

Constructing Sacred Pyramids: A Cosmic World View in Mesoamerica

Sandra Storms Kropf
Clifton Middle School

INTRODUCTION

Ask students “*What is Art?*” and most often you will hear “*It’s Self-Expression!*” However, students do not realize that art is more than expression of personal emotion – it is deeply integrated in daily life on personal, societal, political, and religious levels. To help my students appreciate this broader integrated base, this “art world view,” my middle school art curriculum typically focuses on student exploration of the nature of art and its integral relationship to daily life with links to math, as well as science, social studies, and language arts. To enhance student recognition and expression of identity, I like to present Pre-Columbian influences on the Modern artists of both the 20th and 21st centuries to ground my students in their cultural heritage and to explore issues of identity in the contemporary world.

UNIT OBJECTIVES

In this unit students will investigate the Teotihuacán people and their integration of art, math, and science in daily life, such as astronomical alignment of their city and pyramid construction symbolic of sacred cosmic themes. Students will practice Pre-Columbian math calculations with constructive applications in designing an urban city grid layout, a symmetrical mural panel, and a pyramidal building. Students will be introduced to Mesoamerican influences on Modern Constructivist and Abstract artists of the 20th century – specifically artists of the Bauhaus and El Taller Torres Garcia, who pursued constructivist theories using spheres, pyramids and cubic forms (Kropf).

Students will practice higher order thinking skills demonstrated in reflection, group dialogue and both verbal and written analysis of artworks to explore issues of art and the use of abstraction to develop symbolic communication. As students develop visual literacy – the visual thinking skills that “strengthen their ability to examine, articulate, listen and reflect” on artworks (Housen and Yenawine 1), students will investigate the use of symbolic geometric forms in contemporary art and architecture. Isamu Noguchi’s courtyard gardens for the IBM Headquarters, Buckminster Fuller’s geodesic domes, and the *Pyramide du Louvre* by I. M. Pei will be presented to demonstrate that art is not just decorative artifacts - that art embodies creative patterns of symbolic, often geometric, abstraction that communicates cultural beliefs.

TAKS / TEKS OBJECTIVES

Interdisciplinary connections are embedded in lessons to support the *Texas Academic Knowledge Skills* (TAKS)

Science (natural environment, solar system);

Math (geometric shapes and volumes, symmetry, spatial issues, counting, measurement);

Social Studies (social hierarchy, customs, symbols and communication);

Reading and Writing (vocabulary, reflective and critical evaluation)

Language Arts (interactive discussion, diverse viewpoints, critical de-construction)

Lessons make specific interdisciplinary connections to support the *Texas Essential Knowledge Skills* (TEKS) for 6th, 7th, and 8th grades in Math and Visual Fine Arts

MATH *Texas Essential Knowledge Skills* (TEKS)

TEKS: *Number Operations and Quantitative Reasoning*

- ~ Represent and use rational numbers in a variety of equivalent forms to compare and order non-negative rational numbers: **Math 6.1.01.A; Math 7.1.01.A; Math 8.1.01.A**

TEKS: *Geometry and Spatial Reasoning*

- ~ Use geometric vocabulary to compare and classify shapes and solids, including pyramids, cones, prisms and cylinders: **Math 7.6.C**
- ~ Use geometric concepts and properties to solve problems in fields such as art and architecture: **Math 7.8.C; Math 8.7.B**

TEKS: *Measurement*

- ~ Select and use appropriate units, tools, or formulas to measure and to solve problems involving length (including perimeter), area, time, temperature, volume and weight: and apply the problem-solving model when doing so: **Math 6.8.B; Math 7.9**

TEKS: *Underlying Processes*

- ~ Use underlying processes and mathematical tools to solve problems connected to everyday experiences and investigations in other disciplines: **Math 6.11.A; Math 7.13.A; Math 8.14.A**

VISUAL FINE ARTS *Texas Essential Knowledge Skills* (TEKS)

(Houston Independent School District's *Vertical Alignment Matrix* to show progression for each grade-level in the number of artworks/ ideas required is shown in parentheses)

TEKS: *Creative Expression/ Performance*

Create Original Artworks

- ~ Develop perception skills necessary for generating and organizing original art creations: **Art 6.1.01** (two); **Art 7.1.01** (four); **Art 8.1.01** (six).

Expand Artistic Expression through Interpretation, Invention, and Improvisation

- ~ Understand expressive qualities of specific art elements and design principles in artworks: **Art 6.1.07** (two); **Art 7.1.07** (four); **Art 8.1.07** (six).

Prepare Individual Artworks

- ~ Compare and contrast artworks by artists that use the same content or theme: **Art 6.1.11** (two); **Art 7.1.11** (four); **Art 8.1.11** (six).

Prepare Group Artworks Representative of Murals, Collages, Etc.

- ~ Explore possibilities of drawing, painting, printmaking, and sculpture in the development of ideas: **Art 6.1.15** (two); **Art 7.1.15** (four); **Art 8.1.15** (six).

TEKS: *Historical and Cultural Heritage*

Determine Stylistic Similarities and Differences of Artists

- ~ Critically evaluate his/ her work and the work of other artists: **Art 6.2.02** (two); **Art 7.2.02** (four); **Art 8.2.02** (six).

- ~ Examine ideas of individual style development: **Art 6.2.05** (two); **Art 7.2.05** (four); **Art 8.2.05** (six).

Determine Stylistic Similarities and Differences of Artworks

- ~ Examine the idea of art as pure decoration compared to art as decorative as well as functional in nature: **Art 6.2.09** (two); **Art 7.2.09** (four); **Art 8.2.09** (six).
- ~ Research artworks from various cultures: **Art 6.2.13** (two); **Art 7.2.13** (four); **Art 8.2.13** (six).

TEKS: Perception

Discern Characteristic Types of Visual Expression

- ~ Analyze and critique works of art utilizing description, analysis, and interpretation: **Art 6.3.10** (two); **Art 7.3.10** (four); **Art 8.3.10** (six).
- ~ Interpret and discuss geographic, cultural and historical influences in artworks: **Art 6.3.13** (two); **Art 7.3.13** (four); **Art 8.3.13** (six).

TEKS: Response and Evaluation

Attend and/ or Participate in Art Exhibitions

- ~ Learn how to communicate visually and verbally to describe artworks: **Art 6.4.18** (two); **Art 7.4.18** (four); **Art 8.4.18** (six).

RATIONALE

The demographics at Clifton present widely disparate backgrounds in education, not just in the visual arts, and a majority of our school's students are Hispanic – many are non-natives as well. We are both a Title I and a magnet school, drawing students from outside our Northwest Houston feeder pattern for math and the sciences. I feel compelled to help all my students experience the relevance and integration of math and sciences in the visual arts, so design is a primary concern – natural relationships and patterns seen in nature and mathematically realized in art is a theme my students enjoy as much as I do. This unit will be driven by design, patterns and relationships to the natural world with a focus on developing abstract symbols.

UNIT BACKGROUND

The Amerindian peoples used their pyramid complexes for outdoor celebrations, rituals and divinations. As in a stage set, priests climbed steep steps to temples situated at the top of the truncated pyramid to conduct rituals seen by vast numbers of people gathered in the wide open-air plazas, platforms or spaces often laid out symmetrically surrounding the pyramid. To prophesize the proper time for ritual events required a calendar and mathematical calculations based on observations of the movement of stars and planets, the rising and setting of the sun and moon, and the changing of seasons. The pyramid complex and the city at Teotihuacán were laid out in a quadrant to symbolize these sacred calculations. Other pyramid complexes had upright posts, such as seen at Stonehenge to aid in astronomic observations. At Teotihuacán buildings, roads and walkways were systematically laid out with each major structure having one wall aligned facing 15.5 degrees east of true north – to follow the direction of the sun at its highest points of the year observable at the Tropic of Cancer on May 19 and July 25. Circular compass symbols representing this alignment are carved in the floors of many buildings and may represent surveyor's marks to orient direction at the time of their construction (Arnold, *City of Gods* 20-25).

Mesoamerican cultures shared many similar symbols and systems in religion, agriculture, building construction, mathematics, and astronomy by dispersing knowledge through movement

(abandonment and re-settlement), conquest and appropriation, pilgrimage and trade. Although there are variations amongst individual groups, the same basic counting, calendar, cosmic division of the sacred four corners, and cosmic world view seem to be a recognizable foundation throughout Mesoamerica (Arnold, *Cosmic Trees* 267; Lopez Austin 271). Directional colors are documented by the Maya as white for the north, yellow for the south, black for the west, and red for the east (Miller and Taube 65-67).

The Mexican calendrical *Codex Borgia*, painted on screen-folded *amatl* bark paper, is similar to the Mixtec historical *Codex Nuttall*, but representations of the gods and sacred directional trees are recorded for ritual divination by priests. One example is described as the four directions represented by four gods surrounded with plumed serpents forming quadrants: to the East is Tlaloc, the ancient god of waters of the sky, of rain and storms, rain of fire and carrier of lightning – both a creator of life and a destructor; to the North is Tlazolteotl, the ancient mother of the gods – the old goddess of both earth and moon, the eater of filth, and a deity of sensuality; to the West is Quetzalcoatl, the *Feathered Serpent* god of the wind, rebirth and renewal – one of the creators of the sun and the world; and to the South is Macuilxochitl, god of games and pleasure (Byland xiv, xxx). However, as this plate is part of an interactive set in a complex, cyclical or calendrical divination system, neither the gods nor the colors represent recognizable traditional attributes of the cardinal directions.

In Lesson One students will become familiar with Mesoamerican calculations, practicing counting and calendar calculations to develop a sense of the cosmic world view shared among the many peoples of ancient Mesoamerica, and that not only influenced the way they adapted to their Post-Conquest new world, but is still influencing native peoples today.

Around 150-200 CE, in an unusual example of Pre-Columbian urban planning, the cosmopolitan city as well as the temple and pyramid complex of Teotihuacán was carefully re-organized on a terraced grid along the construction of the 150 foot wide processional *Avenue of the Dead* running about 3 miles from the south at 15 degrees 17 minutes east of north, linking the *Pyramid of the Sun* and the *Pyramid of the Moon* at the foot of the Cerro Gordo mountains. In 200-350 CE the re-routing of the San Juan River into canals to follow the grid layout bisected a central canal designed to run parallel to the *Avenue of the Dead*. The *East-West Avenue* constructed at an intersection with the *Citadel* and the *Temple of Quetzalcoatl* divided the city into quadrants representative of the Mesoamerican cosmic world view. This original organizational grid would influence the Aztec design of their capital at Tenochtitlan, referencing their belief in the mythic Teotihuacán as the birthplace of their gods. All the place names we use are from the Nahuatl language of these Aztec peoples who discovered the already ancient abandoned ruins of Teotihuacán lying to the northeast on the central plateau of Mexico (Arnold, *City of Gods* 11; Coe and Koontz 105-107; Manzanilla 202).

The ritual symbolism of the Mesoamerican pyramid itself represented alignment to four cardinal directions based on astronomical calculations of a geometric abstraction of a sacred mountain containing the water of life. As an example of *axis mundi* reaching not just to the heavens, but deep down through its cave, or the center of the universe to the underworld, the mountain symbolically recycled life forces, acting as a conduit – as a world tree. The temple representing an entrance to the sacred cave from which original life issued was erected on top of the truncated pyramid. New pyramids were successively constructed over previous ones, emphasizing the sanctity of the natural forces associated with place itself. Teotihuacán, then, was symbolically planned to represent the setting for its jewel, the *Pyramid of the Sun* – a sacred conceptualization of sustenance – sacred mountain, primordial cave of creation and the life water of the rain god, symbolized in the pyramid structure as the center of the four-petal *Ceiba* flower (Manzanilla 206; Lopez Austin 270-271).

In Lesson Two students will begin to use their Pre-Columbian math skills to design grid plans closely adhering to the Teotihuacán model as they begin to also formulate cosmic views that will inform choices and symbol making.

The murals of the painted city of Teotihuacán represent 700 hundred years of tradition and reveal developmental characteristics, such as the predominance of an iridescent red (known as Teotihuacán Red) in monochromatic tones and the use of black or red contour lines. Figures were drawn 2-dimensionally with an elegant disregard of proportion, thus accommodating the *talud-tablero* architectural style of sloping walls and vertical panels, permitting an adaptation of images within specific architectural frameworks (De La Fuente 44-46). This *talud-tablero* architectural style is identified with Teotihuacán. Both architectural and cultural influence on other Mesoamerican peoples can be traced back to Teotihuacán, such as through iconography and the hieroglyphic writing of the Maya (Martin 105-114; Miller and Taube 18). Because of the city grid-plan that controlled all construction, symmetry in mural paintings of figurative pairs can be often seen complementing the small open-porticoes of architectural units, consisting of three symmetrically arranged structures opening to a courtyard with a central alter, such as *Portico 10 at the Complex of the Jaguars* (De La Fuente 42-47).

Border elements are another characteristic identifiably influenced by the *talud-tablero* architectural style. Motifs are generally geometric and sometimes are seen to incorporate symbolism of the main mural, such as the intertwining bands symbolizing a repeated straight-line motif for the coyote and interlacing-net motif for the jaguar mural at *Atetelco's White Patio, Courtyard 2* (De La Fuente 44-46; Coe and Koontz 110-113).

Abstractions and motifs representing water, such as shells and spiraling volutes, as well as speech scrolls and animal or human figures – all are abstracted symbolic elements used to evoke religious ideas, rituals, priests, and deities (De La Fuente 50-51). The basic organization of the city of Teotihuacán into a quadrant focuses ritualistic and sacred symbolism of four cardinal directions in the cosmic vision of world tree – of the tree of life reaching down into the underworld and up through the earthly world to support the heavens. The monochromatic red mural at the residential complex at Tepantitla portrays the Great Goddess Chalchiutlicue – She of the Jade Skirt, the goddess of land water, fertility and caves. She is the deity of the calendar day sign of the serpent and iconography often shows her dispensing seeds, jade or water from her open hands, but here four streams of large water droplets fall from each hand. Behind her elaborate feather headdress rises an entwined tree of life, each branch ending in elaborate abstract flowers visited by birds (Arnold *City of Gods*, 16-17; Byland xvii; Miller and Taube 60).

In Lesson Three students will continue to develop Pre-Columbian math and design skills to create a mural in its architectural context. Issues of cosmic world view and daily life will dictate the symbolism and design development.

Constantly I remind my students to reflect on “Who is your audience?” Unless an artist’s work is commissioned, the audience is not always well defined – sometimes the audience might even seem to be the artist! But what is being communicated and to whom? The artist comes with background, vision and influences which often work unconsciously through the artist’s hand, but are also a conscious artist’s richest resources.

As art is not created in a vacuum, but is dynamically integrated in social, political, religious and cultural life, similar ebbs and flows or even revolutions are seen in art, just as in society. Just as Mesoamerican art cannot be isolated from embedded content and function, the art we experience in our own time is also functionally engaged with society – past, contemporary and future!

Many 20th century Modern artists created art informed by geometric abstraction and constructivist theories, one fundamental source of which traveled from Pre-Columbian archaeological discoveries to inspire Avant-garde artists both in Europe and in the Americas. Geometric abstraction deeply attuned to nature and the rhythm of cosmic life can be observed in one of Josef Albers' murals, *Loggia Wall*, 1967. Inspired by Mesoamerican brickwork, such as the scrolling frieze in the Palace of Columns at Mitla, Albers displaced brick in a symmetrically ordered pattern to create the ancient hourglass or double pyramid pattern (Paternosto 205-208).

In Lesson Four students will develop their own creative pyramidal architectural building, both appropriating design features and creating inspired symbolic design, communicating social, political or religious issues in everyday life through art.

IMPLEMENTATION STRATEGIES

Visual Learning

- ~ Posters of media, art elements and principles of design will scaffold art learning, art evaluation and reflective response.
- ~ Displays of student artwork will reflect art issues in math and science.
- ~ Technology (video and PowerPoint) will present diverse artworks for discussion.

Kinetic Learning

- ~ Students will use manipulatives and building modules to aid counting or improve spatial experience preliminary to constructing sketching models.

Auditory Learning

- ~ Students will explore social studies, math, science, and art issues in videos.
- ~ Students will use music to focus concentration on creative process and journaling.

Interpersonal Learning - Peer Teaching

- ~ Rubrics will structure group projects, presentations, and evaluations.
- ~ Opportunities will be offered for peer teaching, review, and discussion.

General Scaffolding Strategies

Strategies to scaffold learning will include brainstorming and context referencing, comparative/contrast critical-evaluation, rubrics, Venn diagrams, art posters, and daily Journal/Sketchbook entries with prompts that include written reflections. Lists of drawing ideas, resources and pencil techniques will facilitate creative process and review.

This four lesson unit covers 9 -12 weeks in block-scheduled introductory middle school art classes, but may be extended to accommodate research, explore math and science concepts, explore mixed-media experiments, or facilitate student evaluation, selection, and exhibition of artworks in school or community venues.

Student Evaluation and Exhibition

Rubrics will guide evaluations and group presentations that include interactive discussion, analysis, and critical-evaluation.

Exhibitions in school district and community will be acknowledged concurrently with exhibitions on e-board and school webpage.

LESSON PLANS

Lesson One: Counting to Connect Religion – Astronomy – Environment

Interdisciplinary TAKS Objectives

Science (natural environment, solar system);

Math (geometric shapes and volumes, symmetry, spatial issues, counting, measurement);

Social Studies (social hierarchy, customs, symbols and communication);

Reading and Writing (vocabulary, reflective and critical evaluation)

Language Arts (interactive discussion, diverse view-points, critical de-construction)

Math TEKS/TAKS Objectives

TEKS: *Number Operations and Quantitative Reasoning* ~ Math 6.1.01.A; Math 7.1.01.A;
Math 8.1.01.A

TEKS: *Measurement* ~ Math 6.8.B; Math 7.9

TEKS: *Underlying Processes* ~ Math 6.11.A; Math 7.13.A; Math 8.14.A

Fine Arts TEKS/TAKS Objectives

TEKS: *Creative Expression* ~ Art 6.1.01; Art 7.1.01; Art 8.1.01

TEKS: *Historical and Cultural Heritage* ~ Art 6.2.09; Art 7.2.09; Art 8.2.09

TEKS: *Perception* ~ Art 6.3.13; Art 7.3.13; Art 8.3.13

TEKS: *Response and Evaluation* ~ Art 6.4.18; Art 7.4.18; Art 8.4.18

Introduction / Background

There are variations amongst individual groups, but basic counting, calendar, cosmic division of the sacred four corners, and cosmic world view are a recognizable foundation throughout Mesoamerica informing design and symbol development in art.

Concept Development

Familiarity with basic Mesoamerican math and calendar calculation will introduce students to the dynamic Mesoamerican cosmic world view and help students understand the symbolism represented by the pyramid complex.

Student Practice

Students will become familiar with counting using the Mayan vigesimal number system, referring to handouts of Appendices A, B, and C and practicing using small pebbles (ones), sticks (fives), and shells (zeros) on paper sketched out with a stack of four horizontal lines to use as steps for increasing numbers by multiples of 20 from 1 to 8000

20 x 400 _____ 8000s

20 x 20 _____ 400s

20 x 1 _____ 20s

1- 19 _____ 1s

Students will become familiar with the calendar, using handouts of Appendix E, F and G to recreate a cardboard replica. After visiting the *Aztec Calendar* website to calculate their names and birthdates, students will re-calculate using their hand-held cardboard models, plotting the

cycle of 13 numbers and 20 day signs, as they roll number around day circles. To continue practice, student teams will research and calculate suggested Pre-Columbian events selected from class discussion/brainstorming.

Students will make *Journal/Sketchbook* entries to explore personal symbols related to their names and birthdates, researching the Mesoamerican cosmic characteristics.

Assessment/Evaluation and Exhibition

Students will calculate calendar days and vigesimal numbers in their 15 minute *Journal/Sketchbook* entries at the beginning of class and self-check against answers provided at the end of class. These entries may be developed as creative mixed-media compositions for exhibition and extra credit.

Closure

Open-ended class discussion will focus on student prior knowledge of other calendar – zodiac systems, such as the Western (using twelve Greek and Roman mythological figures) and the Chinese (using twelve mythic animal figures).

Resources

Counting: Appendices A, B, C; paper; concrete manipulatives (pebbles, seashells, sticks)

Calendar: Appendices E, F, G; cardboard; scissors; glue

Journal/ Sketchbooks: graphite drawing and color pencils; sharpeners; erasers

Lesson Two: Ancient Urban Design – Linking Cosmic and Cosmopolitan Realms

Interdisciplinary TAKS Objectives

Science (natural environment, solar system);

Math (geometric shapes and volumes, symmetry, spatial issues, counting, measurement);

Social Studies (social hierarchy, customs, symbols and communication);

Reading and Writing (vocabulary, reflective and critical evaluation)

Language Arts (interactive discussion, diverse view-points, critical de-construction)

Math TEKS/TAKS Objectives

Same as Lesson 1

Fine Arts TEKS/TAKS Objectives

Same as Lesson 1

Introduction / Background

The pyramid in an alignment to four cardinal directions became the geometric abstraction of a sacred mountain containing the water of life – an *axis mundi*, just like the world tree. It symbolically reached up to the heavens and down through its “cave” to the underworld to act as a conduit to dynamic life forces. The temple representing an entrance to the sacred cave from which original life issued was erected on top of the truncated pyramid. Teotihuacán carried this cosmic symbolism further by re-designing the whole city in a grid, divided into quadrants that would influence all city construction.

Concept Development

Grids are a mathematical method to organize and structure urban planning in a regular, geometric fashion. The resulting balanced order can be symmetrical or asymmetrical – can overcome natural obstacles or be altered to conform to nature.

Student Practice

Student groups will follow a rubric to design grid plans for specific ceremonial, government, residential, commercial, or craft sites. They may choose to re-construct a smaller area of Teotihuacán or to create an imaginary addition to the city. The rubric will focus on recording measurements using Pre-Columbian math, identification of terrain area and site, urban usage, symbolic ideas (color, symmetry, and cardinal directions) prior to designing a cardboard layout. Layouts may be flat representations with grids drawn, painted, assembled from paper shapes or built-up with cardboard strips, string or dried and colored glue and incorporate features of a map, as well as artistic symbolism.

Assessment /Evaluation and Exhibition

Rubric evaluation will be done concurrently with student group presentations to the class engaging interactive class discussion of grid design and symbolism.

Closure

In a Venn diagram students will compare Teotihuacán with ancient Cuzco's symbolic plan uniting natural features and sacred crouching puma, or a city in the USA.

Resources

Counting: Appendices A, B, C; paper; concrete manipulatives (pebbles, seashells, sticks)

Grid: Rubric; cardboard; graph and construction paper; string; tempera paints and brushes; scissors; glue

Maps: Appendix D; Chicago (Windy City), New Orleans (City of Dreams), or St. Louis (Gateway to the West); ancient Inca city of Cuzco, Peru

Journal/ Sketchbooks: graphite drawing and color pencils; sharpeners; erasers

Lesson Three: Murals – Constructing Visual Symbols for Ritual Practices

Interdisciplinary TAKS Objectives

Science (natural environment, solar system);

Math (geometric shapes and volumes, symmetry, spatial issues, counting, measurement);

Social Studies (social hierarchy, customs, symbols and communication);

Reading and Writing (vocabulary, reflective and critical evaluation)

Language Arts (interactive discussion, diverse view-points, critical de-construction)

Math TEKS/TAKS Objectives

Same as Lesson 1 and

TEKS: *Geometry and Spatial Reasoning* ~ Math 7.8.C; Math 8.7.B

Fine Arts TEKS/TAKS Objectives

Same as Lesson 1 and

TEKS: *Creative Expression* ~ Art 6.1.07; Art 7.1.07; Art 8.1.07; Art 6.1.13; Art 7.1.13; Art 8.1.13; Art 6.1.15; Art 7.1.15; Art 8.1.15

TEKS: *Historical and Cultural Heritage* ~ Art 6.2.02; Art 7.2.02; Art 8.2.02; Art 6.2.13; Art 7.2.13; Art 8.2.13

TEKS: *Perception* ~ Art Art 6.3.10; Art 7.3.10; Art 8.3.10

Introduction / Background

Teotihuacán murals reveal characteristics, such as use of iridescent red (known as Teotihuacán Red) in monochromatic tones, use of black or red contour lines, and 2-dimensional disproportionate figures fitted, often symmetrically, into the *talud-tablero* architectural style of sloping walls and vertical panels.

Concept Development

Visual design combines abstracted symbols in Mesoamerican art, which are often developed from naturalistic forms. Abstraction can intensify their dynamic meaning and expressiveness – the content being the message.

Student Practice

Students working in groups will develop a symmetrical design with borders, researched from Mesoamerican iconography for a mural painted on a *talud-tablero* structure. The rubric will focus on recording measurements using Pre-Columbian math, division of the picture plane into separate painting areas, identification of theme and purpose, research of iconography and development of symbolic ideas (abstracted imagery, color, symmetry, or cardinal directions) prior to constructing a cardboard panel. The panel will be fashioned as a *talud-tablero* to provide multiple areas for painting. It may be designed to stand alone, as a pair, as a triptych, or as a four corner set.

Alternatively, student groups may choose to construct a small apartment courtyard unit, small temple, or an alter as the basis for their mural.

Assessment /Evaluation and Exhibition

Students will critically evaluate their work individually and as a group, using the rubric as guide for both discussion and written evaluation. Students will document their creative process using photographs and text in a PowerPoint to be used with finished artwork for exhibition. Students will also reflect on their experience and creative process in their *Journal/Sketchbook* entries.

Closure

Each day student groups will take turns sharing and reflecting on work-in-progress.

Resources

Counting: Appendices A, B, C; paper; concrete manipulatives (pebbles, seashells, sticks)

Calendar: Appendix E, F, G

Murals: Appendix H; rubric; graph and construction paper; straight edges or rulers; scissors; poster board or cardboard; gesso; tempera paint and brushes

Journal/Sketchbooks; graphite drawing and color pencils; sharpeners; erasers

Lesson Four: Ancient Mesoamerican Speaking to Contemporary Forms

Interdisciplinary TAKS Objectives

Science (natural environment, solar system);

Math (geometric shapes and volumes, symmetry, spatial issues, counting, measurement);

Social Studies (social hierarchy, customs, symbols and communication);

Reading and Writing (vocabulary, reflective and critical evaluation)

Language Arts (interactive discussion, diverse view-points, critical de-construction)

Math TEKS/TAKS Objectives

Same as Lesson 1 and

TEKS: *Geometry and Spatial Reasoning* ~ Math 7.8.C; Math 8.7.B

Fine Arts TEKS/TAKS Objectives

Same as Lesson 1 and

TEKS: Art 6.1.07; Art 7.1.07; Art 8.1.07; Art 6.1.13; Art 7.1.13; Art 8.1.13; Art 6.1.15; Art 7.1.15; Art 8.1.15

TEKS: *Historical and Cultural Heritage* ~ Art 6.2.02; Art 7.2.02; Art 8.2.02; Art 6.2.13; Art 7.2.13; Art 8.2.13

TEKS: *Perception* ~ Art 6.3.10; Art 7.3.10; Art 8.3.10

Introduction / Background

Art is dynamically integrated in social, political, religious and cultural life, and will change just as these facets of life change. Mesoamerican art, integrated in a cosmic world view and communicating embedded messages, cannot be isolated from that content and function. The art we experience in our own time is also functionally engaged with society – past, contemporary and future.

Concept Development

In our world we actively appropriate, freely weaving influences and ideas to create new visions not only in society and commerce, but in the arts.

Student Practice

Students will identify, compare and discuss appropriations in Isamu Noguchi's *Science Garden*, 1964, Buckminster Fuller's *U. S. Pavilion for Expo '67*, using his geodesic dome construction patented in 1947, and I. M. Pei's *Pyramide du Louvre*, 1989.

Students working in groups will conceive, design, and construct a model for a contemporary building (dog house, tree house, residence, dough-nut shop, school, etc.) using appropriations from Mesoamerican pyramid complexes, such as the *talud-tablero* architectural construction style.

Students will use a rubric to record measurements using Pre-Columbian math, to identify and describe appropriation, specify theme and functional purpose of building, record research of iconography and development of symbolic ideas (abstracted imagery, color, symmetry, or cardinal directions) prior to constructing building model.

Assessment/Evaluation and Exhibition

Students will critically evaluate their work individually and as a group, using the rubric as guide for both discussion and written evaluation. Students will also reflect on their experience and creative process in their *Journal/Sketchbook* entries.

Closure

Student groups will take turns sharing work-in-progress or engage class in open-ended discussion of buildings they have seen that exhibit inspired or appropriated features.

Resources

Counting: Appendices A, B, C; paper; concrete manipulatives (pebbles, seashells, sticks)

Models: Appendix H; rubric; graph and construction paper; magazines; poster board or cardboard; scissors; gesso; tempera paint and brushes

Journal/ Sketchbooks: Graphite drawing and color pencils; sharpeners; erasers

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