Telfair Museum of Art

Art & Life

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Lesson

Artists as Explorers

This lesson for middle school students examines the role some artists assume as explorers of far away places, recording, through their writing and art, the people, places and things they witness. Time: 1 hour.

Materials

Image of Ship of the Desert by Edwin Lord Weeks
Computers
Internet access

Vocabulary

Anthropology – The study of customs, characteristics and intercultural comparisons of humankind.

Expedition Art – Art made during the mid eighteenth century by artists who teamed with natural scientists and explorers to record the natural world as they witnessed it during their travels.

Orientalist – Nineteenth century artists and writers whose work focused on subjects related to the Middle East, which at that time was referred to as the Orient.

Objectives

Research the writings and illustrations of European explorers regarding the people, animals and cultures they encountered during their explorations. Look for examples which accurately depicted what they encountered on these journeys. Also look for instances in which erroneous information from the explorers led to negative European attitudes and stereotypes foreign cultures.

Examine the life of Edwin Lord Weeks, focusing on how his travels were important to his.

Research the writings and illustrations of American explorers, such as Lewis and Clark. Study the written and artistic documentation from their expeditions. How did this documentation, accurate and inaccurate, affect general American attitudes and stereotypes about the west?

Development

Artist and Explorers

We are all familiar with stories of explorers like Christopher Columbus, Amerigo Vespucci, and Vasco da Gama, among others. Their stories about distant places, the people who lived there and the customs by which they lived, are legendary.

Artist: Edwin Lord Weeks, American (1849-1903)
Title: Ship of the Desert
Date: 1874
Medium: Oil on panel
Size: 14 7/8 x 18 1/16
Gift of R.C. Johnson

This painting is typical of Weeks’ artworks that portray the romance of travel. This is a relatively early work of his, perhaps inspired by his first trip to the Middle East. In this painting, we see how the artist was particularly fascinated with those aspects of ancient Middle Eastern life that survived into modern times, and recorded them in scenes that varied from simple street, desert, and market settings to elaborate court ceremonies. Weeks had an exceptional eye for detail but his best works display a unique blending of careful, factual recording of people and places.
Some explorers were artists, some took along an artist to record their travels, and shared with the public upon their return home. The illustrations of the people and animals, of America and Africa, were of great interest to Europeans. In some cases, the information was accurately reported and other cases distorted.

Research the writings and drawings of explorers and those who accompanied them. Look for examples that authentically represented what the explorers found and other examples, which were inaccurate and gave a false impression to Europeans about what the explorers found.

Edwin Lord Weeks is an example of an artist who became an explorer because of his desire to capture the “exotic” world in his art. Born in Boston and trained as a painter in Europe, he was intrigued by travel into north Africa, the Middle East and India. He was among a group of nineteenth century artists called Orientalists, who documented the people, places and customs of what was then known as the Orient. Weeks was committed to documenting the Orient from first hand observation. In some cases, he and his companions were among the first westerners to visit places. To get to such distant locales, he had to endure life threatening hardships that often accompany such extensive travel. Weeks survived typhoid fever, famine, natural disasters and encounters with groups hostile to his presence. He was an avid mountain climber, which added to his reputation as an adventurer. Weeks was also a published author, writing and illustrating articles for popular magazines of his day, and creating an illustrated book of his four-year adventure traveling through Persia (now Iran) and India.

Examine the painting, Ship of the Desert, completed in 1874, less than a decade after the American Civil War. Why would the artist title this painting as he did, when there is obviously little water in the desert? In what ways is the camel like a ship? How is the desert like a body of water? Examine the darker blue strip along the horizon in the painting. What might account for the change in blue? What clues are present to tell what time of day it is? What do you think Weeks wants us to understand about the figure in the painting? What do you think Weeks wants us to know about this camel? Camels are famous for being able to travel great distances on very little water. Research camels as a form of transportation and determine other places where they have been used as transportation. Why is only one Arab depicted and what does Weeks want to imply with that? If the desert is so hot and dry, why would those who live there cover themselves so completely? What might the Arab’s climate and religious beliefs have to do with the clothing being white and the brilliant color only being present on the saddle of the camel?

Suggestions: Research the following American artist/explorers. Determine the degree to which they accurately represented the cultures they documented. Locate information that reveals how their writing and illustrations shaped the attitudes of Americans about the west and its native inhabitants.

Albert Bierstadt    Ralph Blakelock    Karl Bodmer    Frederick Remington
George Catlin        Alfred Jacob Miller    Titian Peale    Worthington Whittredge

Assessment

Did students locate the writings and illustrations of European explorers and their companions regarding the people, animals and cultures encountered during their explorations?

Did they locate examples of the accuracy of what explorers actually found, and what the inaccurately claimed to discover?

Were students able to identify instances in which erroneous information from the explorers led to negative attitudes and stereotypes by Europeans?

Did students examine the life of Edwin Lord Weeks, focusing on how his travels, as an explorer, were important to his art?

Extending the Lesson

Investigate how other explorers like Admiral Perry and Sir Edmund Hillary visually documented their travels. How did this process of documentation change with advancements in technology? What about explorers of the undersea world or outer space? Why do you think they don’t just write about what they see, why are pictures and illustrations still so important?

Webliography

- http://monet.unk.edu/mona2/artexplr/artexplr.html
Three Major Migrations of African Americans

In this lesson high school students investigate and map the routes taken during three distinct and major migrations of African Americans and their ancestors. Students, also speculate about why certain routes were taken and how alternative routes or destinations might have altered today’s society. Time: 1 hour.

Materials

Computers and internet
Maps of the United States, Africa and the world
Images of: Harriet Tubman, by Vernon Edwards and Migrants Arrive and Cast Their Vote, by Jacob Lawrence

Vocabulary

African Diaspora – the dispersal of African people and their cultures, both by voluntary and involuntary (slave trade) means.

Middle Passage – the voyage across the Atlantic Ocean that brought slaves from the west coast of Africa to North America.

Migrant – one who moves from one city, region or country to another to settle and build a new life.

Underground Railroad – a group of free blacks, whites, Native Americans and former slaves that helped southern slaves escape from slavery to freedom in Canada and Mexico.

Negro – an out dated term, and now considered disparaging, used to refer to members of the black African race and their descendants.

Jim Crow Laws – laws implemented, primarily in the southern United States, to impose racial segregation and systematically deny rights to African Americans, including, in some cases, the right to vote.

Great Migration – A period in United States history during the 1900 to 1930s when large numbers of African Americans, from the south, moved to northern industrial cities hoping to find better living conditions.

Harriet Tubman – a leading figure in the underground railroad. She was a former slave who escaped to freedom, but returned again and again to lead others to freedom in the north.

Objectives

Research the routes taken by African Americans as they migrated at three different points in American history: as unwilling participants in the slave trade, escaping on the Underground Railroad and the great migration to northern cities in the mid 20th century.
Create maps to document these separate migrations.

Speculate on why such routes were chosen and what might have happened if alternate routes or alternative destinations had been chosen.

Development

African American families in the United States have experienced three migrations over the span of several generations. Brought against their will from the African continent and forced into slavery, later risking their lives to escape from slave-holding states and territories to free-states, or to Mexico or Canada. Harriet Tubman, sometimes called, “Moses” and other times called the “General” was an important character in the Underground Railroad. Tubman was memorialized in a wooden sculpture by Savannah artist, Vernon Edwards. The third, in mid twentieth century, was a northern migration to escape the Jim Crow laws of the south. The Great Migration is documented in the paintings of Jacob Lawrence. These African American artist; one a trained artist of renowned and the other a simple barber, were driven by an internal need to create works of art about people and events they considered significant.

Assessment

To what degree did students successfully complete research about the three routes of migration?

Has the student created maps which accurately demonstrate the routes of migration?

Have students produced logical observations about why such routes were taken and what might have happened if alternate routes or alternate destinations had been chosen?

References


Webliography

• www.freedomcenter.org
• www.nationalgeographic.com/railroad
• www.nationalcenter.org/UndergroundRailroad.html
• www.cr.nps.gov/nr/travel/underground/opugrr.htm
• www.itrails.org/undergroundroad.html
• www.Afromistory.about.com/cs/jimcrowlaws/a/jimcrowlaws.htm
• www.Afromistory.about.com/library/weekly/aa010201a.htm
• www.lwvabc.org/history.html
• www.jimcrowhistory.org/history/creating2.htm
• www.northbysouth.org/1999/index.htm
• www.pbs.org/ket/newamericans/3.0/personalstories.html

ABOUT the ARTIST

Born in Pooler, Georgia, Edwards was a self-taught (Folk) artist who followed in the footsteps of his father, a carpenter, and of self-taught artist, Ulysses Davies, another accomplished African American woodcarver. Edwards is best known for his carved wood sculptures of famous black individuals as well as for his walking sticks in the form of snakes. The artist made valuable contributions to the folk art of the region. The prolific body of work by Edwards speaks to diversity of heritage and shared national experience, individual creativity, and community values.
How People and Places Equally Reshape One Another

This lesson for middle school students examines the many ways in which people impact the places where they live and how those places, in turn, also impact on them. Time: 1 hour.

Materials

Image of Savannah, by Andree Ruellan
Access to internet and computers

Vocabulary

Demographics – The study of populations with regard to vital and social statistics, like race, ethnicity, age, gender, migration patterns.

Port - A place along a body of water, where ships come in, unload their cargo, reload and depart to other ports.

Objectives

Examine the painting, Savannah, by Andree Ruellan, and speculate upon ways in which the Savannah River impacted upon people’s lives when Savannah was established, at that time of the painting, and today. How did people, in turn, effect the river and its surroundings?

How would Savannah be affected by the closing or destruction of the port or river, through natural or human-created disaster? Examine the environmental, social, and economic changes that could result from these events.

Development

We know when people move into an environment, they begin to change it to meet their needs. They build shelters and fortifications to protect themselves against the elements, dangerous animals or hostile populations. They establish systems for producing or collecting the foods they need. For example, they may clear large patches of land to grow crops or dig wells for fresh water sources. They may begin to set traps or hunt for animals to provide food and other materials. In this way, humans reshape the environment to meet their needs. But the environment also causes changes in human culture. It can dictate where we live and what we live in, what food sources are available and what crops we can grow, even the weather and climate have a tremendous impact on our lives. In fact, if you think about it, the places where we live reshape us and our lives, as much as we reshape them.

Industry and Economy

Examine the painting, Savannah, by Andree Ruellan. It depicts a view of the port city of Savannah from the Barnard Street ramp, looking toward the Savannah River, as it might have been seen in 1942. Consider how important living in a port city...
along the River was to the people at that time. Speculate on what kinds of jobs and products were based on the Savannah River and what it could provide. What other industries and kinds of workers would be needed to support the products and services that depended upon the river? What types of transportation would be required to move the products of the river to the customers who might buy them? Look more closely at the painting and notice what material has been used to create the ramp going down to the river. The sandy soil of Savannah and the low country does not naturally have many stones like those used in the streets of the painting. Although they did not come directly from under or near the river, the cobblestones used to pave the streets were a direct product of being a port city and the industries associated with the river. The cobblestones tell of an association with sea going shipping industry and commercial ports, because they were once the ballast stones from the bellies of large ships. Ballast stones were used to weight a ship down and make it more stable. What job did tugboats, like the one depicted, do then and now? What might the people on the distant dock be doing? How dependent upon the river are those activities?

**Suggestion:** Think all the way back to the founding of Savannah. What advantages and disadvantages came with establishing the city along the Savannah River? Think about and discuss/write about the following questions, with regard to the role the river has played in Savannah’s development as a city.

How did the local geography impact the kinds of crops, which could be cultivated? What did the geography of Savannah and the low country have to do with the large concentration of African Americans in Savannah? Why did they stay, even after emancipation? What did they eat? How did that impact the local foods eaten by everyone? What animal and plant life was/is available in the vicinity of the river? Are there any food sources, which were once available, but are not anymore? How does diet affect the health and physical development of people? What foods are available during all seasons and which are only available during certain seasons? How does the length of the “growing season” affect availability of food? What insects live in the area and what problems do they present? How might people living along a river construct their homes differently from those who do not live along a river? What building materials are readily available along the river? How were traditional building materials, used elsewhere, modified because of the lack of essential ingredients in this geographic area? (Tabby) What materials are rare and might, therefore, be more valuable? What kinds of clothes might they wear because of the weather and the work they must do? What kinds of work do people living along a river do for fun? What natural disasters must people living along a river be concerned about? Where might people along the river live and what types of jobs might they do? What kind of education and skills might they need to do the jobs? What social structures might be required to support the river based port city industries? Was there a social hierarchy among seagoing folks, hierarchy of merchants who sold the products of the sea, hierarchy of landowners, etc? How is a community that often has visitors different from one that is so isolated it seldom has visitors?

**Modern Savannah**
Now think about the Savannah River today and the Savannah Port. In what ways do the river and the port continue to be an important force shaping the lives of the citizens of Savannah and the surrounding area? Has their importance increased? Does their importance affect people who live further away than ever before? What impact does the port have on the demographics of the region? Consider how radically our lives would change and how Savannah would change, if some natural or human-made disaster were to harm the Savannah River or damage the port to the point they were unable to continue giving to those who live near it.

**Assessment**

Did students provide examples of how the Savannah River and the port might have impacted upon people’s lives at the time Ruellan painted, Savannah?

Did students provide examples of how people impacted upon the river and its immediate surroundings?

Did students provide examples of how the Savannah River might have impacted upon those who first established the city of Savannah?

Did students speculate on the continued importance of the Savannah River and the port to our lives today?

Did students speculate on the impact on people’s lives, which might result if some natural or human-made disaster befell the Savannah River or the port?
Extending the Lesson

Contact the Longshoreman’s Association for information on types of jobs and salaries related to working at the Savannah Port Authority. Contact the Georgia Port Authority to obtain the latest estimates of the economic impact the port has on the local, state and regional economy. Research what requirements one must satisfy to become a River Pilot. Examine a map or nautical chart of the Savannah River from Tybee Island to the Savannah Port. Examine land elevations, types of land structures, water depths and other attributes of the local geography. Speculate on why the port and city of Savannah are located where they are instead of either being further toward the ocean or more inland.

Webliography

• www.ilaunion.org
• www.gaports.com
• www.georgiaencyclopedia.org/nge/Artic ... /WaterTransportation&id=h-1298

ABOUT the ARTWORK

Savannah is a major painting of Ruellan’s mature period, painted when she was 37 years. This painting is just one of many paintings Ruellan painted from her travels to the South. A familiar scene to all who visit Savannah, this river front image is timeless, capturing the beauty of the landscape and the work that takes place on the river. The image reveals riverfront buildings framing the Savannah River as a steamboat visibly passes through the port side of the city that bustles with activity. Savannah also reveals what the city was experiencing in the World War II era. It was intended as a public image depicting a local community at a time when artists across the country were painting the American Scene. Ruellan’s image show a view looking down one of the city’s distinctive cobblestone ramps on Bay Street toward the Savannah River.

ABOUT the ARTIST

Andrée Ruellan was born in New York to French-émigré parents. Her artistic career spans the 20th century and can be divided into three themes: visits to the South, the Works Progress Administration period, and focus on racial discrimination. A child prodigy, Ruellan was inspired by European Modernism she saw at the New York Armory Show of 1913 and1925 (at the age of 20), she had her first one-person show at the Galérie Sacre du Printemps in Paris. By the time she was a teenager, her work was exhibited with Ashcan School artists Robert Henri and George Bellows and her illustration, Spring, was published in the journal, New Masses. In 1920, Ruellan accepted a scholarship to the Art Students League, and traveled to Rome continue her studies. Settling in Paris in 1923, she formed part of an impressive circle of writers and artists, including novelist James Joyce, Gertrude and Leo Stein, and artists Stuart Davis, Man Ray, who photographed her, and Isamu Noguchi, who wanted to marry her. Ruellan returned to America in 1928 where she married John Taylor, also a painter. Ruellan now lives in Woodstock, New York.
Migration of Cultural Objects and Skills

This lesson for high school students examines how the culture, cultural artifacts and everyday skills of west Africans brought to the southeastern United States as slaves were critical to the economy.  Time: 1 hour.

Materials

Images of: *Coiled Fanner Baskets*
Maps of Africa and the United States

Vocabulary

*Chaff* – the inedible husk of the grain that must be removed before the grain can be consumed as food.

*Coastal Rice Kingdom of the United States* – Section of the southeastern United States in which rice became the principal crop placing the plantation owners among the wealthiest in America. It stretched from the St. Johns River in Florida to Cape Fear, North Carolina.

*Grain* – Small hard seed of any cereal plant like wheat, rice, etc.

*Grain Coast of Africa* – Western coast of African continent, from Senegambian region to the British colony of Sierra Leone, known for its strong agrarian traditions of growing grain crops, like rice.

Objectives

Use maps to locate the African Grain Coast, from which, the use of Fanner baskets originated and the region of the United States known as the Rice Kingdom.

Examine the important role played by the Fanner basket in the Rice economy of the southeastern United States.

Explain how the traditional skills, tools and diet of West African slaves contributed to the development of rice plantations and the economies surrounding them.

Development

Migration

When large populations of any culture (like the African slaves) migrate from one place to another, no matter the reason, it is natural that important components of their culture migrate with them. Among other things, they bring their language, family structures, arts, foods, belief systems, skills, and tools along with them. In the case of some West Africans, it was their
grain cultivation and processing skills that made them more valuable as slaves to rice plantation owners in the southeastern United States. Some historians believe it was these skills that actually made them a more desirable target for enslavement than others, with approximately 25% of all slaves imported to Savannah, coming from one region where such skills were commonplace.

Suggestion: Ask students to examine maps and trace the route followed by slave ships bringing slaves from the Grain Coast of Africa to the Coastal Rice Kingdom of America.

Rice Culture
The lowlands of the southeastern coastal regions of the United States were often too wet to grow other crops. Rice, however, thrives in such conditions, and smart plantation owners quickly realized the economic potential of matching the land with the right crop. If they were to grow more rice than they needed to feed themselves and have some left to sell elsewhere, they must raise it in large quantities and, therefore, needed a knowledgeable workforce to tend the crops. During the late eighteenth century, such a workforce was available along the western coast of Africa, called the Grain Coast. Not only did the West Africans know how to grow the crops, but they also knew how to process it to make it edible. In some cases, it was not only profit that motivated plantation owners to cultivate rice. For many of the African slaves imported into this part of America, rice had traditionally been a major part of their diet. To keep the slaves healthy and productive, their apparent need for rice had to be met.

Winnowing and Fanning
Once any grain is harvested, it must be beaten to separate the hard, edible part of the grain from its inedible husk. This is a process called winnowing. It was accomplished by placing the rice into hard bowls, called mortars, and beating them with a hard pounding device called a pestle. This was very hard work and even after the process was completed, the inedible husks, also called chaff, were still mixed with the desirable rice grains. It was necessary to separate the two before the rice was useful. This is where the Fanner baskets were put to work. The Fanner baskets were a tool made by the slaves brought in from the Grain Coast. They had used them to process several types of grain in their homelands and making and using these baskets were skills passed down through many generations. The baskets were low sided, tray-like baskets into which the threshed rice and husks were poured. The baskets were then “fanned” to flip part of its contents into the air. As the wind blew, it would blow away the very light husks and the heavier grains of rice would fall back into the basket. The process would be repeated until all or most of the husks had been separated from the rice. The basket would be filled again and the entire harvest would eventually be processed this way.

There are plantation business records, which describe the time of the year and number of slaves assigned to collect the tall grasses and make the baskets that would be used to process that year’s rice harvest. The fanner basket was so valuable to the process that some plantation owners had their slaves make many more than they needed for the harvest and sold the rest to plantation owners who did not have slaves with these skills. This process was eventually replaced by threshing Mills and Winnowing Houses in order to process larger quantities of rice more quickly. Black farmers in Georgia and South Carolina continued the African processes using mortars and pestles and “fanning” to process their small crops of rice until the 1900s. They were also used to winnow other grains and to prepare grits. The tightness of their sides and bottoms made them very useful for carrying smaller products like husked corn and peas, which would slip between the gaps in traditional woven baskets.

Basket Making
Fanner baskets differ from baskets made by other cultures, because they are sewn rather than woven. Most baskets weave strips of material over and then under another piece that crosses over it. The traditional African Fanner baskets were made by twisting the grasses, set parallel to one another, and then coiling them on top of one another to wrap around the circumference of the basket. Each coil is then sewed to the one beneath it with strong strands of grass and a needle made of bone. Sometimes the slaves would make a needle from the handle of a piece of discarded silverware like a spoon or knife. Because the baskets were made of such fragile materials, few have survived as part of the historical record. Some fragments from as early as the Revolutionary War have been found in Charleston, South Carolina.

Suggestion: Ask student to write a paragraph explaining how the traditional skills, tools and diet of West African slaves contributed to the development of rice plantations of southeastern United States and the economies surrounding them?

Assessment
To what extent did students examine the important role played by the Fanner basket in the Rice economy of the southeast-
ern United States?

To what extent did students use maps to locate the African Grain Coast, from which, the use of Fanner baskets originated and the region of the United States known as the Rice Kingdom?

To what extent did students explain how the traditional skills, tools and diet of West African slaves contributed to the development of rice plantations and the economies surrounding them?

Extending the Lesson

Research the Gullah culture of South Carolina. Try to trace contemporary aspects of Gullah culture back to its roots in the cultures of West Africa.

References


Webliography

• http://www.knowitall.org/gullahnet/gullah/baskets
• http://historywired.si.edu/object.cfm?ID=180
• http://www.georgiaencyclopedia.org/nge/Artioce.jsp?path=/HistoryArchaeology

ABOUT the ARTWORK

Fanning baskets are made using rushes or marsh grasses, though most contemporary baskets in this tradition are made from sweet grass, a native, perennial, warm-season grass found growing sparsely in the coastal dunes extending from North Carolina to Texas. Sweet grass is a long-stemmed plant that grows near the ocean behind the dune line and along the boundaries between marshes and forest. It is harvested in the spring and summer by pullers, who slip it out of its roots, like a knife from a sheath. Weavers dried the freshly cut grasses in the sun for days or even weeks, depending on the season, before they could made into baskets. This type of basket is based on a tradition brought to the United States from West Africa by slaves. The African American art of basket making dates from the 1700s, when baskets were first used in rice cultivation. Fanner baskets were wide winnowing trays used to throw threshed and pounded rice into the air, allowing the wind to blow away the chaff. The basket making tradition was revived in South Carolina in the early twentieth century at the Penn School, a historic school for African American students on St. Helena Island, South Carolina. This type of coiled sea grass basketry have survived in America for 300 years, and sweet grass baskets now are recognized as an art form.
Curriculum Connections - National Standards

Lesson One: Art Works as Primary Source Historical Documents

NSS-US.H.5-12.7     ERA SEVEN: EMERGENCE OF MODERN AMERICA

Lesson Two: Historical Record of a Place Told Through Its Monuments

NSS-US.H.5-12.2     ERA TWO: COLONIALIZATION AND SETTLEMENT
NSS-US.H.5-12.3     ERA SIX: DEVELOPMENT OF INDUSTRIALIZED US
NSS-US.H.5-12.4     ERA SEVEN: EMERGENCE OF MODERN AMERICA
NSS-US.H.5-12.5     ERA FIVE: CIVIL WAR AND RECONSTRUCTION
NSS-US.H.5-12.6     GREAT DEPRESSION AND WWII
NSS-US.H.5-12.7     ERA SEVEN: EMERGENCE OF MODERN AMERICA
NSS-US.H.5-12.8     POSTWAR UNITED STATES
NSS-US.H.5-12.9     CONTEMPORARY UNITED STATES
NSS-G.K.12.2     PLACES AND REGIONS

Lesson Three: The Art Object as an Eye Witness to an Event or Time Period

NSS-WH.5-12.6     EMERGENCE OF THE FIRST GLOBAL AGE

Lesson Four: The Great Migration

NSS-G.K.12.1     THE WORLD IN SPATIAL TERMS
NSS-G.K.12.4     HUMAN SYSTEMS
NSS-US.H.5-12.2     ERA TWO: COLONIALIZATION AND SETTLEMENT
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NSS-US.H.5-12.7     ERA SEVEN: EMERGENCE OF MODERN AMERICA
NSS-US.H.5-12.9     ERA NINE: POST-WAR UNITED STATES
This lesson examines the notion that art works can be documents, which record history. It further, compares two possible “historical documents” (paintings) to determine the degree to which the stories they tell can be considered reliable from an historical context. Students will apply internal and external criticism to each work and render a judgment as to which might be the most reliable source of “testimony” about the events depicted. Time: 1 hour.

Materials
Images of: Childe Hassam’s Avenue of the Allies and Julian Story’s The Black Prince at Crecy

Vocabulary

External criticism – Testing the artifact or document for consistency between what the object says internally and how that matches evidence about the event, from external sources.

Historical event – An event large or small, which provides us with insight and understanding of a time period, its people and their motivations.

Internal criticism – Testing an artifact or document for internal consistency to ensure it is telling the truth.

Primary source – A person, artifact or document actually present at an historical event. An eye-witness to a historical event. This is the highest status of historical evidence because it was closest to the actual event and, therefore, has the potential to be most accurate.

Objectives

Learn the value of primary source artifacts to the retelling of the historical record.

Apply historical criticism to paintings by Childe Hassam and Julian Story to determine the degree to which they can be trusted as primary source documents.

Development

Examining the Source
If you ever played the children’s game of “Telephone,” you can understand how the accuracy of information becomes gradually less reliable as it moves further from its original source. In the game, what was originally whispered by the first player, became completely distorted by the time it reached the last. The original “truth” is modified, because people do not always translate things accurately. This example demonstrates why the closer information is to its original source, the more accurate it is likely to be. An eye-witness is someone who was present at the event. The presumption is that the truth is...
embedded in what they witnessed first hand. This idea is particularly true with the study of historical artifacts and documents. Documents, pictures, objects and even art objects can be considered as “primary source” artifacts, if they possess this eye-witness quality. Good historians would not simply accept that an artifact has primary source status without first verifying that the story, the same way a good detective would. This process of investigating for truthfulness is called “historical criticism.”

Show students the reproduction of Avenue of the Allies, by Childe Hassam and briefly discuss what they see in the painting. Childe Hassam, who painted this scene in 1917, once said:

I believe the man who will go down to posterity is the man who paints his own time and the scenes of every-day life around him...A true historical painter...is the one who paints the life he sees about him, and so makes a record of his own epoch.

Hassam is expressing his belief in the artist as a visual historian. Fulfilling that role would require the artist/historical painter to record the people, places, events, implements and customs of everyday life during the period in which he/she lives. Read the following quote from the artist about the work and what inspired it.

I painted the flag series after we went into the war. There was that Preparedness Day, and I looked up the Avenue and saw these wonderful flags waving, and I painted the series of flag pictures after that.

From Hassam’s own words we are told that he personally witnessed this event. He says he was an eye-witness or primary source. Perhaps he was, but as a historian that must be verified, if possible. If he was at the event, Hassam had potential for accurately. So, we must test to see if his story is plausibly supported by evidence. We know that from 1916 to 1919, Hassam did approximately 30 paintings on this same theme of flags.

What major event was taking place around the world at that time? What is depicted in the work, which seem to support that he was actually at the event? What does the title, Avenue of the Allies suggest about the scene depicted? Who were the Allies? Historians refer to the clues within the work, which either support or deny the claims of eye-witness testimony, as internal criticism. Is everything in the painting consistent in regard to the story that it tells?

Historians also apply external criticism to test the eye-witness status of the document (painting). What facts outside the work support its claims of authenticity? Go to the Telfair Museum Website and read the information about Hassam’s life to determine if it is even possible that Hassam could have been present at this event? Combine what you learn about Hassam with what other sources say about this time period. Is there any consistency? When was Hassam born and when did he die? Is that consistent with being an eye-witness to this event? How old would he have been at the time of this event? Was he ever known to have been in the place where the scene being depicted took place? To what degree do you believe we can rely on Hassam’s “testimony” about this event and why?

Now look at The Black Prince at Crecy by Julian Story and apply both internal and external criticism to this “historical document” to determine if Julian Story can be considered an eye-witness to the event, which would grant his depiction a higher status as historical evidence. Go to the Telfair Museum Website and read about Story’s life. When was Julian Story born and when did he die? How does that time period compare to the historical dates of the event depicted in the painting? Research the event depicted in the painting. When did it happen?

**Assessment**

Can the student explain the value of a primary source for historical records?

To what extent did students apply historical criticism to paintings by Childe Hassam and Julian Story to determine the degree to which they can be trusted as primary source documents?

**Extending the Lesson**

What types of technologies might be used to determine the age of an object, and there by know if it is from the same time period as the event it depicts? Research dating methods (such as carbon-dating) or other technologies that can give clues to the age of an object.
References


Webliography

• www.metmuseum.org/explore/childe_hassam/index.html
• www.en.wikipedia.org/wiki/primary_source
• www.lib.washington.edu/subject/history/rusa
• www.kn.pacbell.com/wired/fil/pages/listdocumentpa.html
• www.historybuff.com/primary-html
• www.lcweb2.loc.gov/ammem/ndlpedu/lessons/fw.html
• memory.loc.gov/ammem/ndlpedu/lessons/97/firsthand/main.html
• www.pbs.org/science/science_archeology.html

ABOUT the ARTIST

Praised in his lifetime as a painter of light and air, Childe Hassam (child HASS am) is a significant American Impressionist painter. Hassam was born in Boston and traveled to Paris in 1886 where he became immersed the French style of Impressionism and became part of the emerging American Impressionist group, eventually settling in New York City. He is most known for painting distinctly American subjects—the streets, parks, neighborhoods, and festive military parades. His choice of contemporary scenes, from fashionably dressed New Yorkers parading down Fifth Avenue to the weathered buildings and rocky coasts of New England, contrasted with American artists of the day, who preferred subjects from the past. Hitherto historical painting has been considered the highest branch of the art, Hassam said in an 1892 magazine interview. A true historical painter, it seems to me, is one who paints the life he sees about him, and so makes a record of his own epoch. It is estimated that the artist produced more than 2,000 oil paintings, pastels and watercolors, plus some 400 prints, during his lifetime.
Historical Record of a Place Told Through Its Monuments

As tourists we visit a new place and notice the monuments commemorating important people and events. We have many such monuments in the city of Savannah, but because we pass by them on such a regular basis, we tend not to pay much attention to them or the people and events memorialized. This lesson is intended to lead students to discover the history of their own community as it is recorded in the monuments of the city. Time: 2 class periods.

Materials

Image of: General James Oglethorpe, by Daniel Chester French
Computer and Internet, one per group
Notebook paper

Vocabulary

Memorial—Anything intended to help people remember a person or event, such as a monument, holiday or celebration.

Monument—Something set up to perpetuate the memory of a person or event deemed significant by some individual or group.

Objectives

Work in small groups to conduct internet research on Savannah’s monuments.

Categorize each monument based on who, what, why and where questions about the monuments.

Share small group findings with remainder of class to create a comprehensive information index.

Share findings and insights about the obvious histories and motivations behind the monuments.

Prepare individual reflections and proposals for a new memorial.

Development

The sculpture of General James Oglethorpe memorializes his contributions as the founder of Savannah. Savannah has many additional objects with the similar purpose of remembering the contributions that people have made to the history and development of the city. A closer examination of these monuments reveals much about the history of our city. Students can research on the internet the many monuments in Savannah and develop a better understanding of its history by considering who, what, why was celebrated and if its located in the city has a particular meaning.
Ask students to go the “Park and Tree” link at the following website, www.ci.savannah.ga.us/cityweb/database.nsf/visitingIndex. At this link there is a comprehensive list of all Savannah’s monuments with some description of where they are located and what or who is honored. Break students into small groups and assign each to conduct internet research on a number of the monuments. Students should examine the monuments for categories into which they can be grouped. Each group’s findings should be merged with the findings of other groups to gain a complete picture of the monuments in Savannah and the history they reveal.

Who does the monument memorialize?
What was done that is worth memorializing?
What different forms do the monuments take?
Where is the monument located and what does its location communicate?
Why should future generations care for or about who/what is being memorialized?

Other questions about the monuments, which may enhance student understanding: Who erects them? What qualifies someone as worthy of having a memorial made to honor them? What do these monuments say about Savannah? Has the monument been placed at its present location because of its proximity to a historical event/place? Do people sometimes create memorials to themselves? If your school is named for someone, is it a memorial? Are there images of the person somewhere in the school? What about graveyard monuments? What kind of histories do they tell?

Sharing findings with entire class. Once small group research is completed, students should rejoin rest of class to combine what each group has learned about the monuments into a comprehensive index or chart using the “who, what, where and why” questions.

Individual reflection activities. Are there individuals, groups, events or ideas that you believe still need a memorial in Savannah? If you were to propose a new memorial for that person, group, event or idea, where would you place it and what would it look like? What would you want it to depict? Research the history of that entity and describe or design a memorial.

Assessment

Work in small groups to conduct internet research on Savannah’s monuments.

Categorize information about each monument based on who, what, why and where questions about the monuments, then created a comprehensive index of information.

Shared findings and insights about the obvious histories and motivations behind the monuments.

Prepared individual reflections and proposals for a new memorial.

Extending the Lesson

Have student conduct similar research on monuments in Washington D.C.

Webliography

• www.pbase.com/savannnahga/monuments
• New Georgia Encyclopedia at: http://www.georgiaencyclopedia.org/nge/Article.jsp?id=h-2547

ABOUT the ARTIST Daniel Chester French established himself as one of the leading American sculptors and public artists of the early 20th century. Author Louisa May Alcott’s sister encouraged French to become a sculptor. He studied briefly in the U.S. with William Hunt, Samuel Ward and later had the opportunity to study for a year in Florence, Italy. Much of French’s work incorporates allegorical figures and themes illustrated by his first major commissions, the Minute Man monument in Concord, Massachusetts (1871-75), and the statue of John Harvard in Harvard Yard, Cambridge (1883-84). French created hundreds of other sculptures most notably, the massive statue of Abraham Lincoln, which sits in the Lincoln Memorial in Washington, DC. French became a member of the National Academy of Design (1901), the National Sculpture Society, the Architectural League, and the Accademia di San Luca, of Rome.
Historians, anthropologists and archeologists study evidence, interpret clues, then connect their conclusions to form a bigger picture of people, places, and cultures. They are the story tellers of our world, past and present. This lesson will examine the painting, *The Black Prince at Crecy*, as more than simply the narrative story depicted. As an artifact, the painting might provide many other clues about how people lived and related to one another. Time: 1 hour.

**Materials**
- Image of: *The Black Prince at Crecy*
- Computers and Internet
- Paper and Pencil

**Vocabulary**
- **Historical** – based on people of events of the past.
- **Inference** - A reasoned conclusion arrived at by examining something known or assumed.
- **Primary source artifact** – an authentic artifact present at the time or event it purports to represent or an eye witness to an event or period of time because it is an authentic product of that event or period of time.
- **Visual Narrative** – to tell a story in visual form.

**Objectives**

Use guiding questions to closely examine the artwork for clues to gain broader insights into the story of the painting.

Test their conclusions against evidence in the artwork to determine the extent to which their inferences are based on evidence in the painting.

Determine the extent to which the painting can be relied upon as an eye witness or primary source document of the event depicted.

**Development**

What does an art work reveal about its maker?

What do detectives, crime scene investigators, historians, anthropologists and archeologists share in common? The detectives and crime scene investigators often deduce larger stories and events from small pieces of evidence and apply it to solving mysteries and crimes. Historians, anthropologists and archeologists also use extended logic to try to reconstruct reasonable scenarios about people, places, and cultures of the past. Sometimes they investigate the lives of historically
significant individuals and events and sometimes they focus on the lives of average people. Art objects have the potential to provide eye-witness accounts (known as primary source accounts) that depict the daily tasks and important events from long ago. Historical paintings like *The Black Prince at Crecy*, can also document more than the historical event depicted. An historical artifact like *The Black Prince at Crecy* offers information in two ways. There is the story depicted in the image, wherein people, objects and events exist in certain relationships to one another. Just as importantly, however, is the actual physical object (the painting), which can be tested. By carefully examining a variety of clues in the artwork, the painting may reveal much about its makers. If the clues provided by the story are examined carefully, inferences can be drawn.

Available materials & technologies
- Fashion
- Transportation
- Social activities
- Values and social structure
- Attributes of the environment
- Attributes of the economy
- Spiritual practices and beliefs
- Relationships among people
- General health and wealth of people
- Politics and power relationships

As interesting as the surface story of the historical event might be, there are clues in the physical object of the painting, which might reveal an even more interesting story.

**Activities**

1. Examine the narrative story of the painting for clues that tell us about the lives of those depicted. Be sure to base your inferences on evidence present in the work itself. Use the following questions to guide your examination. Write down all the inferences, which seem reasonably supported by evidence in the art work.

2. Look for objects that have been made by humans. List materials and technologies required to make the objects shown. What kind workers were required to make such objects? What related occupations would be needed to support the main? An example might be a baker. The baker bakes the bread, but who grows the grain, and grinds it, and delivers it to the baker?

3. Examine the clothing. What does it reveal about the social status of those wearing them? Of what material is it made; how simple or fancy? What does it reveal about the climate? Does it reveal anything about the social or religious beliefs?

   **Question:** Are there artifacts depicted which give clues to daily life activities, social status, job? Are there common objects depicted, like combs, plates, furniture, light sources, or other objects which might be used to perform common daily tasks, not just for the occasion depicted?

   **Question:** Are there any clues, which demonstrate this culture may have had contact with another culture? Can you detect the presence of raw materials, products or technologies not actually produced or found in this culture? How could such exotic items come to found in this culture? Has there been contact for the purpose of exchanging commercial goods? Has there been a war, from which such items were brought back as souvenirs? What other explanations might be reasonable?

   What other clues are present, which provide inferences and insights into the people depicted or the culture of the artist?

4. Research the Battle of Crecy. Find out when and where it took place. Now research the life of the artist, Julian Story. Why do you think Story was drawn to this particular battle? What mood does the painting have and how does that tie into the action of the scene from the painting?

**Assessment**

Used questions to closely examine the artwork for clues, which can be used to infer broader insights into the narrative story, those depicted and the artist?

Test their conclusions against evidence in the artwork to determine the extent to which their inferences are logical and well thought out.

Determine the extent to which the painting can be relied upon as an eye witness or primary source document of the event depicted?
ABOUT the ARTIST

Born in England, Artist Julian Russell Story was the youngest child of American neoclassical sculptor and poet William Wetmore Story. Story grew up in Rome, surrounded by the literary and artistic elite who admired his father. He received his formal education at Eton and Brasenose College, Oxford University, England. Story is most known for his paintings of portraits, narratives, history, and interiors. *The Black Prince at Crecy*, won a medal at the Paris Salon in 1888 and was later awarded a bronze medal at the Paris Universal Exposition of 1889 (the same exhibition that showcased the Eiffel Tower), where the Telfair’s first Director, Carl Brandt, purchased it for the museum.

ABOUT the ARTWORK

Story painted *The Black Prince at Crecy* to gain acceptance into the French Academy’s annual Salon exhibition. By having work in the annual salon, artists gained exposure for their work to encourage commissions and provide financial stability. *The Black Prince of Crecy* is a large painting (it is the largest painting in the Telfair’s collection) based on an actual battle in the Hundred Years War between England and France. The painting portrays a scene after the Battle of Crecy, which was fought in France on August 6, 1346 and considered a major turning point in the war. Standing at the center of the composition is the Black Prince (so called because of his armor), who was actually Edward, Prince of Wales. His clothes are whipped by the wind into a lively silhouette in contrast to the lifeless body of King John of Bohemia on the right, who fought on the side of the French. King John, who was completely blind, lies dead on the field amongst 4,000 other men killed in the conflict. In the upper right stands the windmill from which the Black Prince’s father, King Edward III of England, watched the battle. The storm clouds visible on the horizon not only provide a dramatic setting for this event, but as a historically accurate detail. The Black Prince stands in front of his troops, paying homage to the brave King John, whom he admired as an adversary. Despite his blindness, King John had insisted on being led into battle by twelve knights with their horses tied together so that he “might strike one clean blow.” The Black Prince later adopted the motto of King John, *Ich dien (I serve)*, shown inscribed on the bridle of King John’s horse. It has been the motto of the Princes of Wales ever since.
The Great Migration

Throughout time art works have recorded stories of important historical people and events. These works sometimes serve as eye-witness testimony to the events, providing valuable insights into the who, what, where, and how of history. Though not as concrete as the previously mentioned “big questions” of history, these artworks can also provide insight into the human motivations behind “why” the events took place as they did. Time: 1-2 hours.

Materials

Image of: The 1920s...The Migrants Arrive and Cast Their Ballots
Paper and Pencil
Reference materials for Jim Crow Laws and Voting Rights Act of 1965
Computer and Internet

Vocabulary

Democracy – a system of government in which the people have a direct say over how they are governed. The United States is a “Representative Democracy”, which means the citizens periodically vote to elect representatives and authorize them to govern on their behalf.

Great Migration – A period in United States history during the 1900 to 1930s when large numbers of African Americans, from the south, moved to northern industrial cities hoping to find better living conditions.

Jim Crow Laws – Laws implemented, primarily in the southern United States, to impose racial segregation and systematically deny rights to African Americans, including, in some cases, the right to vote.

Migrant – one who moves from one city, region or country to another to settle and build a new life.

Negro – a word derived from the Latin word for black (niger) was once a commonly used term for persons in the US of African descent. While appropriate in a historical context (i.e. Negro League Baseball), it is now considered a derogatory term.

Voting Rights Act of 1965 – This Act was created to enforce the 15th amendment and insure the voting rights of minorities. In the years following Reconstruction, blacks in southern states were subjected to literacy tests, poll taxes and other bureaucratic means to prevent them from registering or voting. After violent episodes in 1964, including the murder of civil rights workers in Mississippi and state troopers’ assault on a peaceful protest march in Alabama, Lyndon B. Johnson called for new legislation to protect the rights of black voters. On August 6, 1965, President Johnson signed into law the Voting Rights Act which prohibited mechanisms by which African American voters and others could be impaired from registering or voting. Amendments and extensions to the act were enacted in 1970, 1975 and 1982.
Objectives

Examine artwork by Jacob Lawrence about African Americans voting during the Great Migration.

Discuss why such a common event in a democracy was important enough to be memorialized in the work by Jacob Lawrence.

Conduct additional investigation into Jim Crow laws of the southern United States, and discuss the motivations and experiences of "negro" migrants during that period. Examine and discuss the attitudes behind Jim Crow laws from Georgia.

Recreate imaginary conversations between family members discussing the pros and cons of migrating. Recreate a conversation at the polls depicted in Jacob Lawrence’s work.

Investigate the migrations of other groups to or within the United States to determine the motivations behind their move, what they hoped to achieve, and what became of their efforts.

Development

Migration

From about 1900 until the 1930s African Americans traveled in large numbers from the southern United States to the large industrial centers of the north. This is known as “the Great Migration.” African American artist, created more than sixty art works based on this theme. He did so by talking to friends and family about what they remembered of the experience. He supplemented these “eye-witness” accounts with additional research. A good example of work from this series is the print (based on the original series of paintings) entitled, The 1920s...The Migrants Arrive and Cast Their Ballots, which depicts African Americans casting their vote at a polling station in a northern city. Voting is a common practice for citizens in the United States, so why is this particular event and the people it depicts important enough for Lawrence to create an artwork about them? To answer that question, it will be necessary to investigate “why” the migrants moved in the first place. To better understanding their motivations, examine “Jim Crow” laws.

The following are several Jim Crow laws from the state of Georgia. What larger social attitudes do you think they portray? How would it make you feel if laws like these were written to exclude you and others like you?

All persons licensed to conduct a restaurant, shall serve either white people exclusively or colored people exclusively and shall not sell to the two races within the same room or serve the two races anywhere under the same license.

It shall be unlawful for any amateur baseball team to play baseball on any vacant lot or baseball diamond within two blocks of a playground devoted to the negro race, and it shall be unlawful for any amateur colored baseball team to play baseball in any vacant lot or baseball diamond within two blocks of any playground devoted to the white race.

Ask students to further research the “Jim Crow Laws”, of the southern United States. Have them also investigate the Voting Rights Act of 1965. Once the research is completed students should apply that information to discussing the following:

Why is this event important enough to depicted in Lawrence’s artwork? Why would entire families choose to endure the uncertainty and hardships that might come from moving across the country to build new lives? What difficulties would they have during and after these moves? What were they hoping to find at their destinations, which could have motivated them so strongly to choose the new places? What did they sacrifice or give up, in some cases, in order to move?

Activities

Use the following activities to try to put your self in the place of these migrants in order to gain some insight into the motivations behind the historical event of this migration.

1. Divide the class into small groups and have each group write a short dramatic script about an imaginary conversation that might have taken place between those in favor of moving and those wishing to stay? Write the script to include viewpoints from three different generations of the same family: grandparents, parents and teens. What arguments might they have made both for and against moving?
2. Have the members of each group read their scripts to the rest of the students. Discuss any differences and similarities in the conversations presented by each group. Are there any viewpoints still not represented? Do all viewpoints seem reasonable and consistent with what you know of the time and the conditions under which these people lived?

3. Return to the groups and imaginatively “fast forward” to a year later and restage the conversation among the same characters. This time focus on how things might have turned out for them after migrating north and how that compared with their own expectations.

Look at the artwork again. What seems to be the general mood of the event? Discuss what the Migrants might have thought and felt as they voted for the first time. Look closely at the artwork and describe how the people are dressed. Does that give any clues to the importance of the event? How many generations of African Americans are present at the voting poll? What do you think migrants hoped the right to vote might change their lives?

From watching the news over the past several years, can you think of any other groups of people who are voting for the first time? How do you think their hopes and expectations of democracy compare to those of the migrants in Jacob Lawrence’s artwork?

**Assessment**

Examined the artwork by Jacob Lawrence about African Americans voting during the Great Migration and investigated its importance?

Examined and discuss the attitudes behind Jim Crow laws from Georgia and the eventual Civil Rights movement?

Recreated imaginary conversations between family members discussing the pros and cons of migrating during the three periods of African American migration in the United States?

Recreated an imaginary conversation that might have taken place between at the polls depicted in Jacob Lawrence’s work?

Investigated the migrations of other groups to or within the United States to determine the motivations behind their move, what they hoped to achieve, and what became of their efforts?

**Extending the Lesson**

Jacob Lawrence’s work concerned the African American struggle for civil rights in America. Have students investigate Supreme Court rulings that brought about the end of racial discrimination in the United States. Also, have students investigate current civil rights issues in the US? Are there still examples of discrimination in our country?

**References**


**Webliography**

- www.Afroamhistory.about.com/cs/jimcrowlaws/a/jimcrowlaws.htm
- www.lwvabc.org/history.html
- www.jimcrowhistory.org/history/creating2.htm
- www.northbysouth.org/1999/index.htm
- www.pbs.org/kcet/newamericans/3.0/personalstories.html
ABOUT the ARTWORK

The idea for this artwork about voting came to Lawrence in 1941 when he produced a 60-panel series called The Migration of the Negro. This series documented the mass migration of more than a million African American people from the rural South to the cities of the North between 1910 and 1940. The Migration was an appropriate subject for Lawrence, whose own parents and many friends had migrated from the South. Jacob Lawrence was 22 years old when he started painting the 60 paintings to tell the story of The Great Migration and it took him one only year to finish. The paintings are now part of The Phillips Collection, housed in The Museum of Modern Art, New York. Jacob Lawrence made this print when he was 57 years old in 1974. He had been asked to contribute to a portfolio of silkscreen prints in honor of America’s 200th birthday in 1976. In this work we see a quiet scene in which a group of African Americans, new arrivals in a northern city, cast their votes, perhaps for the first time.

ABOUT the ARTIST

Jacob Lawrence was born in Atlantic City, New Jersey in 1917. He spent his early childhood in Easton and Philadelphia, Pennsylvania; at age 13 moved to Harlem, New York with his mother and siblings. Lawrence’s artworks were directly inspired by the ideas of the Harlem Renaissance, a cultural and intellectual movement of the 1920s that fostered the arts—visual arts, poetry, fiction, drama, music—as a means for expressing and authenticating the African-American experience. The artist was encouraged by Harlem’s greatest thinkers to feel pride in his African-American heritage and to use it as subject matter for his paintings. In the late 1930s, Lawrence began his paintings of African American history telling the stories in a series of images. Through the 1940s and 1950s Lawrence depicted Harlem subjects focusing on workers and expressing their strength of purpose in bold colors, and strong simple designs. By 1960, Lawrence had achieved great stature in the art world—a full retrospective at the Brooklyn Museum of Art, a faculty position at Pratt Institute and election to the American Academy of Arts and Letters. It was during this time he began working on Civil Rights themes, painting narratives about the struggle for equality and justice. In 1970, Lawrence accepted the offer of full professorship at the University of Washington. He and his wife Gwendolyn moved to Seattle, where he spent the rest of his life (the Telfair Museum’s collection includes a sculpture bust of Gwendolyn). He continued to teach and created art until his death.
Curriculum Connections - National Standards

Lesson One: Creative Writing and Art

- NL-ENG.K-.4 COMMUNICATION SKILLS
- NL-ENG.K-.5 COMMUNICATION STRATEGIES
- NL-ENG.K-.6 APPLYING KNOWLEDGE
- NL-ENG.K-.9 MULTI-CULTURAL UNDERSTANDING

Lesson Two Director’s Cut: Writing a Script with Two Alternative Endings

- NL-ENG.K-.5 COMMUNICATION STRATEGIES
- NL-ENG.K-.6 APPLYING KNOWLEDGE
- NL-ENG.K-.9 MULTICULTURAL UNDERSTANDING

Lesson Three: Using Critical Analysis to Discover Meaning

- NL-ENG.K-.1 READING FOR PERSPECTIVE
- NL-ENG.K-.2 UNDERSTANDING THE HUMAN EXPERIENCE
- NL-ENG.K-.3 EVALUATION STRATEGIES
- NL-ENG.K-.6 APPLYING KNOWLEDGE
- NL-ENG.K-.11 PARTICIPATING IN SOCIETY
This lesson is for middle school students. The written word and visual images are both powerful ways of telling stories. The ability to writing a story and staging a artwork is very similar. Even the processes are similar. In this activity, students will use two different artworks as catalysts for creatively exploring characters, settings, sensory descriptions and plots. The final outcome will be a work of creative writing, which places the characters from one image into the setting of another image. Time: 2 hours.

Materials

Images of: Augusta Oelschig, *In Memoriam* and Helen Levitt, *New York*
Paper & Pencil
Thesaurus & Dictionary

Vocabulary

Character – a person in a story.

Plot – the plan of a story with the details to be resolved at the end.

Point of View – things and events as they are experienced through one person’s perceptions.

Sensory descriptions – to depict with words what one experiences through sight, hearing, touch, taste and smell.

Setting – the environment in which a story takes place.

Objectives

Examine the artworks, *In Memoriam* by Augusta Oelschig and *New York* by Helen Levitt. Look for clues about the characters, setting, sensory elements and plots.

Create an imaginative story which combines the characters from Levitt’s photograph with the setting, the carousel, of Oelschig’s painting.

Use prompting questions to develop ideas about characters, settings and plots.

Combine the information from the questions into a first draft of a story.

Share the first draft in small groups for further idea development and make revisions to the story.
Development

Story Telling
Humans have been telling stories for countless generations. Whether told orally, visually or in writing, these stories tell of our greatest hopes, dreams, fears, accomplishments, failures, tragedies and triumphs, thoughts and feelings. Visual artists and writers have provided inspiration for one another’s work for generations. Sometimes the visual images created by artists provided the inspiration for writers. In this activity you will examine the work of two artists. One will provide the main characters, the other will provide a setting and potential plot materials. You are then to write a story about what takes place when the three children in the photograph end up in the carousel from the painting.

To help you develop your story, there are a series of “prompting questions” below, which are intended to encourage you to explore various aspects of of your characters, the setting in which they find themselves and the story in which they are involved.

Characters
Use the following prompting questions to help develop brief character sketches of each of the three children. What are their names and ages? Does their dress, pose, attitude, placement nearer the door say anything about their personalities or the group dynamics? What is their social class? Who is the leader? If the characters could tell us one thing about themselves, what would it be? Why are they on the front porch steps at this particular time? Where might they be going? What do the children want? Even though the parents or other adults cannot be seen in the photo, is it possible for them to become characters or voices in the story?

Setting
Based on what they are wearing, what time of the year is it? What time of day is it? What is the weather like? Are there any other clues about location? Is this their home or perhaps the home of someone else? Where is the carousel located in relation to the front porch the children are standing on? On the trip from the front porch to the carousel what kinds of places do they pass? Is the carousel set apart by itself or part of a larger environment?

Point of View
Whose viewpoint is the story told from? Are they the narrator and retelling the story from memory? Are they telling the story as it happens in real time? Is the point of view from that of a character or just an observer?

Details
Use your five senses to provide more interesting descriptions. Use these descriptions of people, places and things to create a richer experience for your reader.

Sight: What visual details can you provide? Colors, textures, shapes, shadows, sizes, and light. Are objects sharply focused or fuzzy? Is the light warm or cool, bright or dull? Are you seeing things from a bird’s eye view or at eye level? Paint a picture with your words so your reader can visualize the setting and the characters.

Hearing: What noises do you hear in the background? Are they loud or soft, sharp, shrill, dull, hollow, etc. From which direction is the sound coming? What are your characters’ voices like? Do their voices change as things happen?

Taste: If your characters are eating something, what does it taste like?

Smell: What does the air smell like? What do objects in the story smell like? Are there smells associated with the characters? Do those smells change depending on the action taking place?

Touch: Touch can include pressure, temperature, and texture, What do your characters touch and how do those objects feel or make them feel? Some objects might look as though they would feel a certain way if touched.

Plot / Storyline
What kind of plot line can you develop that places or takes the children to the carousel? Who or what will they see/meet along the way? Describe the physical attributes of the carousel. Is there some physical explanation for why the carousel is here and its condition? Where will the children wander within the carousel? Will all of them go together or will they separate? What will each see, hear, smell, and feel? How will what they encounter cause them to speak or react? Will all of the children experience the same things on the carousel? Will there be some experience that will transform them, individually or as a group? What can you do in the end of the story to surprise the reader and not arrive at a predictable conclusion? Can the story have no ending? Is it possible for the story to end at the same place it began?

Now that you have collected all this information about the characters, the setting, the point of view and plot, read back through it all and select those aspects of each topic that seem to be most important to telling and understanding the story. Be certain such details serve to clarify and enrich the story you are telling. If not, leave them out. Now restructure the first draft of the story to include the essential elements you have just selected.
Assessment

Did the student carefully examine the artworks for clues about the characters, setting, sensory experiences and possible plots for a story they will write?

Did the students use the prompting questions to develop in-depth information?

Did the students, thoughtfully and imaginatively, combine the information from their prompting questions into a first draft of their story?

Extending the Lesson

Examine illustrated stories to observe how illustrators use the authors’ verbal descriptions to create images. Examine the works of Newbery and Caldecott Award winning authors and illustrators for relationships between the written descriptions and visual images. Pay particular attention to how the artist has used colors, marks and shapes to represent feelings. Speculate on why the artist might have chosen a particular scene in the story to depict

Webliography

• http://teenwriting.about.com/od/characters/tp/CharQuestions.htm
• http://teenwriting.about.com/library/weekly/blbasicsguides.htm

ABOUT the ARTWORK

In Memoriam is a surreal painting that seems to depict a dark side to what is usually thought of as a pleasant experience—riding a carousel. The carousel horses have come alive and seem to be racing to leave the mechanical platform, perhaps to freedom. The story of the painting is based on a real experience. Oelschig was riding the bus home in New York one evening and saw a homeless man cooking over a fire that he had started near the Carousel in Central Park. She called the police but no action was taken and that night the Carousel burned. The Carousel was one of Oelschig’s favorite places in the city and she painted the burned ride several times. The first of these paintings was titled Death of a Carousel. The artist did a second major painting of the carousel a year later, in 1952 after hearing that her brother’s plane had been shot down in the Korean War. A new shaft of light had broken through the ruined carousel, and this made the horses appear to be in motion, and suggested, to her, life after death. This second painting was named In Memoriam in honor of her brother.

Artist: Augusta Oelschig
Title: In Memoriam
Date: 1952
Medium: Oil on Masonite
Size: 21 13/16” x 38 11/16”

ABOUT the ARTIST

Augusta Oelschig was one of Savannah’s most important painters in the 20th century, known for her local scenes, political works and spiritually charged abstractions. She was one of the first students enrolled at Armstrong College when it opened in 1935. She also attended the University of Georgia, where she studied under painter Lamar Dodd and received a B.F.A. Degree in 1939. Later that year, she studied with well-known American painter Henry Lee McFee in Savannah. She had one-person exhibitions at the Telfair Academy of Arts and Sciences in 1941, and at the Montgomery Museum of Art in 1942. During these years she held a teaching position in the Art Department at Alabama Polytechnic (now Auburn) University. In 1946, she opened up her own art school in Savannah on Bay Street. In 1947 she spent most of the year in Mexico, where she met the famous Mexican muralists Diego Rivera and Jose Clemente Orozco, who influenced her to include social themes in her work. She moved to New York in 1948 and participated in numerous gallery exhibitions, then returned to Savannah 1962. In 1972, she received a commission for a mural depicting the history of Savannah for the New Home Federal Bank composed of 44 individual paintings in an overall design. The mural took three years to complete. In 2000 the mural was reinstalled at the Savannah Area Chamber of Commerce office on Bay Street, not far from her former studios.
Director’s Cut: Writing a Script with Two Alternative Endings

In this activity, middle school students are asked to assume the role of a screen writer/director, who wants to produce a Director’s Cut DVD movie with alternative endings to the story. Students will use the famous painting of *The Black Prince at Crecy*, by Julian Story, as the pivotal point of the film. Students will write a portion of a script, which begins with the scene depicted and ends two minutes afterward. They are to produce a total of two alternative endings to the story they create. The activity may be done individually or in small collaborative groups. Time: 2 hours.

Materials

*The Black Prince at Crecy*, by Julian Story
Paper & Pencil
Thesaurus & Dictionary

Vocabulary

**Action** – What characters do physically and how they physically react to the actions and words of others.

**Character** – a person in a story.

**Dialogue** – What characters say to themselves and one another, as well and how they say it.

**Plot** – the plan of a story with the details to be resolved at the end.

**Setting** – the environment in which a story takes place.

Objectives

Examine the painting, *The Black Prince at Crecy*, for clues about the characters, setting, dialogue, actions and possible alternative plots or endings to the story depicted.

Use prompting questions to develop information about character, setting, and plots for their script.

Combine the information from their prompting questions into a first draft of their script.

Share the first draft of the script in small groups for further idea development and make revisions.

Development

Alternate Endings

On contemporary DVD movies, it is not uncommon to find director’s cuts with alternative endings to the movie. It is always
interesting to observe how far back into the film they must go to begin making each change, while still making it fit well with everything that happened prior to the change. The director must select the "pivotal" moment in the story, when many choices confront the main characters, can lead to vastly different outcomes. In this activity, you will use *The Black Prince at Crecy*, as a pivotal moment, frozen in time. You will construct a script, which details the actions, dialogue and storyline/plot that moves from that point forward for the next two minutes in real time. Then you will construct an alternate ending, which also begins at the moment depicted in the painting and moves forward in time for two minutes. To help you develop your script, there are a series of "prompting questions" below, which are intended to encourage you to explore various aspects of your characters, the situation they find themselves and the alternative stories that might evolve. To ensure continuity in your story, you may also construct a script for the time immediately proceeding the scene depicted in the painting.

**Characters:** Use the following prompting questions to help develop brief character sketches of the relevant characters in your script, so their actions and dialogue will fit logically with the scene depicted in the painting. What are the names and ages of your relevant characters? Does their dress, pose, attitude, placement in the painting tell you anything about their personalities, their importance to the story or the group dynamics? What is their social class? Who is the leader? Why are they dressed as they are? If the characters could tell us one thing about themselves, what would it be? What do the characters think of each other? What is happening at the exact moment depicted in the painting? What do the characters want? What thoughts and feelings are the characters experiencing at this exact moment? What will they experience in the next two minutes?

**Setting:** Based on their clothes and other items shown, during what historical period does this occur? Based on what they are wearing, what time of the year is it? What is the weather like? Are there any other clues about location? Based on what you have observed about historical period, dress, location and weather, how do you think they might speak? What might their dialogue be about?

**Plot/Storyline:** What kind of plot line can you develop to unexpectedly shift the outcome of the scene from one logical ending to another? Will all the characters be involved in the alternative plot shift/ending or only a few? What might they say to each other or utter under their breath? Does your dialogue and action demonstrate that the characters are reacting to one another’s actions and words? Will the different endings transform one or more of your characters in different ways? Will there be any new characters introduced in the alternative endings? How will you develop the character story behind this new character? What physical actions will have to change in order to create the two alternatives? Can one alternative ending lend doubt or mystery to the story?

**Bringing Ideas Together:** Now that you have collected all this information about the characters, the setting, and plot, read back through it all and select those aspects of each topic that seem to be most important to telling and understanding the story. Be certain such details serve to clarify and enrich the story you are telling. If not, leave them out. Now restructure the first draft of the story to include the essential elements you have just selected.

**Assessment**

Did the student carefully examine the artwork, *The Black Prince at Crecy*, for clues about the characters, setting, and possible plots?

Did the students use the prompting questions to develop in-depth information about character development, setting development, and plots for the story?

Did the students, thoughtfully and imaginatively, combine the information from their prompting questions into a first draft of their script for two alternate endings?

**Extending the Lesson**

Select any other art work from the Telfair collection which seems to have narrative potential and write alternative endings for it.

**Webliography**

- [http://teenwriting.about.com/od/characters/tp/CharQuestions.htm](http://teenwriting.about.com/od/characters/tp/CharQuestions.htm)
- [http://teenwriting.about.com/library/weekly/blbasicsguides.htm](http://teenwriting.about.com/library/weekly/blbasicsguides.htm)
Using Critical Analysis to Discover Meaning

Students will examine the abstract symbolist work of William Scharf and apply to it a structured system of critical analysis in an attempt to decode the work and arrive at reasonable interpretations of its meaning. Students will further examine several aesthetic questions, which arise from examining the work. Time: 1 hour.

Materials

Image of: Ascending Betrayal by William Scharf
Pen and Paper

Vocabulary

Critical analysis – A systematic collection and analysis of available clues, which contribute to the reasonable interpretation of an artwork.

Intentionalist – One who believes that the meaning and success of an artwork cannot be known unless the creator of the work first reveals his/her intentions.

Objectives

Speculate on whether a record of the artist’s intentions for creating a work of art are essential to arriving at any meaningful interpretation of the work.

Examine vivid case puzzles and speculate on additional questions, which arise from issues of artistic intentionality.

Examine the painting, Ascending Betrayal, by William Scharf and apply a system of critical analysis to the work to develop an interpretation of its meaning.

Development

Communication and Interpretation

Beginning with the assumption that all kinds of artwork (literature, drama, music, painting, etc.) are forms of communication, then it is reasonable to ask, “What do they communicate?” When we ask questions like, “What does the artwork mean?”, we are asking questions of interpretation. Sometimes the creator of the artwork tells us what a work is intended to mean and we are left to discover it meaning on our own. A very interesting question arises from this latter situation. That is, “If the creator of an artwork is unwilling, unable or unavailable to tell us what the work means, does that mean the work has no meaning?”
Considering Meaning
Read the following scenario to the class and then discuss. In rummaging through a recently deceased great aunt’s attic, you find a poem written by a famous poet. The poem has never been read by anyone other than your aunt and there is no explanatory information for the poem. If the poet has left no indication of the intended meaning, does that mean the poem has no meaning? Is it possible to evaluate the successfulness of the poem without knowing what the poet intended to communicate? Explain your response.

Now consider the same scenario and assume that instead of a poem, you found an abstract painting. Once again the famous painter has left no information about what he intended the work to mean. Does the work lose all meaning, unless the artist tells us what it means? Can we evaluate its meaning and successfulness at conveying without information from the artist?

If you said you believe the artist or poet’s intentions are critical to interpreting and evaluating the success of the work, then you share something in common with a group of art theorists called Intentionalists. If you believe you can interpret a work successfully with out knowledge of what the artist intended, you would agree with intentionalist fallacy.

If you believe the work has meaning regardless of the fact that the artist or poet has left no record of its meaning, then it poses several other questions. Does the work have a meaning, but we will never be able to determine that meaning without knowing the artist’s intentions? If so where and how? Does the artist exclusively determine the meaning? Do artist always fully know what their own works mean? Do artworks only have one meaning?

Aiding Interpretation
Look at the work *Ascending Betrayal* by William Scharf. This is an abstract symbolist work and the artist has resisted making a definitive statement about its meaning. Although he has not disclosed the meaning, he has left scribbled notes among his sketches for the painting. The evidence in the painting, title, and notes can be used to aid the viewer in interpreting the work.

The preliminary sketches for the painting include the following notations: “the kiss of Judas”, “corona”, “the witness”, “grapes of wrath”, “gallows”, and “Dark Angel.” Does the title, *Ascending Betrayal*, relate in any way to the phrases found in the sketches?

To determine what or even if these clues have any relevance to the meaning of the painting, one must consult the artifact. Examine the work to see if any of the clues can be accounted for in some way by visual evidence in the work. Create a chart, which lists each of the clues and under each heading describe any visual evidence, which seems to support the connection. Once you have established that such connections may exist, it is time to begin a thorough examination of the work to make sure no clues are missed. That can be done through a simple process of critical analysis.

Critical Analysis Process
The first step is to carefully prepare a descriptive list or inventory of everything you see in the work. Describe objects, colors, shapes, placements, etc. Be as thorough as possible and state the description as factually as possible, without trying to add meaning. It is important that you only compile a neutrally stated list of clues at this point. An example might be: there is a small red triangle in the upper left corner of the image. The apex of the triangle points to the top left corner of the painting.

The second step is to analyze the work for relationships among the objects, colors, and shapes. An example might be: the left side of the work is primarily made up of light colors and the right side is primarily comprised of dark colors, or the triangle on the right side of the white parallelogram in the center of the page is more sharply defined than those found in the upper left of the painting. This step is about making comparisons.

The third step is to make mini-hypotheses about how several components of the work seem to come together to create meaning. What might it mean that most of the light colors are on the left and most of the dark colors are on the right? Is there any potential meaning in the fact that the large white form in the center seems to straddle both the light and dark?

The fourth step is to combine several of the mini-hypotheses into a grand hypothesis about the meaning of the work. Several students may propose different grand hypotheses about the meaning. Test each one against all of the available clues. Which one seems the most plausible?

Now consider how your final interpretations might have changed if the artist had not left the written notations. Were they critical to your interpretation or would you have been able to decipher the codes without them?
Assessment

To what degree did students speculate on whether a record of the artist’s intentions for creating a work of art was essential to interpretation the work?

To what degree did students examine vivid case puzzles and speculate on additional questions, which arise from issues of artistic intentionality?

To what extent did students examine the painting, Ascending Betrayal, by William Scharf and apply a system of critical analysis to the work to interpretation its meaning?

Reference

• Telfair Museum of Art Collection Highlights, Telfair Museum of Art, 2005.

Webliography

• www.absolutearts.com/artsnews/2000/11/20/27735.html

ABOUT the ARTIST

Born in Media, Pennsylvania. As a youth, Scharf’s artistic pursuits were shaped by American artist, N.C. Wyeth, who facilitated his admission to the Pennsylvania Academy of Fine Arts. After serving in the U.S. Army Air Corps, Scharf resumed his studies with classes at the Barnes Foundation and the University of Pennsylvania and with European travel and study at the Académie de la Grande Chaumière in Paris. Scharf settled in New York in 1952, where he later met Abstract Expressionist artist Mark Rothko, who, along with Jackson Pollock and Willem deKooning formed The New York School. Scharf's work brings to mind the paintings of Mark Rothko, for whom he served as a studio assistant, and he has been considered second generation Abstract Expressionist. The artist's artwork is characterized by its blend of abstract expressionism, surrealism, and individual vision. His paintings can be found in public collections across the country including the Brooklyn Museum of Art, the National Museum of American Art, and The Phillips Collection.

ABOUT the ARTWORK

Scharf creates dozens of sketches and preliminary drawings for large canvases, to develop and refine his ideas. These sketches reveal the compositional development of the work and the artist's process. Scharf’s wife was from Savannah and he rented a studio on the Savannah riverfront which he used during summer visits to the city from 1966-1985. The reference to water and a floating feeling in many of Scharf’s works from this period is not coincidental as the artist worked in a studio overlooking the Savannah River during their creation. In fact, the artist’s sketchbooks identify the names of ships passing in the Savannah River as the artist worked in his studio. The monumental Ascending Betrayal was completed during Scharf’s final summer in Savannah. Symbolic elements such as the truncated cross, crown of thorns, and cluster of grapes, in combination with the painting’s title and the notated sketches refer to the Christian bible story of Judas’s betrayal of Jesus. In Ascending Betrayal, a sense of approaching conflict is created by the tension between light forms on the left half of the canvas and the ominous dark ones on the right. A gleaming white parallelogram floats at the center of the canvas dividing the work with its strong geometry lending contrast and structure to the work’s organic flow. Ascending Betrayal is a tribute to the power of suggestion. It demonstrates the capacity of abstract form and rich color to generate meaning, mood, and emotion.
# Curriculum Connections - National Standards

## Lesson One: Art Organized With Math

- **NM-PROB.REP.PK-12.1**
  - ORGANIZE, RECORD & COMMUNICATE MATH IDEAS
- **NM-PROB.REP.PK-12.2**
  - TRANSLATE AMONG MATH REPRESENTATIONS
- **NM-PROB.REP.PK-12.3**
  - USE MATH TO INTERPRET
- **NM-PROB.CONN.PK-12.1**
  - CONNECTIONS AMONG MATH IDEAS
- **NM-PROB.CONN.PK-12.2**
  - UNDERSTAND HOW MATH IDEAS INTERCONNECT
- **NM-PROB.CONN.PK-12.3**
  - APPLY MATH OUTSIDE MATHEMATICS
- **NM-PROB.GEO.9-12.4**
  - PROBLEM SOLVING BY VISUALIZATION, SPATIAL REASONING, GEOMETRIC MODELING
- **NM-GEO.6-8.1**
  - PROPERTIES OF TWO AND THREE DIMENSIONAL GEOMETRIC SHAPES
- **NM-GEO.6-8.4**
  - PROBLEM SOLVING BY VISUALIZATION, SPATIAL REASONING, GEOMETRIC MODELING

## Lesson Two: Measuring What Does Not Exist

- **NM-PROB.REP.PK-12.1**
  - ORGANIZE, RECORD & COMMUNICATE MATH IDEAS
- **NM-PROB.REP.PK-12.2**
  - TRANSLATE AMONG MATH REPRESENTATIONS
- **NM-PROB.REP.PK-12.3**
  - USE MATH TO INTERPRET
- **NM-PROB.CONN.PK-12.1**
  - CONNECTIONS AMONG MATH IDEAS
- **NM-PROB.CONN.PK-12.2**
  - UNDERSTAND HOW MATH IDEAS INTERCONNECT
- **NM-PROB.CONN.PK-12.3**
  - APPLY MATH OUTSIDE MATHEMATICS
- **NM-MEA.9-12.1**
  - UNDERSTAND MEASURABLE ATTRIBUTES
- **NM-MEA.9-12.2**
  - APPLY APPROPRIATE STRATEGIES TO DETERMINE MEASUREMENTS
- **NM-MEA.6-8.1**
  - UNDERSTAND MEASURABLE ATTRIBUTES
- **NM-MEA.9-12.2**
  - APPLY APPROPRIATE STRATEGIES TO DETERMINE MEASUREMENTS
- **NM-MEA.6-8.2**
  - APPLY APPROPRIATE STRATEGIES TO DETERMINE MEASUREMENTS
- **NM-MEA.9-12.4**
  - APPLY APPROPRIATE STRATEGIES TO DETERMINE MEASUREMENTS
- **NM-MEA.6-8.1**
  - APPLY APPROPRIATE STRATEGIES TO DETERMINE MEASUREMENTS
- **NM-GEO.9-12.1**
  - ANALYZE TWO AND THREE DIMENSIONAL GEOMETRIC SHAPES
- **NM-GEO.9-12.2**
  - DESCRIBE SPATIAL LOCATIONS USING COORDINATE GEOMETRY
- **NM-GEO.9-12.4**
  - USE SPATIAL REASONING
- **NM-GEO.6-8.1**
  - ANALYZE TWO AND THREE DIMENSIONAL GEOMETRIC SHAPES
- **NM-GEO.6-8.2**
  - DESCRIBE SPATIAL LOCATIONS USING COORDINATE GEOMETRY
- **NM-GEO.6-8.4**
  - USE SPATIAL REASONING

## Lesson Three: Proportional Measuring

- **NM-PROB.REP.PK-12.1**
  - ORGANIZE, RECORD & COMMUNICATE MATH IDEAS
- **NM-PROB.REP.PK-12.2**
  - TRANSLATE AMONG MATH REPRESENTATIONS
- **NM-PROB.REP.PK-12.3**
  - USE MATH TO INTERPRET
- **NM-PROB.CONN.PK-12.1**
  - CONNECTIONS AMONG MATH IDEAS
- **NM-PROB.CONN.PK-12.2**
  - UNDERSTAND HOW MATH IDEAS INTERCONNECT
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  - APPLY APPROPRIATE STRATEGIES TO DETERMINE MEASUREMENTS
- **NM-MEA.9-12.4**
  - APPLY APPROPRIATE STRATEGIES TO DETERMINE MEASUREMENTS
- **NM-MEA.6-8.1**
  - APPLY APPROPRIATE STRATEGIES TO DETERMINE MEASUREMENTS
Artwork Organized With Math: Golden Section, Golden Mean, and Rule of Thirds

Some people believe that math and art have few connections. Nothing could be further from the truth. The reality is there is a strong historical link between math and art that stretches deep into our common past. It is easy to find artistic traditions, from all over the world, that use math extensively in their creations. In this lesson we will focus on how artists in western cultures sometimes rely on mathematically based relationships to organize the elements in their art works in a more pleasing fashion. The golden section, the golden mean, and the rule of thirds are three variations of such organizing strategies.

Time: 1 hour.

Materials


Magazine photos and ads that demonstrate the principles of the golden mean or rule of thirds

Computer & Internet

Pencil

Vocabulary

**Golden Mean** – an approximation of the golden section that has been rounded off to a ratio of 3:5.

**Golden Section** – an ideal proportion, developed by the Greeks, which is based on the precise mathematical ratio of 1: 1.618.

**Proportion** – size relationships which compare parts to the whole (finger to hand), parts to other parts (finger to finger), and one whole to another whole (right hand to left hand).

**Rule of Thirds** – a ratio used by photographers to create interesting compositions, which is based on dividing the photo into three equal sections both vertically and horizontally to create a grid. It is based on a 1:2 ratio.

Objectives

Brainstorm for ways artists use math to create art.

View and discuss examples of artworks which use the ratio of the golden mean or rule of thirds as a strategy for organization.

Examine various aspects of the built environment, print and electronic media for examples of how the golden mean and rule of thirds are used.

Identify examples of the golden mean and rule of thirds by drawing them onto photocopies of master artworks, magazine
photos, etc. Suggestion: Ask students to brainstorm for ways that artists might use math to make art. Accept all answers and record them on the board. (Most responses will likely involve making geometric shapes or measuring.)

### Development

#### The Golden Mean

The ancient Greeks used math, in particular the geometry of the square, to develop a proportion they believed was ideal in the way its parts compared to the whole. Originally called the Golden Rectangle, this ideal proportion eventually came to be called the Golden Section, and was based on a precise mathematical ratio of $1:1.618$. The Greeks applied the proportion of the Golden Section to their buildings and art in an effort to make them more ideally beautiful. The Greek Parthenon is considered one of the finest examples of this ideal. The Greeks even used the Golden Section to create an ideal proportion in their figure sculptures. According to some experts, the Greeks used the navel (belly button) as the Golden Mean division on the human body, with three units falling above the navel and the five units below (this 3:5 ratio is explained below). The plaster cast of the original Greek sculpture, *Laocoon*, is a good example of this. (Because the figure is bent and twisted, you might have to use a tape measure rather than a ruler to test the measurements.) Because the Greeks were so influential on the development of our culture, it is no surprise that their ideas about beautiful proportion have survived into today's culture and art. For most artists, it would be too complicated and cumbersome to create their works based on such exact computations as $1:1.618$, so over time most artists simplified or approximated the ratio, which were applied to their work. This simplified version is called the Golden Mean and has been rounded off to a ratio of 3:5. You can see how they arrived at that ratio by multiplying the Golden Section $1:1.618$ by three, which yields a ratio of 3 to 4.854, which rounds up to 3:5. Photographers use a similar ratio, called the Rule of Thirds, to organize what they see in the viewfinders of their cameras when composing a photograph. The Rule of Thirds is slightly less precise than either the Golden Section or Golden Mean. It is rounded off to a 1:2 ratio. Artists use all of these mathematically based organizational methods to overcome our natural tendency to divide things exactly in half. Such divisions are considered so predictable that they are not interesting. Artists, therefore, use these three strategies of the Golden Section, the Golden Mean and the Rule of Thirds to make sure the divisions in their works and the placement of important elements are less predictable, and therefore more interesting.

#### Activities

1. **Exploring the Golden Mean in Art**
   - Distribute photocopies of the images. Look carefully at the painting by George Hitchcock, *Early Spring in Holland*. Notice how the light area of tulips divides clearly from the area of sky and trees above it. If the left side of the artwork were divided into eight equal sections, the tulip field would separate the painting into three units above and five units below, or a ratio of three to five...the Golden Mean! As you examine the work further, look for divisions within the work that also seem to depict this three to five ratio of the Golden Mean. Examine divisions that move horizontally as well as vertically. Also consider that objects themselves might be subdivided using the golden mean or rule of thirds. How many examples of the golden mean can you find? Draw on the photocopy of this image to show each example you have found.

2. Look at the painting by Robert Gwathmey, *Marketing*, for evidence of the Golden Mean divisions. Start along the outside edges and look for big divisions, which might be based on the Golden Mean. Then look at parts within the painting for divisions, which might reflect this strategy for controlling proportion. Draw on the photocopy of this image to show each example you have found.

3. Examine the photograph by Helen Levitt. Drawing directly onto a photocopy of the photograph, divide it horizontally into three equal sections, then divide it into three equal sections vertically. This is an example of the Rule of Thirds. Notice where or near, the photographer has located the exact intersection of two of the grid lines in the bottom right. These intersections are considered ideal places to locate very important elements in the artwork. Some call these intersections “powerpoints,” because they are powerful locations in the composition. This off-center placement still has the primary purpose of making the image less predictable and more visually exciting. Look at Levitt’s photograph one more time. There is one more element that falls on a “powerpoint.” Can you find it?

#### Assessment

The Golden Mean in Your Everyday World: Look around your school and classroom for architectural elements that might be based on the Golden Mean. For example, try to estimate the ratio of the width of the door to its height. How close does it come to the Golden Mean? What about the height of windows compared to their width? What about the width of the windows compared to the spaces of wall between them. Are there chair moldings or wainscots along the wall? Does
the molding or wainscots divide the height of the wall at the Golden Mean? Go outside and look at the front of your school building, your house or apartment building? Can you find examples of the Golden Mean?

As you watch television, pay attention to special shots to see if the cameraperson uses the Golden Mean or Rule of Thirds to frame the subject of the shot. Examine advertising images in magazines and on billboards for examples of both the Golden Mean and Rule of Thirds. Don’t stop yet! Look at graphic novels and comic books to see if you can detect the Golden Mean at work. Look at the patterns on some articles of clothing. Can you find evidence that the clothing designer used the Golden Mean to place a brighter stripe on the chest or arm? Now that you know what the Golden Mean is, you are going to notice it more as you go about your everyday tasks. When you do see it, remember the Greeks who did not think that math and art were such opposites after all.

**Suggestion:** Ask students to find examples of the following:

- The golden mean in: art, architecture, product packages, household appliances and implements (industrial design), print and electronic media advertising.

- The rule of thirds in: print and electronic media advertising, photography, photocopy examples – draw a line to represent the division between the 3 and 5 unit break of the golden mean and/or the powerpoints of the rule of thirds.

**Extension of Lesson**

Who was Leonardo Fibonacci? What are Fibonacci numbers? What is the relationship of the golden mean to Fibonacci numbers? What natural objects and natural phenomenon demonstrate the use of Fibonacci numbers? What is the Greek number Phi? How do the Fibonacci numbers and golden ratio apply to music?

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**ABOUT the ARTIST**

George Hitchcock is best remembered as an American expatriate artist who lived in Holland and exhibited in Paris at the turn of the century. Though trained as a lawyer (graduating from Brown University in 1872 and from Harvard University in 1874), Hitchcock abandoned law for art and traveled to Europe to study and teach in London, The Hague, Düsseldorf, and Paris. He eventually settled in Holland, where he established a reputation as a painter of landscapes, flowers and peasant women. Hitchcock was influenced by the Impressionist artists whose main focus was the effects of light and color. His paintings were exhibited at the Paris Salon in 1887, and he was later elected to the National Academy of Design in New York. Hitchcock was a close friend of Gari Melchers, another American who worked in Holland, and who was buying art for the Telfair’s collection during the early 20th Century.

**ABOUT the ARTWORK**

This painting depicts a garden in Holland and is painted in the Impressionist style. Impressionism is a late 19th century movement in which artists painted *en plein air* (out-of-doors) the fleeting qualities of color and light on their subjects at different times of the day. The garden, in particular, was a favorite subject for Impressionist artists. Hitchcock painted this garden in the Netherlands, a country renown for its tulips. The artist portrays the garden from the perspective of a gardener, surrounded by tulips.
Robert Gwathmey was born and raised in Richmond, Virginia and moved to New York where he became involved with the Social Realist movement. The artist was inspired by his own experiences in the South, where he witnessed first-hand the poverty, racism and near-slavery conditions of African American life in the late 1930s and 1940s. Gwathmey will be remembered as one of the first white artists to produce dignified and empathetic images of African Americans at a particular time and place. The artist was especially influenced by modern artist Pablo Picasso, whose use of abstraction and experimentation gave artists a new way of looking at the world. Some of Gwathmey’s paintings were inspired by his wife Rosalie’s documentary photographs of African-American life at the time. He also used her as a model on occasion. Gwathmey taught at the Carnegie Institute of Technology from 1939 to 1942 and then at the Cooper Union School of Art in New York City until his retirement in 1968.

Marketing

Marketing is typical of Gwathmey’s paintings, which capture people’s daily tasks. Celebrating the ordinary aspects that make up our lives. This painting characterizes Gwathmey’s painting style in which he arranges simple shapes and angles against expressive color, often outlined in black. He uses simple spatial techniques such as overlapping and size to create a sense of real space. Gwathmey believed that by simplifying a composition to its essentials and using symbolic abstraction, the message of his work could be most strongly communicated. In choosing color, Gwathmey sometimes arranged collected bits of different hued papers and rags on the table or floor until he arrived at the desired effect. The following description is from the Telfair Museum Education website: Marketing, painted in the early 1940’s, is typical of the social realism found in the early work of Robert Gwathmey, depicting situations faced by tenant farmers and sharecroppers, particularly African Americans, in the rural South. This work is instrumental—that is, the artist means to tell us about something that is troubling, and wants his art to serve actively as inspiration for change. In this work, an African American man is shown standing on the porch of a country store. Dressed in a straw hat and overalls, he appears to be a farmer, and he peers into his hand in a gesture that suggests he is counting change. Nearby, a small hand-painted sign advertises apples, while peeling posters spread across the side of the store, garishly advertising poultry, Coca Cola, 666 Cold and Fever remedy, and a circus. A blonde, white beauty queen appears in a poster possibly advertising beauty aids. In the background lie a blacktop road and a barren expanse of red clay. In the foreground, a single stalk of corn springs up in front of the posters, while several opened cans (label suggest vegetables and soup) litter the ground. The work is painted in flat areas of color with minimal shading. The artist appears to comment on several issues surrounding the rural South in a time of great change. One-fourth of black farmers in the early part of this century were landowners, and the remainders were sharecroppers or tenant farmers who worked the land for a small share of the crops. The lone corn stalk and the empty food cans provide clues to the man’s situation. Racist laws in Southern states, and the emergence of commercial agriculture, forced many blacks from subsistence farming into sharecropping. Commercial farming favored very large plantings of a single crop, such as tobacco, cotton, or corn. If blight like the boll weevil or a natural disaster occurred, crops were wiped out and tenant farmers often faced hunger. This farmer, though he works all day to grow food, may be having difficulty finding enough money to buy food that has been canned by a large company. The world of money and advertising (“marketing”), as seen in the posters, reminds the viewer of everything that is out of reach for the farmer. Rural markets, like the one shown in Marketing, were extremely important to farmers, who would buy goods on credit during the planting season. Often credit charges were so high, many farmers owed everything they made to the store.

Laocoon and His Sons

This cast was made especially for Telfair. Carl Brandt, Telfair’s first director, comissioned it. The original marble statue is currently in the Vatican Museum in Rome. According to legend, Laocoon was the son of Trojan Prince Antenor and responsible for the cult of Apollo, he committed sacilege by marrying. Thus violating a vow of celibacy and incurring the wrath of Apollo. He also played a role in the fall of Troy. He attempted to persuade the Trojans that the horse was hollow, and little more than camouflaged fortress, by throwing a spear. At that moment, two serpents rose out of the sea and swallowed the priest and his sons. The Trojans misinterpreted this as punishments from the gods for not allowing the horse in. Thus the gates were parted and the Trojans sealed their fate.
Measuring What Does Not Exist

When artists like Sylvia Mangold draw realistically, they must solve the problem of how to measure the size of the subjects they draw compared to one another as they move both across the space and back into it. Measuring an object’s vertical or horizontal size is easy enough, because a piece of paper or canvas also has a vertical and horizontal dimension to its surface. The real problem comes with how to measure back into space when you are drawing on a two dimensional surface. Obviously, you can lay a ruler on the surface of the paper to measure vertically, horizontally and even diagonally, but you cannot push the end of the ruler through the surface of the paper to measure back into space. Artists, architects and interior designers must be able make such measurements in order to plan and conduct their business projects.

How can one accurately measure back into a space that does not really exist? Is it possible to accurately measure the size of objects compared to one another within such a non-existent space? Time: 1 hour.

Materials

Checkerboard
Grease pencil
Small box
2 - 8 x 4 x 1/16 inch thick acrylic sheet
Pencil
Ruler
9 x 12 white drawing paper
Paper towel

Vocabulary

Grid System - a pattern of lines, usually at 90 degree angles to one another, and placed at regular intervals – like a checkerboard.

Ground Grid – a drawing device constructed by architects, interior designers and artists that permits one to accurately measure three dimensional forms and space on a two dimensional surface.

Linear Perspective – a quasi-mathematical system of drawing used to create the illusion of three dimensional space and form on a two dimensional surface.

Three Dimensional – a space or form having height, width and depth; full volume or deep space.

Two Dimensional – a shape or space having only height and width, essentially flat or without depth.

Objectives

Speculate about ways artists can use math to solve the artist/designer’s problem of how to accurately measure three dimen-
sional objects in a two dimensional space.

Observe a demonstration of how a two dimensional grid can be projected into deep space.

Create their own grid and use it to locate and define the specific footprint of objects within the space.

**Suggestion:** Use the information learned about perspective and ground grids to carefully examine Sylvia Mangold's painting and calculate an approximation of the square footage represented.

## Development

In Sylvia Mangold's untitled painting of a floor, the artist uses applied EUCLIDEAN geometry to create the illusion of a floor plane that moves back into a three dimensional space even though, in reality, the surface of the painting is two dimensional and, therefore, has no physical depth. This method of depicting three dimensional space and form on a two dimensional surface is called linear perspective and was developed during the Renaissance Period. Although the rules of perspective were originally developed during the Renaissance, they have been used since that time to produce illusions of volume and space and are still applied in the 3D rendering software used by individuals and industry.

**Perspective** is based on two important concepts that are rooted in the difference between reality and appearance:

**Convergence** Parallel receding lines appear to converge to a single point in the distance. Think of railroad tracks as you stand in the middle of them and look toward one end or the other. The point where they seem to come together is called the vanishing point. You know the tracks are really parallel; otherwise, the train could not stay on the tracks. Nonetheless, the tracks appear to converge. It is this phenomenon of appearance or illusion that the artist must represent rather the reality of being parallel.

**Diminution** Objects, which are really the same size, appear progressively smaller as they move farther away from the viewer. When looking down from the top of a building, people who are really as big as you, appear to be the size of ants. If you have three Volkswagen “Bugs” and one is parked right next to you and the remaining two are parked two blocks away and four blocks away, you know that in reality the three cars are exactly the same size. The second “bug” appears smaller than the one closest to you and the farthest “bug” seems smaller than the other two.

Mangold’s painting is essentially a grid comprised of equally sized units, in the same way that a chess or checkerboard is a grid comprised of equally sized squares. If we could draw a large checkerboard so that it seemed to recede back into space, we could simply count squares and fractions of squares to measure that illusionary space. If we assigned the size of one square inch to each square on the checkerboard, it becomes a measuring device. We could then measure across and back into the imaginary space marked off by the grid. We could also subdivide the squares by bisecting them to find their centers and using the center to divide the square into four equal parts. Each quarter square can be further subdivided by using bisecting to yield 16 subdivisions of the square to arrive at fractional divisions of the original grid units. This checkerboard like device, used to measure back into space, is called a ground grid.

**Suggestion:** Ask students to point out examples of convergence and diminution in Mangold’s painting. The end of the planks, closest to the viewer, seem to be the same width, but as you compare the end of the closest planks with those that are increasingly farther away, their widths seem to diminish in an orderly and predictable way. This is an excellent example of diminution.

If one traces the angles of all the lines moving back into space, you will see that they seem to come together at a single point in the distance somewhere beyond the boundaries of the image. Remember, that imaginary point is called the vanishing point.

Before the development of the computer, Architects and interior designers used such grids to “map out” the spaces they were designing even before they could be built. Drawings based on ground grids and similar projected measuring systems allowed potential clients, who did not possess the artist/designer’s imagination, to visualize what the proposed structure might look like upon completion.

It is possible to visualize this process by starting with a top view drawing of the checkerboard. Linear perspective can then be applied to make the checkerboard lie down on a horizontal surface so it can be used to measure a specifically sized shape.
at a precise placement on the checkerboard. The following demonstration is helpful in visualizing this phenomenon.

**Demonstration Step One (see illustration)**

Lay a checkerboard on a table top and place one of the acrylic sheets on top of it so all students can see. Use the grease pencil to carefully trace the outside edges of the checkerboard and the interior grid system that define the squares. Place this tracing where it can be referred to for comparison in a few moments.

**Step Two (see illustration)**

Lay the checkerboard on top of the table, close to the table edge. Stand the acrylic sheet so that it is perpendicular to the table and its bottom edge rests along the front edge of the checkerboard. The acrylic sheet now represents what artists call the picture plane. It is the view we would see if the paper we draw on were transparent. Have a student sit in a chair directly in front of the acrylic sheet facing toward the checkerboard. The student should close one eye, hold their head completely still and use the grease pencil to trace the outline of the checkerboard onto the acrylic sheet. Following the same procedure, the student should also draw the interior grid system that defines the squares on the checkerboard. After the tracing is complete, display the results next to the previous tracing.

On the second tracing, notice how the left and right edges of the checkerboard, which move away from the viewer, converge to a point in the distance. See how all the grid lines, which move away from the viewer, do the same? In the top view of the first tracing, these lines were parallel to one another. This is a clear demonstration of the definition of convergence; true parallel lines which recede appear to converge at a point in the distance.

Now look at the lines, which run from side to side on the checkerboard. See how the first tracing shows them as parallel and equidistant? Compare that with the second tracing and you will discover an example of the second perspective principle, diminution. Although these lines continue to remain parallel, notice how the distance between them seems to get progressively smaller/narrower as they move further back into space. What you have just witnessed is a demonstration of how the principles of linear perspective can be used to translate a regular grid from a top view, without any depth into a grid, which lies in a deep projected space moving away from the viewer.

**Activities**

1. You can create your own ground grid by using the following instructions. (see illustrations) Start by drawing two parallel horizontal lines that are 12 inches long and six inches apart. The left end of both lines should line up with one directly over the other. The same is true of the right ends. Place a dot in the center of the top line. This will become the vanishing point, which is the imaginary point on the horizon where all parallel receding lines appear to converge. Now divide the bottom line into 12 one inch segments, by making a tic mark at each measurement. From each tic mark, carefully trace along the edge of the ruler to draw a line back to the dot (vanishing point). Do not skip any tic marks. Be certain you have drawn from each one back to the vanishing point. Draw a line from the left end of the bottom line to the right end of the top line. Draw true horizontal lines across the page at each intersection of the diagonal and the receding lines.

   You have now created a ground grid that is lying down and moving away from you. If you assign a specific size to each square, you can measure across the space and back into the space to place objects. Remember that each square can be further subdivided by way of bisecting to produce smaller units which therefore, create more accurate measurements. If you were plotting the placement of objects within this space, you could accurately place them wherever you desire.

2. Below are 5 shapes represented on a top view grid (see illustration). They are shaded in to represent the “footprint” of some object that must sit in that space. Translate the top view shapes onto your ground grid. Be sure to get both the size and placement correct.

3. If we now return to Sylvia Mangold’s painting of the floor, you will see she has provided you with enough information to be able to measure both across the page and back into the illusionary space she has created. Her ground grid looks a little different than the checkerboard you just created, but if you look closely, all the necessary components for the checkerboard are there. There is actually enough information for you to assign sizes to the grid and measure the space represented.

4. Devise a strategy for assigning size to Mangold’s ground grid. Calculate the approximate area of the floor space depicted by using the information the artist has provided.
Creating a Perspective Ground Grid in One Point Perspective: Seven Steps

Step One
Vanishing Point (6 inches)

< 6 inches
V 12 inches

Step Two

VP
Step Three
VP

Step Four

VP
Step Five
VP

Step Six

VP
Step Seven
VP
Assessment

Next time you visit the Telfair look for works in which the artist or designer has had to use a ground grid to measure a space and the objects within it, by using a method like this. It might show up as a tile floor or sections of sidewalk moving back into space. Don’t just look at the floors in artworks to find such examples. If you were standing on your head, the tiles of ceiling would behave exactly as they do on the floor. Roll over on your side and the bricks and blocks used to create walls are also ground grids rotated 90 degrees. Think about this! If we had six checker boards, we could use them to create the six sides of cube, with the grids on the inside of the cube. If we drilled a hole in the end so we could see inside, the same measurements we used on the floor would transfer up onto the walls and continue up onto the ceiling. In such a space, we could potentially measure anything.

Extending the Lesson

1. How can one create fractions of a square to account for measurements that are not in whole square units? “X” it! That’s right! Bisect the square from opposite corners to find the center of the square, then trace horizontal movements horizontally and receding movements back to the vanishing point. (see illustration) Using this “midpoint” technique, you can continue to subdivide the squares into smaller squares indefinitely (or at least until the squares are smaller than your pencil point.)

2. Look out glass windows and find a view of a building that shows two or more perpendicular sides. Keeping your head completely still, close one eye and use your grease pencil to carefully draw the outlines and interior forms of the building. Notice the places where diminution and convergence are demonstrated.

3. Find magazine photos of houses and buildings that show at least two perpendicular sides. Make photocopies of them and use a pencil to trace their receding lines back to the vanishing point(s). Also trace the elements, which demonstrate diminution.

References

• The Paintings of Sylvia Plimack Mangold, by Cheryl A. Brutvan, Sylvia Plimack Mangold, 1994.

Webliography

• For an interdisciplinary course on mathematics in art and architecture go to http://www.math.nus.edu.sg/aslaksen/teaching/math-art-arch.shtml
• For more images by Sylvia Plimack Mangold, visit www.artcyclopedia.com/artists/mangold_sylvia_plimack.html

ABOUT the ARTWORK

Plimack Mangold’s simplified composition, with the central emphasis on geometric forms, characterizes the 1970s art style, Minimalism. The artist realistically rendered each grain of wood using the technique of one-point perspective to achieve the illusion of depth on the flat painting surface. The parquet floor depicted in this painting was modeled from the artist’s New York City apartment she lived in with her young son and her husband. Plimack Mangold has commented that the floor was, in part, the reason she and her family moved into the New York City Eldridge Street address in 1967, where they resided until moving to rural upstate New York in 1971. The floor continued to be the primary subject matter for Plimack Mangold through the 1970s, although other compositions included additional elements such as a baseboard or a mirror and, eventually, a window with a view of the landscape.

ABOUT the ARTIST

Sylvia Plimack Mangold grew up in New York City. Although Plimack Mangold paints everyday objects with meticulous accuracy, she is perhaps best described as a painter of illusions. Plimack Mangold’s paintings, watercolors, drawings and prints are inspired by both interior and exterior surroundings. Plimack Mangold was influenced by artist James McNeill Whistler’s subtle tonalities he achieved in his paintings, watercolors, and prints at the turn of the century. Plimack Mangold’s husband, Robert Mangold, is also a well-known painter and depicts similar Minimalist subject matter.
Proportional Measuring

A Short History of Length: If you were asked to measure something, you would probably reach for a ruler or tape measure and begin thinking in terms of inches or centimeters. People have not always thought about measuring in that way, however. Did you ever wonder how an inch or a meter came to be the length it is? And who came up with names like inch and meter? What about measurements like a furlong, a fathom, a league, an acre or a mile? It seems like someone simply picked a size or unit “out of the blue” and over time people agreed to employ the same unit until it became commonly accepted and widely used. Well, it seems that way, because, in some cases, that is exactly what happened. Time: 1 hour.

Materials

Two pencils (1 sharpened, 1 unsharpened)
11 Magazine photos of different front view faces (large and up close) -per student
Image of: Zorach’s, Mother and Child and Story’s, The Black Prince at Crecy -per student

Vocabulary

Proportion - the size relationship of one part to another part, a part to a whole, or a whole to another whole.

Objectives

Participate in a discussion on the history of length.

Practice proportional measuring on a magazine photo of a front view face.

Apply the proportional measuring strategy to examples of artwork from the Telfair Museum collection.

Conduct a small study of the proportions present in the faces of ten different people and report their findings as mathematical averages.

Compare the proportional structure of their own face to the mathematical averages derived from their study.

Development

Throughout time people and cultures evolved many different ways of expressing sizes. Sizes were usually were based on a comparison to something common in their environment. For example, the oldest recorded unit of measurement is the cubit. In the book of Genesis, Noah’s ark is described as being 300 cubits long. Most people today don’t know that a cubit is equal to the length from the end of the outstretched middle finger to the elbow. Try measuring a cubit on your arm? Is it the same size as your neighbor’s cubit? What about the mile? Is it also based on some obscure comparison of size to something in the environment? Absolutely! Believe it or not, the mile is based on the length of 1000 (“mille”) double steps (approximately
5 feet) of a Roman soldier. The foot is based on the mathematical average length of the right foot of the first 40 men emerging from a church in England on one Sunday morning. Even the inch is compared to the length of three kernels of barley corn laid end to end. In the late 1600s, the meter was defined as one ten millionth of the distance between the North Pole and the Equator along a line passing through Paris, France. Today, the meter is defined as the distance traveled by light in a vacuum for 1/299 792 458 of a second. So you see, even our most modern and precise measurements are still based on comparisons, of one kind or another, to existing phenomenon.

Proportional Measuring

Considering the natural way that systems of measurement have evolved, it should be no surprise that artists would resort to the same types of strategies for seeing, analyzing and recording size comparisons of things they include in their art. Artists often use a system called “proportional measuring” to examine their subject for relationships of size. What they discover helps them recreate the objects they draw in the correct size relationships compared to one another. Proportional measuring relies on comparisons of the size relationship of one part to another part, a part to a whole, or a whole to another whole. To better understand the concept of proportion let’s consider your hand and its parts. The length of your first finger compared to the length of your pinky finger is an example of a “part to part relationship.” The width of your ring finger compared to the width of your hand is a “part to whole relationship.” The size of one hand compared to the other hand is a “whole to whole relationship.”

When artists draw realistically, they establish or invent their own unit of measurement, based on the size of whole objects or parts of objects within the subject they are drawing. If the artist consistently and accurately uses the measurement, they will be able to reproduce what they see with considerable accuracy.

How Does It Work?

As the artist examines the subject to be depicted in the artwork, she searches for a smaller dimensions within the subject, which can be used as a standard for measuring all other objects or parts of objects within the composition. By using a dimension already present in the subject, the artist can consistently check and recheck her proportional measurements for accuracy by comparing it to the original object. Imagine you are an artist preparing to create a portrait of someone from the waist up. As you scan the subject, the width of the left eye seems small enough to be a helpful measurement for working on the more complex parts of the face. Begin by establishing how wide the left eye is. Instead of an inch, you will now use the “eye-width” as your standard unit of measurement and will use it just like a ruler to measure everything else in the artwork. How many eye-widths does it take to be as wide as the face? How many eye-widths does it take to make the height of the face? How many eye-widths equal the length of the nose or the length of an arm? By using proportional measurements, the artist can easily enlarge or shrink a work and its component parts. If the ratio of eye-width to face width it is 5:1 then it does not matter if the face is five inches wide or five miles wide! The relationship of the eye-width to face-width will always remain the same - a 5:1 ratio and the eye will always be one fifth the width of the face.

Activities

1. Try this yourself. You will need two pencils. One should be new and unsharpened, so that it still retains its full length. The other pencil should be sharpened. You will also need a close up front view photo of a person’s face from a magazine. You will use your new pencil to measure with rather than a ruler or some other measuring device. Lay your new pencil flat onto the photo and place its eraser end on the left end of the left eye. Now, without letting the pencil move from its position, use the second pencil to mark the right end of that eye on the surface of your pencil. This is now your new unit of measurement. Now analyze the object carefully using your newly selected unit of measurement. Express the size relationship of various parts of the face in terms of how it compares to your new unit of measurement. How many eye-widths are between the eyes? from the outside edge of each eye to the outside edge of the face? How many eye-widths are equal to the width of the bottom of the nose? to make the length of the nose? to equal the width of the entire face? the height of the entire head?

Hopefully, you can see how this strategy for measuring can be taken pretty far. Just like one can use multiples of an inch to create a foot, this method might permit you to measure using the eye-width or some multiple of the eye-width.

2. Examine the bronze sculpture by William Zorach, titled, Mother and Child. Identify a small form on the sculpture, which might serve well as a new proportional unit of measurement. A good example might be the height of the child’s ear. This now becomes your “new inch”, with which you will measure everything else within the sculpture.

How many ear-heights equal the height of the baby’s face? the width of the baby’s head? How many ear-heights does it take to create the length of the mother’s arm from the elbow to wrist? to make the entire height or width of the sculpture?
the width of the mother’s left knee?

3. Look at the painting of The Black Prince at Crecy, by Julian Story. How many head heights does it take to make the height of the full figure of the Black Prince? Now look at the figure of the squire to the left of the Black prince. Use the Squire’s head height to determine the total height of the squire. Using their own head height to determine their total height, how does the Black Prince compared to the squire. Are they equal in terms of head heights? Now use the total height of the squire to compare to the total height of the Black prince? How could you express that relationship?

4. Select ten close-up photos of people’s faces depicted from the front view. Now use the eye of each figure to analyze the proportional relationships of the facial features and record them. Analyze the same seven measurements on each face, using only the eye of that particular portrait to determine its proportional relationships. Once you have completed your measuring and recording, calculate mathematical averages for each relationship to arrive at generalized proportions for the face. How close do your own features come to these averages?

**Assessment**

As you have seen, in order to accurately depict forms and spaces, artists must measure comparative size relationships of all parts within their compositions. For many generations, visual proportional measuring has provided one of the most accurate means of accomplishing this. Ratios of comparative size allow the artist to enlarge or reduce the size of all objects while maintaining appropriate size relationships at any scale.

**Extending the Lesson**

Sight measuring is a variation of proportional measuring. As an artist views any subject (like a landscape, portrait or still-life) from a distance, it is impossible to actually lay a pencil on its surface (unlike the photocopies you have worked from so far) to make proportional measurements. In this case, the artist still uses proportional measurement, but must “sight it” from his position in space. This is done by holding the measuring device (pencil) in one hand and extending that arm to its full length. It is important to keep the “sighting arm” fully extended each time you measure in order to ensure consistency in your measurements. Now sight down your arm like you are aiming down the barrel of a gun. If you are sighting down your right arm, close your left eye and look with your right. If you are sighting down your left arm, only your left eye will remain open. With a steady hand, place the end of the pencil so it looks like it is touching one end of the object you wish to measure. Slide your thumb up the pencil to mark the other end of the object being measured. Now you have a unit of measurement. Compare it to everything else just like you did on the photocopies. All measurements are now made by “sighting.” Try to “sight measure” some of the same facial proportions with which you are already familiar.

**References**


**Webliography**

- www.illuminations.nctm.org/index_o.aspx?id=148

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**ABOUT the ARTIST**

Zorach grew up in Cleveland, Ohio, where he studied at the Cleveland School of Art. He moved to New York City in 1907 where he continued studies at the National Academy of Design. During 1910-11 he exhibited paintings at the Salon d’Automne in Paris; he then returned to the United States and was represented in the Armory Show of 1913. Zorach began carving sculpture in 1917 and by 1922 had decided to entirely devote himself to sculpture where he became an advocate of direct carving and worked in wood and stone. During the 1930s he was one of the leaders of the modern movement in American. During the 1920s William Zorach was one of few American sculptors who carved directly in stone by preparing models in clay, which were transferred into stone by professional carvers. This sculpture is typical of Zorach’s works, which are characterized by their simplified, massive forms. Also it is an example of his use of traditional subjects; he often depicted animals, children, mother and child, and child and animal. His daughter, Dahlov, often served as the subject of his sculpture. This was the last cast made of Zorach’s Mother and Child before the artist’s death in 1966.
Curriculum Connections - National Standards

Lesson One: The Museum: Intersection of Science, Technology and Art

NS.5-8.5  SCIENCE AND TECHNOLOGY
NS.5-8.6  PERSONAL AND SOCIAL PERSPECTIVES
NS.9-12.5 SCIENCE AND TECHNOLOGY
NS.9-12.6 PERSONAL AND SOCIAL PERSPECTIVES

Lesson Two: Art and Technology

NS.5-8.7  HISTORY AND NATURE OF SCIENCE
NS.9-12.5 SCIENCE AND TECHNOLOGY
NS.9-12.7 HISTORY AND NATURE OF SCIENCE

Lesson Three: Bronze Casting

NS.9-12.5 SCIENCE AND TECHNOLOGY
NS.9-12.7 HISTORY AND NATURE OF SCIENCE
NS.9-12.7 HISTORY AND NATURE OF SCIENCE

Lesson Four: In The Eye Of The Beholder

NS.5-8.3  LIFE SCIENCES
NS.5-8.5  SCIENCE AND TECHNOLOGY
NS.5-8.6  PERSONAL AND SOCIAL PERSPECTIVES
NS.9-12.5 SCIENCE AND TECHNOLOGY
NS.9-12.7 HISTORY AND NATURE OF SCIENCE
The Museum: Intersection of Science, Technology and Art

When visiting an art museum, we are directed to pay attention to the art, not the scientific and technological systems behind the scenes that make the museum a perfect place for spending time with some of humankind’s greatest accomplishments. This lesson is intended to examine some of the behind-the-scenes technologies at work in the new Jepson Center for the Arts, the Telfair Museum, as well as other similar institutions.

Materials

Images of: Jepson Center for the Arts, Telfair Academy, Owens Thomas House
Computer and internet access

Vocabulary

Architect – somebody whose job is to design buildings and advise on their construction.

Architecture – the art and science of designing and constructing buildings.

Conservation – the preservation, management, and care of natural and cultural resources.

Engineering – the application of science in the design, planning, construction, and maintenance of buildings, machines, and other manufactured things.

Infrared Light – the portion of the invisible electromagnetic spectrum consisting of radiation with wavelengths in the range 750 nm to 1 mm, between light and radio waves.

Tension – a force that pulls or stretches something.

Ultraviolet Light – relating to or producing electromagnetic radiation of wavelengths from about 5 to about 400 nanometers, beyond the violet end of the visible light spectrum.

Objectives

Examine the behind-the-scenes technologies required to operate a museum such as the new Jepson Center of the Telfair Museum.

Examine the special curatorial problems encountered when historical buildings like the Telfair Museum and the Owens Thomas House, are adapted to showcase and display valuable cultural artifacts.

Cite examples of the hazards presented by excessive light, moisture, and temperature, which may affect the artifacts housed in the museum.
Development

Because we spend so much time in our homes and other buildings, we tend to take such architecture and its systems for granted. Architecture is really a complex machine that is the result of many generations of scientific and technological innovation. Systems we take for granted such as indoor plumbing and toilets, electric lighting and power for appliances, climate control (heating and air conditioning), are relatively recent developments in the western world and still not found in many homes in other parts of the globe. Your grandparents or great grandparents probably could tell you stories about what life was like before the development of some of these systems which are so common today.

Architecture itself, can also tell us such stories. Three local structures that illustrate the evolution of scientific technologies in terms of architecture are the new Jepson Art Center, The Telfair Museum, and the Owens Thomas House. As architecture, either intended or converted for use as museum space, each building presents its own unique set of problems which require certain technologies to assist in solving these problems. Though entirely functional, these buildings must also be pleasurable to use or they will be left unvisited and ineffective. That being said, it is important that the technologies used to solve potential problems must go unnoticed as to not intrude on the overall viewing experience, which is after all, the primary function of the museum.

Scientific considerations and solutions employed in designing a museum of art: A museum houses valuable artifacts, which are sensitive to many environmental factors capable of causing irreparable damage or even total destruction of the object. Light, temperature, humidity, air borne pollutants must all be controlled if the artifacts are to be preserved for future generations. Scientific and technological advances have provided museum curators with an extraordinary array of ingenious solutions to the special problems of the museum setting. Most of us walk past them without acknowledging the important role they play. A new structure, like the Jepson Center, was designed with the intention of being a museum that incorporates the latest technologies developed specifically for the needs of such an aesthetically unique, yet utilitarian space. In contrast, the Telfair Museum and Owens Thomas House were both originally designed as individual residences, rather than museums. These historic structures, just like the artifacts they house, are in fact, artifacts themselves. The conversion of these types of structures to a new purpose like a museum, can present real challenges to those responsible for caring and preserving the artifacts for future generations. In the discussion that follows, you will read about the Gardner Museum in Boston, which, like the Telfair and Owens Thomas House, was originally a residence converted to serve as a museum.

**Light:** Exposure to bright light, particularly certain wavelengths, severely bleaches or fades colors and otherwise degrades an artifact. That is why light is strictly controlled in the museum environment. Have you ever wondered why museums will not allow you to take a photograph of an artwork with a flash? One reason is simply that the total cumulative effect of thousands or hundreds of thousands of flashes going off over a period of time can be as damaging as prolonged exposure to sunlight. The constant challenge in a museum is to provide enough of the right kind of light to allow visitors to fully view the artifact without providing too much of the most damaging kind of light. In some cases, particularly fragile artifacts may be placed out in the light for controlled periods of time, and then returned to a protective storage environment. You may have seen some galleries or museums that had rather dim lighting except for special lighting focused on the artwork. While this serves for a dramatic purpose of emphasizing the artwork, it is also a precaution against over-exposure to light and its damaging effects.

Architects use both electric and natural light in the museum spaces they design yet are aware of the danger it presents to the artifacts. Outside light is often filtered, reflected off other surfaces, or diffused so that will not harm the artifacts while providing a pleasant atmosphere for visitors.

Museums employ the following four basic strategies for controlling lighting: reduce the illumination levels of all existing sources of light, interrupt illumination by using switches and motion detectors that only illuminate objects when viewers are present, remove or reduce infrared and ultraviolet radiation, and spread out exhibition periods over many years by alternating between exhibiting and storing objects for specified, shorter periods of time.

Note: The development of LED lighting shows promising new possibilities for minimizing the risks of illumination damage without sacrificing sufficient light to fully appreciate the artifact and its colors.

In the Telfair’s Jepson Center for the Arts, architect Moshe Safdie incorporated indirect natural lighting into the galleries that can be closed off to make the space dark at the flip of a switch. In other parts of the building, the light is the art! Sunlight enters the two ends of the building and central staircase creating striped patterns of light which shift and change over the course of the day. Look at the architect’s website or archive to see how his firm’s buildings utilize natural light.
**Temperature:** Temperature is another environmental factor that must be controlled in the museum setting. Changes in temperature cause objects to expand and contract. Even subtle changes in temperature subject these precious objects to expansion and contraction, which might cause the paint on a canvas to loosen and cracks in an ancient ceramic pot to widen or lengthen. Paintings on wooden panels and wooden sculptures are particularly susceptible to damage from temperature fluctuations. Allowed to fluctuate unchecked over time, temperature changes can do significant damage to precious artifacts. Climate control systems are installed in museums with the goal of keeping the temperature as constant as possible, (somewhere around 70 degrees) no matter what the outside conditions might be. Therefore, reliability of these climate control systems is paramount.

**Moisture (Relative Humidity):** Relative humidity within the museum environment is also an important archival issue in regards to the maintain ice of art. Moisture or excess humidity can be as damaging to artifacts as light. Uncontrolled moisture can lead to the formation of molds and mildews, which both stain and eat at surfaces of the artifacts. Temperature and moisture variations work in tandem to create a real menace to preserving museum artifacts.

The Gardner Museum in Boston studied fluctuations within its environment and recorded these fluctuations in relative humidity between 8% and 84% while summer temperatures in the building often reached 90 degrees. Through the years this unstable environment reportedly damaged “lacquered objects, veneer and cane furniture, gilt wood, panel paintings, and enamels. Paint has blistered, leather wall panels have cracked, wrought iron has corroded, and stained glass has been damaged by high heat from the sun. Not even stone has been exempt from the damage with stalactites forming.” Although the problems of the Gardener Museum may represent an extreme case, they still serve to illustrate the potential problems that may occur within the museum walls of a converted historic building.

Within most museums, several protections are in place to ensure against moisture damage to artifacts. Some of the solutions are simple and very low tech while others are more advanced. One of the simplest controls for moisture is used on works of paper. It is the glass and mat under which the paper is displayed. The glass will prevent outside moisture from contacting the delicate surface, but most people believe the mat is only serving as a decorative purpose. In fact, the mat creates an air space, which prevents the glass from making contact with the work of paper. This is necessary because changes in temperature can cause condensation to form on the inside of the glass. If the paper touches the glass, the condensed moisture could transfer from the glass onto the artwork and damage it. Air conditioners and dehumidifiers are high tech solutions to controlling the humidity inside the building. You may see small boxes on the museum walls that have gauges in them. These are most likely monitoring devices used to ensure moisture does not become a problem. Microclimates inside transparent display cases are sometimes used when overall conditions inside a museum are too difficult to control or when different objects react differently to the same environmental conditions. For example, what might be good for one material in a gallery might be damaging to another. One environment cannot meet all needs, therefore smaller, enclosed environments are created for each object which are maintained according to the needs of each.

There are essentially three types of damage caused by improper climate control: mechanical damage (warping, swelling, shrinking and cracking) caused by humidity; fluctuations; biodeterioration caused by insects, mold and mildew; and inherent chemical decay or natural aging which are accelerated by improper balance between temperature and humidity.

**Fire:** While many buildings use sprinkler systems that automatically spray water if fire is detected in a museum building, the sprinkler might do as much damage as the fire. Contemporary museums, including Savannah’s Jepson Center, employ a dry fire extinguisher system throughout the building. Fire retardant materials are used where possible to protect both the artifacts and the visitors to the museum. Fire alarms must be discrete so that they do not attract attention to themselves over the artwork. Some newer fire alarms use optical sensors to catch fires by detecting stray light produced by flames. Thermo alarms react to heat, smoke, or gas levels that exceed a predetermined level.

**Sound:** Perhaps you had not thought about it, but such cavernous spaces as one finds in museums, can create problems with sound. In this case, it may not be such a detriment to the artifacts, but if uncontrolled, noise creates an unpleasant atmosphere which is less appealing for visitors. Architects and engineers try to create a balance in the use of hard materials, which reproduce and echo sound, and softer materials, which dampen and reduce sounds.

**Anti-theft:** The first and most obvious security system, in a museum, is the security guard standing sentry to protect the artwork. New security technologies use small electronic devices, which measure the distance between the artifacts and the viewer. When someone gets too close the device, it activates an alarm.
Moshe Safdie is an accomplished architect who was born in what is now known as Israel and moved to Canada at age 15. He studied architecture at McGill University in Montreal, Quebec, and then worked for Louis I. Kahn for two years in Philadelphia. Safdie’s Habitat 67, a project built for the 1967 World’s Fair, called Expo ’67, in Montreal, was the first major prefabricated housing project ever constructed. Since then he has constructed similar projects in Puerto Rico, Israel, and other countries. In 1970, Safdie began intense involvement with the rebuilding of Jerusalem. During this period, he also became involved in the developing world, working in Senegal, Iran, Singapore, and in the northern Canadian arctic. He was the director of Harvard University’s Urban Design program from 1978-1984. In addition, Safdie’s major cultural and educational commissions have included: the Telfair Museum of Art; the Skirball Museum and Cultural Center in Los Angeles, CA; Exploration Place in Wichita, KS, and the National Gallery of Canada; educational facilities such as Eleanor Roosevelt College at the University of California in San Diego; civic buildings such as the Springfield, MA, Federal Courthouses; and performing arts centers such as the Kansas City, MO, Performing Arts Center.

The mansion in which the Telfair’s fine art collection is housed was designed by English architect William Jay in the neoclassical Regency style. Built 1818-1819 for Alexander Telfair, son of the Revolutionary patriot and Georgia governor Edward Telfair, the mansion was home to the Telfair family until 1875. Mary Telfair, an early patron of the arts, bequeathed her house and its furnishings to the Georgia Historical Society to be opened as a museum. In 1883 the Telfair mansion was enlarged with the addition of the Sculpture Gallery and Rotunda. The formal opening in 1886 of the Telfair Mansion and Art Museum was attended dignitaries, such as Jefferson Davis, former President of the Confederacy. Jay’s classical Regency design for the exterior is punctuated by a rectangular porch surmounted by a semicircular window.
Art and Technology

This lesson for high school students will examine how new developments in science and technology have given artists new ideas to incorporate into their art work as well as the technological innovations to do so.

Materials

Images of: *Puy L’Evec* by Henri Martin, *Brooklyn Bridge in Winter* by Childe Hassam, *Swarm* by Dan Shiffman
Two pieces of thread of different colors
Comics from paper
Popular magazine
Television or computer screen
Fine point markers of red, yellow and blue

Vocabulary

**Architect** – somebody whose job is to design buildings and advise on their construction.

**Architecture** – the art and science of designing and constructing buildings.

**Conservation** – the preservation, management, and care of natural and cultural resources.

**Engineering** – the application of science in the design, planning, construction, and maintenance of buildings, machines, and other manufactured things.

**Infrared Light** – the portion of the invisible electromagnetic spectrum consisting of radiation with wavelengths in the range 750 nm to 1 mm, between light and radio waves.

**Tension** – a force that pulls or stretches something.

**Ultraviolet Light** – relating to or producing electromagnetic radiation of wavelengths from about 5 to about 400 nanometers, beyond the violet end of the visible light spectrum.

Objectives

Speculate on how life would be different if selected scientific discoveries and inventions had not been developed.

Participate in a lecture or discussion about how Chevreul discovered optical color mixing and its impact on the Impressionist movement and digital art.

Examine the impact that optical color mixing had on other widely used technologies of today.
Throughout human history there have been numerous scientific discoveries and technological advancements that altered human lives and reshaped the direction of civilization. Imagine how our lives would be different if the wheel had not been developed. Ask students to speculate on how their lives and the world around them might be different if the following had not been discovered or invented:

- forging
- welding and casting molten metals
- airplane
- atomic bomb
- polio vaccine
- aspirin
- automobile
- computer
- printing press

Ask students to suggest other scientific discoveries/inventions that have had monumental impact upon civilization and speculate on how the world would be different as a result.

Suggestion: Such discoveries and innovations have significantly impacted almost all fields of human endeavor. Art is no exception. Ask students, “What connections exist between two threads of different color, the Sunday funny papers, your favorite magazine, your television/computer screens and this Impressionistic painting by Henri Martin?”

They are all connected to a scientific discovery called “optical color mixing,” first observed by a French chemist working in the textile industry of early nineteenth century Europe. As you will soon learn, this discovery had a profound impact on science and technology, which in turn, forever changed both the direction and nature of art.

Nineteenth century art was concerned with both the explanation of nature and the manner in which we perceive it through physical vision. This meant understanding what it was that constituted color as well as the structure of light and the physiology of human vision. It is no surprise to discover that research in the area of optics was as important to the history of art as it was to the history of science. Many painters of the period were concerned with contemporary optical theories and the nature of vision. These concerns found their way into the art made by these individuals.

Eugene Chevreul, was a chemist appointed to be the Director of the Dyeing Department at the Gobelin tapestry factory. He was hired to solve what was thought to be a chemical problem with dyes, which were not producing bright enough colors. It was there he discovered that two tapestry threads of completely different colors seem to have a single color when seen together at a distance. In other words, if a red thread and a blue thread were placed next to one another the human eye and brain perceive them as being mixed to create the color violet. The resulting “optical mixture” is brighter than if the blue and red were mixed directly together. This discovery had a very practical application toward making more beautifully colored cloth products for sale. As usual, however, even simple scientific discoveries lead to unexpected applications and the cascading effect of this discovery and its offshoots has had a major impact on all of our lives. In 1839, Chevreul authored a book called, The Principles of Harmony and Contrast of Colors and Their Application to the Arts. The primary thesis of Chevreul’s book was the idea that colors placed next to one another influence and modify each other. He also observed that any color seen alone appears to be surrounded by a halo of its opposite or complementary color. Chevreul’s discoveries about the optics of color soon found their way into the works of painters such as the Impressionists and later the Pointalist paintings of Georges Seurat.

Chevreul’s theory of optical mixing led the Impressionists to mingle shadows with colors that were complementary to the object casting the shadow. It also led them to apply their paint in small dashes and dots of color placed next to one another rather than intermingling the color directly. The eye and brain then mixed and fused these colors together to create the illusion of colors much brighter than those achieved by direct mixing. Even the printer on your computer uses optical color mixing to print hardcopies of your screen images. In fact, your computer printer uses exactly the same four colors as the newspaper and magazine industry to produce the color images you see. Now the digital images we see on our computer screens, televisions, and the interactive digital work of Dan Shiffman seen in the interactive gallery, have further extended these ideas.

Suggestion: Look carefully at Henri Martin’s work up close. Notice the separate dots and dashes of color. Now slowly back away and notice how your eyes no longer see individual marks of color, but see the colors as being mixed and blended together. Check the shadow forms to see if you can find complementary colors mixed into them. Now examine the painting, Brooklyn Bridge by Childe Hassam. In what ways is Hassam’s painting similar to the painting by Martin?

Test examples of Chevruel’s discovery by doing one of the following:

Using colored fine point markers on white paper, make many closely placed dots of red ink intermingled with many closely
place dots of blue ink. Up close you can see the separate dots of red and blue, but as you move farther from the paper, the
dots seem to fuse together and create a continuous tone of violet. In reality, the dots do not really fuse together, they just
seem to do so in your brain.

Run a test print on your color printer. Notice how it prints a dot pattern that when applied closely enough becomes a solid color.

**Assessment**

View any image on a television-like screen; examine the color images printed in any book or look at an Impressionist painting: remember that it was the discovery made by a French chemist that made the basic science and technology behind these things possible! Other scientific discoveries and new inventions have had a significant effect on the direction of art at various times throughout history. You might find it interesting to search for these connections between science/technologies and art.

**Extending the Lesson**

Research the relationship between the following scientific/technological advancements and artistic developments: Einstein’s Theory of General Relativity and the art produced by the Cubists of the early 20th century; Leonardo De Vinci’s studies of the anatomy of cadavers and medically based anatomy; Psychological theories of Sigmund Freud and the development of Surrealism, Pittura Metaphysical, Dadaism; the simple development of tin tubes of paint on the art of the Impressionists; and the impact of the development of photography on Impressionism.

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**ABOUT the ARTIST**

Henri Martin moved to Paris in 1879 from his hometown of Toulouse, France. His early works were devoted to poetic and allegorical themes reflecting his training at the Ecole des Beaux-Arts in Toulouse. After winning the Grand Prix he moved to Paris in 1879 to study at the Ecole des Beaux-Arts under Jean-Paul Laurens. Martin exhibited at the Salon des Artistes Francais in Paris from 1880, winning a medal at the 1883 Salon. A visit to Italy in 1885 brought a new lyrical freedom to his work. On Henri Martin’s return to Paris in 1889, he began experimenting with pointillism and turned almost exclusively to landscape painting, specializing in the beautiful rolling countryside around his house. A shy, quiet character, Henri Martin remained independent, refusing contracts from many successful Parisian dealers. He found he no longer enjoyed living in Paris, and by the turn of the century painted almost exclusively in the countryside around his house, Marquayrol near Labastide du Vert in the Lot Valley. His painting changed very little from this time on, he had found a style with which he was comfortable and these canvases, often large, colorful and filled with light, are widely considered to be amongst his most successful.

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Daniel Shiffman works as a researcher, teacher, and sometimes artist at the Interactive Telecommunications Program at NYU’s Tisch School for the Arts. His work has been exhibited at the Jepson Center for the Arts, the New Museum of Contemporary Art, the Savannah College of Art & Design, the Art Directors Club of New York, Galapagos Art Space, the Hillwood Art Museum, and Tisch School for the Arts. Originally from Baltimore, Daniel received a BA in Mathematics and Philosophy from Yale University and a Master’s Degree from the Interactive Telecommunications Program. His piece **Swarm** (at right) is an interactive video installation that transforms live video into a moving swarm of painterly imagery that is continuously projected on plasma screens. It allows the viewer to become part of the art.
This lesson will examine the science and technology behind early metal working efforts in bronze. Students will speculate on how our culture might be different had such technologies never developed. Students will observe a simple mould to cast procedure and compare it to early methods. Time: 1 hour.

Materials

Images of: William Zorach, Mother and Child and Japanese Bronze Stirrups
Plaster
Rolling pin
Mixing bowl
Water
Large spoon or spatula
Coffee scoop or equivalent size
Wax or linseed oil (optional)

Vocabulary

Alloy – a mixture of two or more metals, or a metal and a nonmetallic material.

Bronze – a hard alloy of copper and tin, sometimes containing small amounts of other metals.

Casting – the making of a solid object by pouring molten metal, glass, or plastic into a mold and allowing it to cool.

Forging – a workshop where metal is heated and shaped into objects by hammering.

Kiln – an oven or furnace used for firing clay for pottery, bricks, and drying materials (timber).

Metallurgist – the study of the structure and properties of metals, their extraction from the ground, and the procedures for refining, alloying, and making things from them.

Objective

Speculate on how our lives and everyday implements would change if metal working technologies had never been developed.

Become familiar with the history and basic process of lost wax casting to form bronze objects.

Observe a demonstration of plaster casting to illustrate how a negative mold can be used to create a positive cast object.
Development

Bronze Casting Technology: History and Process

Brainstorming: Ask students to help make a list of everyday tools and implements that are completely or partially made of metal. Now ask students to imagine that metal-working technologies had never been developed. These objects and metal parts would be made of stone, bone or some other naturally occurring hard material rather than metal. Of what materials would cars and airplanes be made? What about smaller objects like nails, bolts, and screws? How many products use these kinds of parts, bits, and fasteners? What could we replace them with that would be as light and strong? How would the absence of these simple metal devices and pieces change our lives?

Because tools, household objects and artwork made of metal are so plentiful today, it is hard for us to imagine a time when such things did not exist or were fashioned from some less suitable material. Until the development of bronze casting, metal working technology was based on the forging and hammering of iron. Before that, tools were made of the previously mentioned stone, bone or some other naturally-occurring hard material. Imagine how even our simplest tools would change if they could not capitalize on the strength of metal and the precision with which metal can be formed.

William Zorach’s sculpture, *Mother and Child*, is an example of bronze casting. Although it was fashioned in the 20th century, it is the heir to a long history of metalworking technologies that predate the birth of Christ by approximately 3000 years. The development of bronze casting by Mesopotamian metallurgists was a major technological breakthrough for humankind. Over time, its use spread throughout the Mediterranean region. Early examples of bronze casting were found in the tombs of Sumerian kings. As the Mesopotamians carried on commercial trade with Egypt, found evidence indicates that the new casting process found its way into Egyptian culture around 1500 b.c.. By the sixth century b.c., Greeks and Romans were also utilizing the advantages of bronze-casting.

Zorach’s, *Mother and Child* exemplifies the contemporary usage of molding and casting. Though unique in its material, the sculpture does not actually exist as a one of a kind! Zorach made multiples of the work, which are housed in other museums in addition to the Telfair. These days, artists take advantage of the ancient technique by casting numerous objects to create a variety of artisan, fine, industrial, design, and craft artwork. Jewelers, sculptors, product-designers, architects and the like, all use variations of bronze casting to bring their creative ideas to fruition!

Suggestion: Students can further explore the development and evolution of bronze casting by locating these cultures on a world map.

What is Bronze? The Mesopotamians discovered that by mixing a small amount of tin ore with copper ore, they could create a harder metal with a lower melting point that was also more fluid in its molten state. Each of these three characteristics made bronze easier to fashion and a more durable material for creating tools and implements of daily life. Because bronze is a metal mixed from different ores, it is called an alloy.

How is Bronze Cast to Make Objects

In the sixth century b.c., the ancient Greeks used a “lost wax direct method” of casting to create small objects and statues. More simply, a mold was shaped by creating the basic form of the object which was to be cast in a malleable material like clay or wax. Small funnel and pipe-like forms called sprues and vents were then attached to the basic form. The vents provided pathways for melted wax and hot gases to escape while the sprues provided a pathway for the molten metal to flow into the mold.

Once the forms were created and the sprues and vents attached, a very thin layer of liquid clay was brushed over them so that the liquid clay could flow into the small bumps and hollows of the mold to record its details. A heavier supporting layer of clay was then applied to the entire form. The entire whole form was then placed in an oven called a kiln and baked slowly. As the heat of kiln increased, the wax would melt and flow out of the vents leaving a hollow space inside the mold. The temperature of the oven was then raised to bake the remaining clay so that the resulting hard shell maintained all the surface details of its inner surface. The molten bronze was then carefully poured into the mold through a sprue which filled the hollow space once occupied by the wax. The vents prevented air or gases from being trapped into bubbles, preventing the molten bronze from flowing into all the details of the mold. After the mold had cooled for several days, the glass-like clay layers were broken away to reveal the cast object. The outside of the bronze objects was then smoothed, cleaned and treated with a final finish. The downside to this particular method of casting was that the mold had to be broken, never to be used again. The entire process had to be repeated each time a new object needed to be created.

These older techniques have evolved and matured into contemporary methods of casting. The new processes are more
suitable for making multiples: more than one of the exact same object. Sculptors can now make molds of nearly any object, cast them in a variety of materials, and keep the original mold so that more than one of the same sculpture can be created. Jewelers and commercial/industrial designers to name a few, also take advantage of the historically revised casting methods to make multiple versions (or editions) of one object, or even several objects! Can you name some everyday objects that require a mold and cast method for production? Imagine how painstaking the process of making multiples for high production, if the process of casting had not been improved to accommodate the demand

Activity

Create a simple mold and cast

Using clay, roll out a slab approximately two inches thick and about 10 inches square. Lay a palm-up open hand (or simple object) into the slab. Gently press the palm (or object) until an impression is made in the clay. You have just created a very simple version of the clay mold used to cast metal. The hollow area created by the back of the hand pressed into the clay (or the object) is called a negative. Now, using the spatula spread the plaster mixture (1 scoop [coffee scoop] water, 2 scoops plaster) into the impression. Let the plaster set until it hardens (usually an hour). Remove the clay around the cast plaster after the plaster is dried. Option to paint the hand imprint or object with acrylic paints. You can seal the plaster cast with wax or linseed oil if desired.

The process demonstrated above does not exactly replicate the lost wax process; but serves to illustrate how negatives molds are formed first, in order to produce positive cast forms. To more completely approximate the lost wax method, imagine that a wax replica (cast) of your hand has been submerged in liquid clay, which then hardens as the water evaporates from the clay. You could carefully drill some vent holes through the clay into the wax. By placing this clay-encased wax hand into the heated kiln, the heat would eventually melt and evaporate the wax leaving a hollow clay form shaped exactly like the wax hand. By drilling new holes through the hardened clay, molten metal could be poured into the hollow form. Original holes would permit the hot gases to escape as the molten metal is poured, ensuring that all areas of the mould are filled evenly. Then, like the early metal smiths, one could carefully shatter the hardened clay to reveal the solid metal form of the wax hand that was originally contained inside.

Assessment

To what extent did students imaginatively and reasonably speculate on how our lives and everyday implements would change if metal working technologies had never been developed?

To what extent did students become familiar with the history and basic process of lost wax casting to form bronze objects?

To what extent did students observe the demonstration of plaster casting to understand how it illustrates the manner in which a negative mold can be used to create a positive cast object?

Extending the Lesson

Research the differences between Egyptian and Greek-Roman bronze foundries. Investigate how modern technologies are used to produce bronze casting today. Research the degree to which the metal working technologies, used by Zorach, have advanced beyond those used by the Greeks and Romans. Then compare the technologies Zorach used with those available today. Compare the methods used by the Japanese to produce the bronze stirrups to those methods used by the Egyptians, Greeks, and Romans.

References

• Telfair Museum of Art, Collection Highlights, Telfair Museum of Art, 2005

Webliography

• www.borschimarts.com/lessons/casting.htm
• www.unc.edu/courses/rometech/public/content/arts_and_crafts/Sara_Malone/BRONZE_3.html
• www.modernsculpture.com/bronze.htm
• http://library.thinkquest.org/23492/data/bronze.htm?tqskip=1&tqtime=0318
In the Eye of the Beholder

This is a lesson for high school students. Both the camera and the human eye can “see”, but they see quite differently. They share a few minor characteristics, however they are vastly different in most other ways. As amazing as the camera is, it is very crude compared to the wonder of human sight. This lesson examines how the eye and camera are similar, yet quite different.

Materials

Image of: New York by Helen Levitt

Vocabulary

Optical color mixing – the blending in the eye of two or more separate colors to create the illusion of a new color.

Complementary color - colors found opposite one another on the color wheel. Three basic pairs of complementary colors are: red and green, blue and orange, and yellow and violet.

Impressionism – Art movement beginning in France in the 1870s named after Claude Monet’s painting Impression Sunrise. Impressionism came to encompass paintings in which artists attempted to capture fleeting qualities of color, light or movement. Subject matter was drawn from nature or modern life.

Objectives

Examine the superficial similarities between the eye and the camera.

Examine the major differences between the eye and the camera and how human vision functions.

Students will compare the effectiveness of binocular vision compared to monocular vision in perceiving depth and space.

Development

Look at the photograph of New York, by Helen Levitt. We sometimes compare the human brain to the computer and vice versa. Perhaps, that is because we admire the power, efficiency, speed, and accuracy associated with computers. Sometimes, we also try to compare the eye and human vision with the photo-technologies of various types of cameras. Once again, we may do so because we admire the objectivity, clarity and attention to detail that contemporary cameras provide. In fact, many believe the camera cannot lie and that “seeing is believing," particularly if it is captured in a photo. Times have changed and the development of digital technologies and powerful image manipulation programs mean that we can no longer believe everything we see, even if presented with photographic evidence.

There are many important ways in which the eye and camera are different from one another. First, let’s examine their su-
perficial similarities which provide the basis for the mistaken assumption behind the comparison. Then we will explore the differences that make the eye and human vision so miraculous.

Superficial similarities of the eye and camera
The camera has an aperture, which is an opening through which light can enter. The aperture is covered by a lens, which can make the aperture opening bigger or smaller to admit more light or less light. The iris is a hole in the pupil of the eye, which provides a similar function. The camera also provides a surface, the film or digital media, upon which images are brought into focus. This function is served by the retina or back inside surface of your eye. That’s it! The camera and your eye really share nothing else in common. In fact, they are substantially different. You will see that as marvelous as the camera is, it lacks the amazing complexity when compared to the wonders of the eye and the manner in which our vision works.

Differences between the eye and camera
Jack F. Meyers, author of The Language of Visual Art: Perception as a Basis for Design, suggests the human eye is different from the camera in a number of substantial ways.

First, our eye has a flexible lens like a bubble that can change focus by changing its form from flatter to rounder. The camera, by comparison, moves the flat surface of the lens in and out to focus.

Light passes through the transparent shell of the eye called the cornea, then passes through the pupil and focuses on a thin tissue at the back of the eye called the retina. The retina of our eye is like a binary data bit receiver with switches that chemically turn on or off when exposed to certain types of light. The retina is covered by photoreceptor cells called rods and cones. Light triggers a chemical response that fires a tiny electrical charge in the rods or cones exposed to the light. This information is then transmitted to the brain via the optic nerve. Rods typically do not respond to color, but rather to dim light, which has little color. The cones respond to brighter light and color.

The eye sees points rather than planes. A stationary camera lens focuses an image across the entire flat surface or plane of the film. In contrast, our eye focuses on points rather than an entire plane. We can test this by staring intently at an object about an arms length away. Notice how things outside the center of your vision seem blurred. Your eyes vibrate and your head moves to pick up information just beyond your center of vision. We then rely on the brain to put all the small pieces of information together in a way we can understand.

The eye is constantly moving up, down and side to side in its socket. The head also is constantly moving, though we are unaware of either movement. Each eye also vibrates very rapidly so that information shifts rapidly from one photoreceptor to another. In a sense, this permits your vision to constantly refresh itself rather than exhausting the rods and cones in your retina.

Peripheral Vision is another attribute that cameras do not possess. Because the retina is spherical, like the inside of a tennis ball, light can enter through the pupil and strike the inside curves of the eye extending from one side to the other in a sweep that exceeds 180 degrees. This allows us to see off to our sides without turning our heads or moving our eyes in their sockets from one side to the other.

Binocular Vision permits us to see objects up close and gives us depth perception. Binocular vision also aids in comprehending the three dimensional quality of objects when slightly different images seen by each eye overlap and are translated by our brain to create a sense of depth, space and form.

Suggestion: You can test the degree to which binocular vision is superior to monocular vision in producing depth perception by simply closing one eye tightly. Ask a friend to hold a pencil vertically out in front of you with the point up. Now, keep one eye closed, stretch out your arm toward the pencil and point one finger straight down. Be sure your finger is vertical, not horizontal. Now try to set that finger down on top of the pencil point. Most people will miss it slightly. You can also test this by having someone toss you a beanbag, while you try to catch it, first, with both eyes open and then with one eye tightly closed.

Our vision is called a psychophysical response because it combines the physical phenomenon of light and the physiological integration of the eye and brain. Though it is the eye that receives the input of light necessary for sight, it is the brain that synthesizes all of the input provided by the eye and translates it into what we call vision. In the photographs, originally examined, although the camera sees the scenes depicted, it is only the photographer that possesses the gift of vision, both in the physical and poetic sense.
REFERENCES

• Telfair Museum of Art, Collection Highlights, Telfair Museum of Art, 2005.
• Levitt, Helen (forward by Adam Gopnik) Here and There: Photographs by Helen Levitt, (PowerHouse Books, 2004).

WEBLIOGRAPHY

• www.artcyclopedia.com/artists/levitt_helen.html
• www.npr.org/programs/atc/features/2002/jan/levitt/02/07.levitt.html

ABOUT THE ARTIST

Helen Levitt is a well-known American photographer born in Brooklyn, New York. For seventy years Levitt took photographs of the city dwellers in New York’s working class neighborhoods. She photographed janitors, children, pushcart vendors, subway riders, and dogs. Primarily a self-taught artist, she is associated with photographers Henri Cartier-Bresson and Walker Evans, whom she studied with during 1938 and 1939. In 1937, Levitt became intrigued with the chalk drawings that were part of the New York’s childrens street culture of the time. She purchased a Leica camera and began to photograph these works as well as the children who made them. The resulting photographs appeared, to great acclaim, in 1987 as In The Street: chalk drawings and messages, New York City 1938–1948. Called one of the 100 best photo-books, first editions are now highly collectable. In 1943, Edward Steichen at the Museum of Modern Art curated her first solo exhibition, after which she began to find presswork as a documentary photographer. In the early 1950s she briefly became a film director, working with James Agee. In 1959 and 1960, she received Guggenheim Foundation grants to take color photographs on New York’s streets. Much of this work was stolen in a burglary. In 1976, she was a Photography Fellow of the National Endowment for the Arts. She has remained active as a photographer for nearly 70 years and still lives in New York City.

ABOUT THE ARTWORK

Levitt’s photographs celebrate the everyday life of New York neighborhood activity. In this work, she captures a group of children as they are mesmerized by the bubbles floating in the air. The artist's black and white photographs are almost taken outside, shot at a medium distance from the subjects. Levitt doesn’t manipulate the images or include herself in the picture, but rather removes evidence of herself as photographer so we can enjoy a new moment we wouldn't have otherwise. In all her works, Levitt captures the direct photographic record of ordinary events that reveal the mystery and fantasy within daily life.
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