><th>Teacher's Activities</th><th>Student Activities</th></tr>
<tr><td>Morning Routine (3 minutes)
Pledge of Allegiance in Apache
Apache Chant: Morning Greeting

Large Group: (15 minutes)
Introduction: KWL Chart
Make a chart for "K" (What do you Know about shapes?)
The teacher will write the learners' responses
Talk about the learners' responses in the chart.

Ask the question of the Day, "What shapes do you see in the carpet? (Start asking this question in simple areas of the classroom, where children can find shapes, and then move to a wider perimeter area of the classroom.) As the children say the shape name, the teacher will repeat it with the Apache name for that shape.
Circle- dibool
Triangle – taagilen 'aa
Square – dii'yulen'aaCircle- dibool
Triangle – taagilen 'aa
Square – dii'yulen'aa</td><td>Children will recite the Pledge of Allegiance and Morning greeting in Apache Language.

Children will answer the K and L part of the chart

Children will respond by naming different shapes they know. They can bring the object to show and tell the name of its shape.

Children will sing along with the shape song</td></tr>
</table>

Sing a song: Model singing a shape song while pointing to the different objects that the children brought to large-group or circle time. Sing the song once more and encourage the students to sing along while pointing to the different objects about each shape being mentioned in the song.	
Read Aloud: Shapes, shapes, shapes by Tana Hoban -show different shapes that are found in the culture area set up in the classroom. Ask about the different shapes that they see. Introduce a daily shape focus and its meaning. Materials: Song Read aloud Book Flag Shape posters Slides	Children say the shapes they see in the culture area, such as displays in camp dresses, ribbon skirts, vests, cradleboards, moccasins, burden baskets, and photos of the community buildings.
Small Group (15 minutes)	Children will get up from the carpet and walk to their assigned groups (there should be a designated board that tells the children's small group designation). Tip: Use a board that you can freely change children's names to your desired groupings (e.g., Velcro, whiteboard, etc.).
From a previously assigned group, children will transition to small groups.	Children will give their ideas and show them to the small group.
Transition Chant: 2D and 3D shapes	
The teacher and co-teacher will work on the groups assigned to them. Using the shapes that the children saw and mentioned in the culture area, the teachers will do the following activities in small groups. *Rainbow Group:* (Teacher's group)	The child will explain how they sorted the shapes. (name of student) will repeat how their classmate sorted the shapes. Children will share their ideas. "I think ……"
Activity 1: Shape Sort The teacher will present different shape cutouts that they mentioned from the read aloud and ask, "I wonder, if I am going to sort or group these shapes, how will I do it?" or "I wonder how I can sort/group these shapes?" "Can you tell me how you sorted the shapes?" "Can somebody from the group repeat how (name of student) sorted the shapes?"	Children will review the shape names and, with the Apache names and their meanings, in simple terms.

"Can somebody from the group repeat how (name of student) sorted the shapes?" "Do you see a pattern in how we sort these shapes?"	Children will match shape puzzles to printed shapes.
"If you were to do it differently, how would you do it?" Encourage children to use sentence starters such as "I think..." to share their opinions.	Children will say the patterns that they see.
The teacher will keep the conversation around different ways to sort shapes and encourage students to share their ways and opinions. Materials: Cut out shapes	Children will say yes or no and explain why.
Garden Group: (Co-teacher group) Activity 2: Shape Match The teacher will present each printed shape and ask children to tell the name of the shape. Repeat the name with the Apache name. "Can we match the shape puzzles to the printed shapes?" (point to the objects while asking). Place the matched shapes in a row and ask, "Looking at the shape puzzles you matched, can you see a pattern?" Show several matched shapes in a row and ask, "Do you see any pattern here?" "How did you know that it was a pattern?" "How did you know that it is not a pattern?" The teacher will have conversations about simple patterns for children. Materials: Shapes puzzle pieces	Children will create complex shapes from shape toys given and draw the figures they made on their journal. Children will choose the interesting area where they want to play.
Butterfly Group: Independent Group Activity 3: Complex shapes Present different shapes (in 3D) to children. Explain that they will use the shapes to form objects that they desire. Model making a home figure using a square and a triangle. Then, they draw the figure they made in their journal. Show patterns in their work.	

Materials: 3D shapes manipulatives Student journal Pencil	

Week 1 (Monday-Thursday) **Focus:** Shapes Around Us **Timeframe: 15 minutes** (small group) Day 2 (Tuesday) September 16 **Question of the Day:** What patterns are there? **Assessment:** Use indicator 1-2 from the rubric below.	
Procedures:	
Teacher's Activities	**Student Activities**
Morning Routine (3 minutes) Pledge of Allegiance in Apache Apache Chant: Morning Greeting	Children will recite the Pledge of Allegiance and Morning greeting in Apache Language.
Large Group: (15 minutes)	
Small Group (15 minutes) From a previously assigned group, children will transition to small groups. *Transition Chant:* 2D and 3D shapes	
Recall: Picture Walk Before going to the small groups, use the picture walk strategy to recall the shapes that the students mentioned from yesterday's lesson. Ask "What does each of this shape symbolizes?" Ask the question about the focus shape of the day. Ask if they can recall other shapes from small group activities from the previous lesson.	Children recall the shapes they see and their meanings. They will share their answers to the whole group.
The students must look at the small group board to find their small group where prepared activities were scheduled. *Rainbow Group:* (Teacher's group)	Children will go to their respective small groups.

Activity 1: Patterns in what she wears Using a small sample, Apache camp dress (girls) has the children identify shapes and patterns they see and draw the pattern they can find in their journal. *Garden Group*: (Co-teacher group) Activity 2: Patterns in what he wears. Using a sample Apache boy's vest, children will identify the shapes and patterns they see and draw the pattern they can find in their journal. After 5 minutes, each group switches samples and does the same activity. Materials: Apache Vest Apache Camp Dress Paper Pencil/ markers Coloring materials Photos for the picture walk	Children will look into the different shapes and patterns present in the sample camp dress (Apache's traditional clothing for girls/women) Children will look into the different shapes and patterns present in the sample vest (Apache's traditional clothing for boys/men) Children switch sample Indigenous clothing and do the same activity with the teacher.

Week 1 (Monday-Thursday) **Focus:** Shapes Around Us **Timeframe: 30 minutes** (small group, Outdoors/ Intentional Teaching Experience) Day 3 (Wednesday) September 17 **Question of the Day:** What is in our tribe seal? **Assessment:** Use indicator 1-3 from the rubric below.	
Procedures:	
Teacher's Activities	**Student Activities**
Morning Routine (3 minutes) Pledge of Allegiance in Apache Apache Chant: Morning Greeting **Large Group: (15 minutes)** As part of the large group activities, introduce the children's Tribal group and the White Mountain Apache Tribe Seal.	Children will recite the Pledge of Allegiance and Morning greeting in Apache Language.

Ask the following guide questions: 1. What is a seal? 2. Why do we have a seal? 3. How did our seal become ours? 4. What characters can you find in our seal?	Children will answer the questions .
Small Group (15 minutes) Small group routines From a previously assigned group, children will transition to small groups. *Transition Chant:* 2D and 3D shapes	Children will go to their respective small groups. Children will tell the different characters they can find from the seal.
Recall: Picture Walk Before going to the small groups, use the picture walk strategy to recall the shapes that the students mentioned from yesterday's lesson. Ask "What does each of this shape symbolizes?" Ask the question about the focus shape of the day. Ask if they can recall other shapes from small group activities from the previous lesson. The students must look at the small group board to find their assigned small group, where prepared activities are scheduled. *Rainbow Group:* (Teacher's group) Materials: Shared writing board Marker WMAT Seal Puzzle pieces from the characters of the WMAT seal	Children will place the missing pieces to complete the WMAT seal. Children answer a quick fact check with the teacher verbally.

Week 1 (Monday-Thursday)
Focus: Shapes Around Us
Timeframe: 45 minutes (large group, small group)

Day 4 (Thursday) September 18
Question of the Day: What patterns simulation can I create?
Assessment: Use indicator 3 from the rubric below.

Procedures:

Teacher's Activities	Student Activities
Morning Routine (3 minutes) Pledge of Allegiance in Apache Apache Chant: Morning Greeting	Children will recite the Pledge of Allegiance and Morning greeting in Apache Language.
Large Group: (15 minutes)	
Small Group (30 minutes) Small group routines	
The teacher will introduce pattern simulation.	
The teacher will employ a round-robin technique to facilitate a smooth flow of manageable simultaneous activities involving both tangible and intangible pattern simulations. The activities are as follows.	Children will answer the questions .
Activity 1: Moving Patterns Participants: all Groupings: small groups Children will work in teams, creating a moving pattern using their body parts, simulating the different environmental patterns created by living and non-living things. Examples of the moving patterns are as follows.	Children will go to their respective small groups.
✅ Arm movements: Move up and down like waving hello or flying. Arms wiggling like waves in the ocean. ✅ Legs Movement: March in place just like the soldiers in parade. Gallop like a horse (Apache's mode of transportation from the past and present generation) ✅ Head Movements: Nod up and down like a friendly way to communicate. ✅ Hips Movement: shake side by side like dancing to music.	Children will tell the different characters they can find from the seal. Children will place the missing pieces to complete the WMAT seal. Children answer a quick fact check with the teacher verbally.

✅ Body Movements: Stepping forward and backward creating a zebra's pattern. Materials: Body parts Activity 2: Patterns in Nature Participants : all Groupings: large group The teacher will introduce how patterns can be found in nature, such as in leaves, rocks, branches, and twigs of trees, snowflakes, raindrops, electrical wiring in the lamp post, walls of the classroom, roofs, building doors and walls, and fences. The teacher will create a mini tour of places around the school where these patterns in nature may be present. Materials: Outdoor Environment Activity 3: Digital Pattern Simulation Participants: Volunteers Groupings: 2 children at a time Children will explore creating digital patterns through software designed for early learners and modified by the teacher using shapes and characters/symbolism of their tribe. Materials: iPad modified software	Children will collect objects that they think make patterns during the tour and tape them to their journal. Some patterns may also be drawn in their journal afterwards. Children will create their own digital patterns by designing their own moccasins (Apache shoes worn with camp dress and by the crown dancers) and burden baskets (Apache vessels during harvest) using sacred geometry learned from the previous lessons. The teacher will supervise this activity, and only two children will be allowed at a time.

Formative Assessment (Observation) Rubric for Week 1: Week 1 lessons concentrate on shape recognition, pattern identification, and pattern creation which entails honing classification, estimation, problem-solving, critical and creative thinking skills.

Indicators	5	4	3	2	1
1. Recognizing shapes	The child was able to identify 5 or more	The child was able to identify 4	The child was able to identify 3	The child was able to identify 2	The child was able to identify 1 shape

	different shapes	different shapes	different shapes	different shapes	
2. Identifying patterns	The child was able to identify 4-5 pattern samples	The child was able to identify 3 pattern samples	The child was able to identify 2 pattern samples	The child was able to identify 1 pattern sample	The child could not identify any pattern at all
3. Creating own pattern 	The child was able to identify complex repeating pattern ABC.	The child was able to identify complex repeating pattern AABB.	The child was able to identify complex repeating pattern AAB.	The child was able to identify complex repeating pattern ABB.	The child was able to identify complex repeating pattern AB.
4. Indigenous Knowledge and participation	The child was able to participate in 7-8 cultural activities	The child was able to participate in 5-6 cultural activities	The child was able to participate in 3-4 cultural activities	The child was able to participate in 1-2 cultural activities	The child did not participate in any of the cultural activities in the lessons.
Total Score: 20					

To compute each child's rating, add their daily score to their score in the 4th indicator after all the activities in week 1 lessons where completed.

Week 2 (Monday-Thursday)
Focus: Art and Architecture in Sacred Geometry
Timeframe: 45 minutes (Large group, Outdoors/ Intentional Teaching Experience)

Day 1 (Monday) September 22
Question of the Day: What is in our school murals?
Assessment: Use indicator 2 and 4 from the rubric below.

Procedures:

Teacher's Activities	Student Activities
Morning Routine (3 minutes) Pledge of Allegiance in Apache Apache Chant: Morning Greeting	Children will recite the Pledge of Allegiance and Morning greeting in Apache Language.
Large Group:/ITE (45 minutes) The teacher will create a tour route for the children to view the school's mural paintings, which depict various shapes and patterns used as representations of the surroundings, individuals, and clothing of their ancestors and the present generation.	Children will take tour around the campus.

The teacher will prepare slides of different murals ahead of time to show after the tour. Have the children recall the patterns they see through the slides. The teacher annotates the patterns that the children will mention and gives input as necessary. Ask children, "How are these patterns important to you? to your grandparents? to your family?" Materials: Mural Paintings Slides Photos	Children will identify the patterns they see. Children will share how these recognized patterns are important to them, to their ancestors (grandparents), and to their family.

Week 2 (Monday-Thursday) **Focus:** Art and Architecture in Sacred Geometry **Timeframe: 60 minutes** (Large group, Intentional Teaching Experience in small group) Day 2-4 (Tuesday - Wednesday) September 23-24 **Question of the Day:** How are my ancestors home look like? How are wickiups built? **Assessment:** Use indicators 1- 4 from the rubric below.	
Procedures:	
Teacher's Activities	**Student Activities**
Morning Routine (3 minutes) Pledge of Allegiance in Apache Apache Chant: Morning Greeting Large Group: (15 minutes) The teacher will show a slide of a wickiup from the white mountain Apache tribe. Ask the following guide questions: 1. How do you describe these homes? 2. What shape can you see? 3. What patterns can you find? 4. Why do they use these shapes? Patterns? The teacher will show a hogan from the Navajo tribe. Use the guide questions above to generate ideas from the children. Then, ask the students to compare both ancestral dwellings based on the shapes and patterns they see.	Children will recite the Pledge of Allegiance and Morning greeting in Apache Language. Children will answer the questions during shared writing. Children will describe and later compare hogan from wickiup.

The teacher will give input on both ancestral homes and the symbolism and meaning of each architecture. **Small Group (40 minutes)** Small group routines Activity: Mini Wickiup The teacher will facilitate making mini wikiups with the children per small group. Materials: Sticks Glue and glue gun Flat board Description tag	 Children will create their group mini wickiup with the teacher and paint/weave designs that show shapes in patterns learned.

Week 2 (Monday-Thursday) **Focus:** Art and Architecture in Sacred Geometry **Timeframe: 60 minutes of children's involvement per day** (Large group, Intentional Teaching Experience/small group) Day 4 (Thursday) September 25 **Question of the Day:** My Apache Story **Assessment:** Use indicators 1-4 from the rubric below.	
Procedures:	
Teacher's Activities	**Student Activities**
Morning Routine (3 minutes) Pledge of Allegiance in Apache Apache Chant: Morning Greeting The teacher will invite Apache language teachers to create a wordless book of the children's own Apache story. **Large Group: (15 minutes)** The teacher will introduce each page of the book with a recall of what they learned from the beginning of the lesson to the end. **Small Group (15 minutes)** Small group routines	Children will recite the Pledge of Allegiance and Morning greeting in Apache Language. Children will recall the concepts learned with the teacher.

The teacher will provide empty mini-book templates to the students in each group. Then work with them on drawing their own Apache Story per page. The teacher will facilitate a small group book-making activity with the children. Materials: Pre-made blank books Pencil Coloring materials	Children will make their own Apache story wordless book.

Formative Assessment (Performance-Based) Rubric for Week 2: Week 2 lessons concentrate on concept learned applications in the form of both art and engineering. Children hone their problem-solving skills, critical thinking, collaboration, creativity, and social-emotional skills.

Indicators	5	4	3	2	1
1. Recognizing shapes	The child was able to identify 5 or more different shapes	The child was able to identify 4 different shapes	The child was able to identify 3 different shapes	The child was able to identify 2 different shapes	The child was able to identify 1 shape
2. Identifying patterns	The child was able to identify 4-5 pattern samples	The child was able to identify 3 pattern samples	The child was able to identify 2 pattern samples	The child was able to identify 1 pattern sample	The child could not identify any pattern at all
3. Creating own pattern 	The child was able to identify complex repeating pattern ABC.	The child was able to identify complex repeating pattern AABB.	The child was able to identify complex repeating pattern AAB.	The child was able to identify complex repeating pattern ABB.	The child was able to identify complex repeating pattern AB.
4. Apache culture, language, arts, and engineering	The child was able to show significant understanding of the Apache culture,	The child was able to show significant understanding of the Apache culture, arts,	The child was able to show significant understanding of the Apache arts, and engineering.	The child was able to show significant understanding of the Apache arts.	The child was not able to show any cultural concept

	language, arts, and engineering.	and engineering.			
Total Score: 20					

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