

Art and Atmosphere: An Examination of Meteorology through Visual Culture

Rationale

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Introduction

Art & Atmosphere: An Examination of Meteorology through Visual Culture, an interdisciplinary high school curriculum, incorporates art in STEM to foster human development and create students who have the sophisticated ability to solve complex problems (Zalazick, 2015). Meteorology consists two main components: weather, the spontaneity of atmospheric conditions, and climate, the long-term influence of atmospheric conditions. Throughout this curriculum, students investigate how weather and visual media, as well as climate, culture, and art are inherently connected and have the power to be vessels for advocacy. Studying the relationship between meteorology and art will help students understand how to use art as a communication tool, visualize intangible issues, and increase public awareness.

Art & Atmosphere: An Examination of Meteorology through Visual Culture is a planned curriculum that emphasizes student learning outcomes. Through the spiral curriculum model, a sequence of skills are built by revisiting concepts with increasing complexity in the interdisciplinary content of art and meteorology. Using creative, logical, and insightful exploration, concepts and skills will be rehearsed in each unit to create memorable knowledge used for establishing new connections. These new connections will aid in the final unit of this curriculum which embodies the lattice method for student-driven research and idea formation. On completion of this curriculum, students will be able to advocate for themselves and others.

This interdisciplinary curriculum requires the metacognitive thinking necessary for multimodal learning, fosters divergent thinking, and motivates students to become life-long learners. Constant exposure to changing conditions of weather and climate as well as the bombardment of visual imagery requires students to understand how to navigate these large-scale and fast-paced changes, which have long-term effects. This curriculum considers the diverse

abilities and individual interests of students by using multimodal learning, which parallels the physical experiences inherent in meteorology (Kozhevnikov et al., 2005). Blending meteorology, a theme reliant on spatial and schematic thinking, with art, a theme dependent on visual and pictorial processing, enhances the ability to synthesize knowledge and create associations (Twissell, 2014). Additionally, integrating gestural, aural, and linguistic modes of thinking encourages strong knowledge formation and communication. Utilizing multimodal learning inherently promotes divergent thinking where students can create various solutions to a problem and select the best one. In this way, students learn how to learn for themselves while being critical thinkers. *Art and Atmosphere: An Examination of Meteorology through Visual Culture* integrates art and meteorology to present a deeper connection with our daily visual experiences that scaffolds high school students to develop their metacognitive ability.

Incorporating visual culture into students' daily learning helps them develop a strong understanding of how the world they live in is influenced by the voices of many artists and a way of contributing to the conversation. In the digital age, we connect to various cultures through expansive technological platforms, while still connecting to cultures through traditional visual cultural like fashion, billboards, and tattoos. In order for people to recognize their innate interdependence, people need to critically examine various cultural contexts emotionally and cognitively through sensory inputs and outputs, including visual imagery (Taylor et al., 2006). Incorporating visual culture provides places for students to make connections. Freedman (2003) exemplifies the value of visual culture in curricula, stating that "the more places associations can be established, the more learning takes place" (p. 67). Through expansive opportunities for learning, students will recognize that people of various cultures have stories to tell that can

change the way they view the world. Students participate in these stimulating cultural conversations and thus are empowered to advocate for themselves and their stories.

The conceptual framework on the front cover of this curriculum encompasses art and atmosphere by including graphic images and symbols of weather that influence long-term climate as well as images of fine art and visual culture. The composition mimics the energy and movement found in the atmosphere. By using wind symbols, which move the viewer's eye towards the title of the curriculum, the viewer can begin to understand how symbols in art are intertwined with communication in meteorology. Using an isotherm map to fill in the title represents the diverse changes of weather as well as the long-lasting influences of climate on communities. The circles that contain images of the fine art and visual culture critiqued in this curriculum function as energy molecules representing the fusion of art and atmosphere. Art and meteorology are valuable to human understanding, and the raindrops dripping off the energy molecules symbolize the ever-evolving conditions of the atmosphere that shape people's way of living among various cultures through a visual medium, inextricably linking the two disciplines.

Aims and Goals

In this curriculum, *Art & Atmosphere: An Examination of Meteorology through Visual Culture*, students will achieve three aims and three goals, which will be clearly communicated to them to aid in their success. When assessing students, these aims and goals will help capture the overarching skills and concepts these students have mastered throughout the curriculum. The aims focus on the societal concepts developed by students through this curriculum, while the goals narrow the focus to the interdisciplinary nature of art and meteorology and allow students to achieve the corresponding aims respectively.

The aims of the curriculum are:

Aim #1: To foster divergent thinking through multimodal experiences.

Aim #2: To understand mutually dependent relationships among cultures.

Aim #3: To encourage personal empowerment for activism.

The corresponding goals to the aims listed above are:

Goal #1: Generate alternative methods of using artistic materials across contexts.

Goal #2: Develop multicultural sensitivity about the intimate relationship between climate and culture through artistic exploration.

Goal #3: Share self-driven discoveries about people and meteorological events to create visual narratives through activism.

The aims and goals in this curriculum are linked to the Illinois State Standards to combine the quality of expectations from society, educational politics, and the content areas. Many of the Visual Arts State Standards are addressed in this curriculum to assess the degree to which students can create, present, respond, and connect to visual art. Unit 1 establishes a foundation for each aim, goal, and standard, then reinforces it through Unit 2 and 3.

The first aim, *to foster divergent thinking through multimodal experiences*, will aid in the student's exploration of various methods of learning to promote metacognitive thinking for maximizing diverse and imaginative methods to solve problems. Throughout each unit, students will use their visual journals to record, research, experiment, and plan to visually communicate their ideas about a topic that interests them. Application of the visual journal connects to State Standard **VA:Cr 2.1.III**, which states that students can “experiment, plan, and make multiple

works of art and design that explore a personally meaningful theme, idea, or concept” (Visual Arts Standards, 2016). Fostering divergent thinking through art will encourage students to consider alternative perspectives and support the need for critical-analytical reasoning (Chin, 2013).

The second aim, *to understand mutually dependent relationships among cultures*, is reinforced by Goal 2 where students will *develop multicultural sensitivity about the intimate relationship between climate and culture through artistic exploration*. Unit 2 emphasizes the complexity of the inherent reciprocal relationship of climate and culture. Throughout this unit, students will “compare uses of art in a variety of societal, cultural, and historical contexts and make connections to uses of art in contemporary and local contexts” (Visual Arts Standards, 2016) as stated in State Standard **VA:Cn 11.1.II**. Imaginatively exploring visual qualities across cultures allows students to have an “ethical relationship to the physical world” (Lakeoff & Johnson, 1999, p. 566). Introducing a holistic approach in Unit 2 encourages a post-modern education where students continue to discover their personal identity and the identities of others for an understanding of cultural community (Campbell, 2011).

Lastly, the third aim, *to encourage personal empowerment for activism*, increases in intensity through Unit 1 and Unit 2 so that by Unit 3 students are fully empowered to share stories visually as a form of activism. This connects to Goal 3 where students *share self-driven discoveries about people and meteorological events to create visual narratives through activism*. Unit 3 is constructed with a lattice method to advance intrinsic and ambitious study by maintaining a diverse and flexible approach. Students will conduct a visual study where they “hypothesize to generate plans for ideas and directions for creating art and design that can affect social change” (Visual Arts Standards, 2016), which correlates to Visual Art State Standard

VA:Cr 1.1.III. In this unit, students work collaboratively and become democratic participants in society where they demand change to improve communities (Campana, 2011).

Corresponding aims and goals that relate to the State Standards aid in proper assessment for social, content-based, and political-educational needs. Building the objectives throughout the lessons embedded in the curriculum on the aims, goals, and State Standards will guide the teacher implementing the curriculum. This allows the teacher to help their students achieve mastery in personal, cultural, and community development.

Importance of Theme

Many historical meteorology themed artworks capture the emotion and turmoil associated with severe weather and natural disasters. For example, *Allerheiligen Moser* (1570) (see Figure 1) depicts the All Saints Flood, which occurred in November of that year and affected northern Europe from Flanders (BE) to Groningen (NL) and parts of northwest Germany. Given the severity of the flood, an estimated 20,000 people were left dead (*Gallery*, 2018). This woodblock print does not simply capture observations of the scenery, but documents the past through visual narrative and provides data about the incident that occurred.



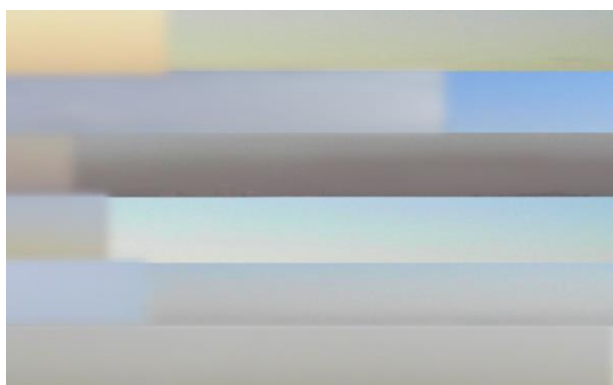
(Figure 1). Adapted from “Gallery (Weather in Art/Media)”, World Meteorological Organization. Copyright 2008 by World Meteorological Organization.

Since humans started living on Earth, meteorology and art have affected the ways that we survive. We use art to communicate meteorological events and record hazardous disasters. As technology and design have advanced, our relationship with climate and weather has become less prevalent. People's connection to climate has been desensitized due to controlled indoor systems. Many people live in homes with moderated climates for ideal living conditions and commute in temperature-controlled vehicles (Knebusch, 2008). If we redevelop our relationship with climate since a lack thereof has caused ignorance about severe changes in the global climate, we can create a healthy way of living through the world. By exploring the media, techniques, and tools used by artists and meteorologists through historical and societal lenses, we can make our understanding between weather and climate stronger.

Inherent connections exist between the effects of meteorology and cultures' artistic creations. Kaolinite, the essential mineral in Kaolin to create porcelain, has shaped the way cultures make ceramic artwork. For example, "Kaolinite is formed by weathering or hydrothermal alteration of aluminosilicate minerals. Thus, rocks rich in feldspar commonly weather to kaolinite. In order to form, ions like Na, K, Ca, Mg, and Fe must first be leached away by the weathering or alteration process" (Nelson, 2014). Kaolin clay was first used in China to create ceramics during the Tang dynasty (618–907), which historically elevated porcelain in art for Chinese culture (Song, 2018). Additionally, in the ceramic artmaking process, artists must account for changes in humidity to manage the clay's drying time in order to not damage the piece. The short-term and long-term effects of meteorology through weather and climate on art expresses the innate affinity of meteorology and art.

As art can rely on meteorology for creative endeavors, meteorology relies on art for clear, yet imaginative communication. Randerson (2015) claims that the art of storytelling and

visualization of data increases the magnitude of statistics in her collaborative art piece titled *Neighborhood Air* (2012; see Figure 2). In this work, meteorologists use sensors to detect the air quality in a local community, Ackland City, Australia, and artists visually express the severity of the weather on a web-based platform that is continuously updated with the new visual data. She states that “transcending the distinction between the social and scientific realms, the online interface pairs numerical information with community stories recorded in online social forums” (p. 22-23). Through modern advancements in art, technology, and meteorology, personal artistic creations influenced by research can communicate activist ideas in democratic society.



(Figure 2). Adapted from “Weather as Medium: Toward a Meteorological Art”, by J. Randerson, ResearchGate. Copyright 2015 by Leonardo.

Examining connections between art and meteorology promote a critical way of thinking about the world through historical and contemporary perspectives. Not only does meteorology in traditional fine art act as an artifact that expresses the emotions of those involved in natural disasters, but meteorology influences art which is reflected in cultures. Additionally, artists can convey ideas about meteorology using collaborative methods and an array of tools. Art can be a vessel to promote activism about the distanced relationship humans have with weather and climate as a means to reconnect people with the world. Meteorology is an overlooked topic of discussion that can resurface as a predominate aspect of human life with the power of visual art.

Course Description

Art & Atmosphere: An Examination of Meteorology through Visual Culture is a planned interdisciplinary curriculum that incorporates three twenty-day units for a 12-week course. Throughout each unit, art and meteorology content are examined with transparency and conscious and intentional questioning to help students arrive to new knowledge. The scope and sequence demonstrate the advancement of student skill throughout each unit in artistic medium, inquiry, imagination, associated meanings, social critique, as well as temporal and environmental flux. The classroom routine of daily mindful reflection helps keep students focused and stimulate creative thinking. Additionally, American Sign Language is integrated into classroom activities as a form inclusion and promotion of cultural diversity.

Unit 1, *The Visual Culture of Weather*, introduces the interconnectedness of media and weather for creating conceptual visual artworks using a spiral model. This unit is comprised of three lessons that build a foundation through multimodal learning and divergent thinking with the spiral model. *Symbolizing Systems* serves as a preface to how symbols of weather are used for classification and weather mapping, which can be applied to personal interests. Next, students will explore how chemical photography processes are influenced by light from the sun as they create abstract, emotional patterns on muslin fabric with embroidery that convey a moment in their life that makes them happy in *Capturing Sunny Moments*. Lastly, students will explore the necessity of computer programming in the field of meteorology as they make digital interactive generative art using p5.js in *Programming Mood and Movement*. Students will envision multiple ways to visually convey their ideas in each lesson using media in meteorology to establish interdisciplinary connections for insightful problem solving.

Unit 2, *The Relationship among Art, Climate, and Culture*, expands on the relationship of art and meteorology through a guided inquiry of climate and culture with artistic research and exploration. In Lesson 1, *Climate Cultural Clothing*, students will investigate the influence of climate on cultural clothing and create a montage narrative with texture rubbings from fabrics worn in a specific culture. In *Fantasy Land Architecture*, students will examine how climate and severe weather inform architecture types in various regions and will paint a home designed for optimal living in their fantasy land using one-point perspective and thermochromic paint on fabric. Lastly, in *Advocating for Agriculture*, students will learn that the agriculture industry is influenced by climate and will research the social and political turmoil that affect farmers. Students will select a specific story that interests them and create a clay bowl to encompass the trouble of modern farmers to share in the community with the Empty Bowls Project. Each lesson builds in skill to advance students' abilities to visually express their personal understanding of multicultural sensitivity.

Unit 3, *Restoration after Weather Disasters through Art*, is a student-driven unit that uses the lattice model to encourage students to artistically investigate severe weather and natural disasters in communities and visually communicate their discoveries. During this unit, students will visit a local community that has been affected by a natural disaster. They will interview community members and others who were connected to the incident through rescue teams, fundraising and volunteering while accounting for diversity among these groups as well as research the severe weather disaster they are investigating. Then students will commemorate those in the community by creating a flag from fabric of the victims as a symbolic visual representation of unity. Through student lead creation, the ability to create and digitally market a reveal event for the flag installation, is reflected. The reveal will include a sale component where

small ceramic sculptures with textures of found objects in the community are sold and the proceeds help restore the community. With a broad approach, students are encouraged to consider the possibilities to visualize community restoration and advocate for proactive preparation of severe weather.

Developmental Level

As students move from early to late adolescence in high school, they use social comparison to evaluate themselves as a way to construct their identity with increased complexity (Meece & Daniels, 2008). Students often view their identity in relation to their peers' achievements and social values. Exposing students to a variety of perspectives through visual culture and multiculturalism increases community engagement to showcase the value of diversity in society. Celebrating diversity can promote individualism as students begin to make "higher-order abstractions that reflect personal beliefs, values, and moral standards" (p. 359). Students need to discover themselves, understand their relationships with others, and learn the value of making ethical choices to respect themselves and others.

Students explore the multiple factors that influence their experiences that ultimately form their identity through artistic exploration. In reference to Bronfenbrenner's (1979) bioecological model of development (as cited in Gauvain & Cole, 1997), interrelationships among various social systems influence the characteristics of developing students with their environment over time. For example, students analyze their immediate environment, such as their family, school, and peers in the microsystem and understand how these influence their overarching values and beliefs in the macrosystem. Development is not a linear process, but a fluctuation of experiences in various areas of a student's life (Meece & Daniels, 2008). By addressing individual identity in Unit 1 and expanding to the macrosystem by Unit 3, students will understand how each system

affects each other in their own development for a better understanding of themselves. The spiral curriculum model helps students transition from identity development to their active role in society while reinforcing the value of their identity in society. This is especially important for high school adolescents as they begin to think complexly about their relationships involved in their identity construction (Erikson, 1968).

As students experiment with artistic media, use collaborative research, and engage in communities, they will become “open to their experiences and trust their inner urges and intuitions” (Mitterer & Coon, 2014, p. 404). This supports Rodgers self-theory where the fully functioning person achieves congruency with their ideal self, self-image, and true self to live in harmony with his or her deepest feelings and impulses (as cited in Mitter & Coon, 2014). Student’s authentic self emerges from the self-exploration within collaboration to aid in healthy living.

Through daily classroom interactions, students reflect on how they express empathy by the choices they make while working with peers. As complex topics arise, empathetically advocating for others becomes a predominate overarching theme where collaboration and compassion are a keystone to students’ artistic ideas. Students at the high school level will learn that people are cognitive and emotional beings who require universal ethical care as supported with post-conventional moral reasoning (Kohlberg, 1973). Although some people never reach the most sophisticated degree of moral reasoning, students are guided to achieve high levels of empathy. An emphasis on virtues helps solidify what students expect of themselves and how this is reflected in the way they treat others as they become active participants in society.

Students at the high school level need to explore their identity while learning their role in society through understanding personal interrelationships and morals. By completing this

curriculum, students will understand that school and life outside of school are interrelated and call for a deeper understanding of student's role in the world. A reliance on ethical choices and authenticity for human functioning is an innate desire for healthy living. At the high school age, identity and empathy are a central focus of discovery as complex thinking heightens and the desire for inclusion competes with authentic identity formation.

Resources

Art & Atmosphere: An Examination of Meteorology through Visual Culture utilizes traditional and new media to encourage creativity with a variety of art making techniques supported by visual and academic resources used during instruction and artistic research. To increase opportunities for divergent thinking, students will explore contemporary methods to combine media. When selecting media to support concepts, students will use academic resources to examine approaches to visually express concepts and experiment with media to preeminently communicate their ideas. Students will explore a variety of artists with different backgrounds, ethnicities, socioeconomic statuses, genders, ages, and abilities through teacher lecture and independent student research. With the support of each student's visual process journal, students will document their exploration process of media and artists as a student-created guide and resource for establishing new connections. The multimodal teacher resources used in this lesson support students as they achieve mastery in the aims and goals of this curriculum. Below is a list of suggested resources used in *Art & Atmosphere: An Examination of Meteorology through Visual Culture*.

Traditional Media	Digital Media	Acedemic Resources	Teacher Resources
<ul style="list-style-type: none"> • pencils • skecthbooks • magizines • collage materails • glue sticks • scissors • archival pens (micron) • illustration board • stoneware clay • ceramic tools (list here) • visual culture • exacto knives • muslin • cyanotype mixture • variety of paper 	<ul style="list-style-type: none"> • computers • internet access • begnner programming software (scratch) • image editor programs (photoshop and illustrator) • website creating platforms (wix, squarespace, weebly) • visual culture 	<ul style="list-style-type: none"> • Freedman, K. 2003. <i>Teaching visual culture: Curriculum, aesthetics, and the social life of art</i>. New York, NY: Teachers College Press. • Taylor, P. G., Carpenter, S. B., Ballengee-Morris, C., & Sessions, B. (2006). <i>Interdisciplinary Approaches to Teaching Art in High School</i>. Reston, VA: National Art Education Association. 	<ul style="list-style-type: none"> • computer • power outlets • projector • speakers • internet access • video clips • youtube • vimeo • art 21 • powerpoint presentations • guided reflection • visual culture • music (from a variety of genres)

Conclusion

In summary, *Art & Atmosphere: Examining a Dynamic Relationship with Visual Culture* showcases the value of an interdisciplinary curriculum where human development is supported through an artistic exploration of meteorology. Support from visual culture and fine art aid in the understanding of technological, multicultural, historical, and contemporary connections among art and meteorology. Implementation of this curriculum results in creating students who can use metacognition as an advocacy tool for their own learning and contribute democratically to the conversations they participate in in their daily life. This course constructs students who are driven by their critical consciousness of self and surroundings in order to effectively react to the evolving circumstances of society.

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