Capturing a Second in Time with Pinhole Cameras

3rd Grade Unit Lesson

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Photograph:
https://i.ytimg.com/vi/CDm1Mpixjuw/maxresdefault.jpg

I) Unit Table of Contents:

II) Introduction to Unit

The lessons within this unit provide students with a deep understanding of the units' essential understanding, how creativity influences innovation, within the realm of photography evolution. Students will learn of the trials and tribulations experienced through the evolution of photography as an artform. This will provide an in-depth understanding of the essential elements of successful photography, and further deepens their understanding of the connection between creativity influencing innovation. Students will have the opportunity to experiment with both camera body structure and photography through the creation and utilization of handmade pinhole cameras. Students will internalize the unit's essential understanding as they experiment and develop authentically with their own hand built tool.

1) Rationale

In this unit lesson, students will study the early history of cameras and photography through the past three centuries. This unit will cover the evolution of early camera bodies, and the impact of camera bodies on the development of photographs, focusing on the pinhole camera. This unit consists of four-180 minute class sessions and is intended for upper elementary grade students.

The lessons have been constructed to assist in building prior knowledge by exploration of what impact, based on the structure of a camera, that light had on some of the most notable pinhole photographs in art history. These lessons focus on the conceptual lens of how creativity influences innovation. Students will then be able to explore the conceptual lens themselves, by investigating, collaborating, problem solving, and creating their own pinhole camera and developing the photographs taken with the camera. Having a personal connection to the conceptual lens will strengthen their understanding to the inventors and photographers, and help to understand how this concept could apply within their own experiences.

The lessons within this unit also focus on the opportunities for students to work on skills of research, interaction and collaboration. This unit provides not only concept and content knowledge, but provides a new experience requiring a methodical, high level of engagement and attention to details in order to have a successful outcome.

2) Differentiation for Gifted Learners

This visual arts unit was developed specifically for highly gifted upper-elementary school students. These children have been identified by, and are served in, the

Academically and Intellectually Gifted program, with an interest in photography as experimental art of self-expression. Differentiation occurs within this unit in the dimensions of content, process, product, and learning environment.

Content:

The content in the beginning of this unit focuses on the sophistication of both camera bodies, as well as photograph development, in a historical sense. The students will explore the complexity of the trials and tribulations photographers experienced in both construction of early cameras, and successful execution of photo-taking. During the photo-taking process, students themselves will choose the complexity of the photograph being created, based on the amount of light given for that environment.

Process:

The process by which students will construct their pinhole camera will be highly individualized through the use of the Creative Problem Solving Model. This model encourages divergent and convergent thinking through problem finding and solving, creativity, research, teamwork, brainstorming, and collaborating to devise the best plan for creating a properly-functioning pinhole camera.

The complexity of developing photographs taken with the camera present unique challenges in visual art creation which they likely have not experienced. Using prior knowledge built from earlier lessons in the unit, students are able to reflect on challenges other photographers experienced, as a tool of guidance for their own experiences. Analyzation of historical photographs will utilize the Visual Thinking Skills model, which will strengthen the student's inferencing and higher-order thinking skills. These skills will also be exercised during the Socratic Seminar student discussion.

Product:

The challenge of creating a pinhole camera, sketching of landscape scenes that students visualize, and the freedom of composing photographs of student's choice are all innately creative. The students will construct the camera based on very few guidelines, which encourages deeper thinking and analyzation based on the essential elements of photography, to ensure successful photographs. The complexity and analyzation with which a camera functions becomes seemingly more complex when the simplicity of a shoebox as a camera body is introduced. This challenge fosters further internalization of the essential understanding as to how creativity influences innovation.

Learning Environment:

Students will be collaborating and working in the three following environments, based on their level of progress: within the context of the classroom during the discussion and camera construction phase, out in the field for the photograph-taking

phase, and in the darkroom for the film development phase. Students will also have several in-depth discussions with their peers regarding notable photographic material and individuals, and their challenges through their periods of creativity and innovation. The lessons within this unit are all complex, challenging, student-driven, and accelerated appropriately.

3) Intended Population

The intended population for this unit are middle class (inferred by the ownership of, or experience with, a camera), high-achieving upper elementary school students with an interest in photography. While a common talent amongst student may be a frequent usage of point-and-shoot digital photography with a cellular phone, few students bring a unique interest in manual photography with a DSLR (digital single-lens reflex) camera, that they may have used with their parent or family-member photographer.

Most students will likely come into the unit with a deep understanding of how technology and photography work together. Few, if any, students, however, will have the understanding of how cameras and photography have evolved in regards to photographic film. With the development of digital photography, many students may have never been exposed to film, due to its increasing rarity and costs in production and development.

This unit has been designed to engage students through communication, collaboration, curiosity, challenges of trial and error, and perseverance. It is highly focused on the social and emotional aspects of gifted learning that is not nurtured as frequently in academia as the content presented within this unit.

III) Goals and Outcomes

This unit addresses content, process, and conceptual goals, in addition to the Common Core State Standards for Visual Arts and Language Arts.

3.V.2.1: Create art through a process that includes generating ideas, planning solutions, and producing original art.
3.V.3.1: Understand how a single tool can be manipulated in multiple ways, safely and appropriately.
3.RI.3: Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedure in a text, using language that pertains to time, sequence, and cause/effect.

1) Content Goals and Outcomes

Goal #1: To understand how camera bodies and photographs have evolved throughout three centuries.

Students will know...

- the evolution and advancement of photography and cameras is a result of creativity, exploration, modification, and collaboration
- Creativity has, and continues to, spark a desire to improve on innovation and design of camera bodies
- The availability of materials and resources may hinder and challenge creativity
- That reflections, aperture, magnification, and inversion all influence the development of a photograph

Goal #2: To understand how the composition of photographs are a unique expression of the photographer-artist.

Students will know...

- Artwork is interpreted and communicated differently based on the prior knowledge and experiences of the individual viewing the piece.
- Artwork often allows for inferencing.
- Photographers are deliberate in their composition of a photograph.
- Creativity of the photographer influences the innovation of a photograph and its composition.

Goal #3: To understand that the outcomes of photography as an artform are highly individualized.

Students will know...

- Artwork (photography) is constructed and interpreted based on the prior knowledge and experiences of the individual composing the piece.
- Artwork often allows for inferencing.
- Experimenting with creativity allows for innovation in photography
- Creativity and innovation can shape and/or change perspective in photography.

Goal #4: To understand that artist creativity and thoughtfulness can evolve the artform of photography.

Students will know...

- Artwork (photography) is constructed and interpreted based on the prior knowledge and experiences of the individual composing the piece.
- Artwork often allows for inferencing.
- Experimenting with creativity allows for innovation in photography
- Creativity and innovation can shape and/or change perspective in photography

2) Process Goals and Outcomes

Goal #1: To understand how to analyze the elements of photography in order to create a successfully-functioning camera.

Students will be able to...

- design and create a pinhole camera based on information collected and criteria provided
- collaborate in small groups on the pinhole camera design
- synthesize the camera's structure based on the materials provided
- analyze ideas for design and articulate reasons for chosen design, given the materials provided
- apply critical thinking skills through investigation of the most effective and efficient camera design

Goal #2: To understand how analyze the composition of a photograph.

Students will be able to…

- Use creative problem-solving skills to express complex concepts.
- Use visual and written forms to communicate observations.
- Use prior knowledge to interpret and analyze a photograph.
- Use imagination to infer about elements of the photograph.

Goal #3: To understand that photography as an artform requires analyzation and critical thinking.

Students will be able to…

- Work collaboratively.
- Create questions and maintain inquiry-based dialogue which helps to examine theme and concepts within the text.
- Explain reasoning and communicate assumptions, exploring various viewpoints.
- Compare and contrast different photographic processes.

3) Concept Goals and Outcomes

Goal #1: To understand the concept of innovation.

Students will be able to…

- Analyze how creativity has influenced innovation of the photographic process and photography as an artform.
- Determine how resources can influence creativity when constructing innovate camera design.
- Comprehend how creativity challenges innovation when faced with reluctance.

IV) Assessment Plan

Students will be assessed throughout each lesson both informally, and formally. Informal observations throughout the week will include observation of participation in discussions, collaboration with group members during camera-constructing process, and observation of the photo-taking and development procedures and process. Formal observations will include completion of a daily journal entry prompt, sketching of photographic landscapes, written observations during Socratic Seminar, and the outcome of photographs after darkroom development. The final performance task will provide a summative assessment of the unit as a whole.

Daily Journal Entry Rubric (Levels 1-3):

Score:	Justification of Score:
1	Student does not address or respond to post-lesson questions; shows lack of comprehension towards understanding of the lesson.
2	Student addresses or responds to post-assessment questions minimally; shows minimal comprehension towards understanding of lesson.
3	Student has fully addressed or responded to post-assessment questions; presents full understanding of lesson.

Performance Task Rubric (Levels 1-4):

Criteria:	Level 4:	Level 3:	Level 2:	Level 1:
Collaboration with Team in Camera Construction & Darkroom Development	Student demonstrated full participation in group and took a leadership role.	Student demonstrated full participation in group.	Student communicated and participated minimally with group.	Student did not communicate and/or participate with group.
Portfolio	Student created a portfolio of 3-4 of his/her photographs.	Student created a portfolio of 2 of his/her photographs.	Student created a portfolio of 1 of his/her photographs.	Student did not portfolio any photographs and/or photographs did not develop properly.

Socratic Seminar: Outer Circle Observation Notes

Your Name: _____

Name of Person Observing: _____

*Place a tally mark in the right column each time the person you are observing does one of the following during our Socratic Seminar:

Asks A Question	
Responds to a Question	
Provides Text-Based Evidence	
Contributes a New Idea	
Agrees with a Comment	
Disagrees with a Comment	

Discussion Notes or Questions:

Final Performance Task:

Your school is undergoing a beautification of campus grounds. The school received a grant for half of the beautification costs. Your school must raise the remaining half of the costs for this project. In order to raise money for the beautification project, your school will be holding a dinner and silent auction fundraiser. Because of your creative eye, attention to detail, and reputation as an excellent amateur photographer, you have been selected to submit a portfolio of photographs for bidding by attendees. Your task is to create a portfolio of photographs which capture your uniqueness, including abstract, portrait, and/or nature photography, using your handmade pinhole camera. Keep in mind, bidders at a silent auction often desire, and are willing to pay a large amount of money, for art that is one-of-a-kind. This portfolio will be a product of your interests, vision, and individuality that showcase your talent as an amateur photographer.

V) Lesson Plans

TEACHER NAME			Lesson #
Christina Davidson			1
MODEL	**CONTENT AREA**	**GRADE LEVEL**	
Creative Problem Solving	Visual Arts	3	

CONCEPTUAL LENS	LESSON TOPIC
Creativity	Pinhole Camera Design

LEARNING OBJECTIVES *(from State/Local Curriculum)*

3.V.2.1: Create art through a process that includes generating ideas, planning solutions, and producing original art.
3.V.3.1: Understand how a single tool can be manipulated in multiple ways, safely and appropriately.

THE ESSENTIAL UNDERSTANDING ***(What is the overarching idea students will understand as a result of this lesson?***	THE ESSENTIAL QUESTION ***(What question will be asked to lead students to "uncover" the Essential Understanding)***
Creativity Influences Innovation	How does creativity influence innovation?

CONTENT KNOWLEDGE **(What factual information will students learn in this lesson?)**	PROCESS SKILLS **(What will students be able to do as a result of this lesson?)**
Students will know… ● the evolution and advancement of photography and cameras is a result of creativity, exploration, modification, and collaboration ● Creativity has, and continues to, spark a desire to improve on innovation and design of camera bodies ● The availability of materials and resources may hinder and challenge creativity ● That reflections, aperture, magnification, and inversion all influence the development of a photograph	**Students will be able to…** ● design and create a pinhole camera based on information collected and criteria provided ● collaborate in small groups on the pinhole camera design ● synthesize the camera's structure based on the materials provided ● analyze ideas for design and articulate reasons for chosen design, given the materials provided ● apply critical thinking skills through investigation of the most effective and efficient camera design

GUIDING QUESTIONS
What questions will be asked to support instruction?
Include both "lesson plan level" questions as well as questions designed to guide students to the essential understanding

Pre-Lesson Questions:	During Lesson Questions:	Post Lesson Questions:
● What are some differences that you see between the photography and cameras from 200 years ago, through the two decades, and the cameras we use today? ● What is creativity? ● What is innovation? ● What is the relationship between creativity and innovation? ● How can critical thinking and creativity influence the changes in the structure of cameras over time? ● What observations can be made about how the camera body evolved? ● How do you think the availability of materials and technology has influenced these changes?	● What design did your group develop, based on the materials available? How did your creativity influence the innovation of your camera's design? ● How does your group's pinhole camera design resemble that of other pinhole cameras and cameras that we viewed earlier in the lesson? ● What innovations are you utilizing while designing and constructing your pinhole camera? ● What items did you utilize in designing your pinhole camera? Why? What other items might you select? ● What are some issues that have arisen while designing your pinhole camera? How might this replicate some of the issues of creativity influencing innovations of camera development through the years?	● What were some challenges that your group encountered while constructing your pinhole camera? ● Why were images inverted onto the photographic paper? ● What did you do or what design elements did you modify while constructing to overcome these challenges? ● What materials would have helped to strengthen your pinhole camera design that were not available? How could they have helped you? ● What similarities and differences do you notice between your group's pinhole camera and the other group's? ● What design elements did you see with other groups that you thought worked well? ● How did creativity influence the design of your innovation?

DIFFERENTIATION ***(Describe how the planned learning experience has been modified to meet the needs of gifted learners. Note: Modifications may beone or more of the areas below. Only provide details for the area(s) that have been differentiated for this lesson.***			
Content	**Process**	**Product**	**Learning Environment**
Groups can choose the complexity of the photograph being created/developed, based on the amount of light the pinhole camera exposes.	Utilization of the Creative Problem Solving model. This model encourages divergent and convergent thinking through problem finding and solving, creativity, research, teamwork, brainstorming, and collaborating to devise the best plan.	Collaborative groups will have individualized pinhole camera design, based on how the group's creativity influences their innovation.	Lesson will be student-driven as students will work in small groups to collaborate and create pinhole camera design, which will affect the outcome of their photographs.

PLANNED LEARNING EXPERIENCES ***(What will the teacher input? What will the students be asked to do? For clarity, please provide detailed instructions)***

Engage and Connect - *This phase focuses on piquing students' interest and helping them access prior knowledge. This is the introduction to the lesson that motivates or hooks the students.*

Students will begin the lesson by viewing photographs of camera bodies/body and photographs from designs over the past 200 years. These examples will be set-up like a life-like "walking timeline", where students are able to observe, move down the timeline, forwards and backwards in history. They will write answers to the following questions:

-What are some differences that you see between the photography and cameras from 200 years ago, through the two decades, and the cameras we use today?
-What observations can be made about how the camera body evolved?
-How do you think the availability of materials and technology has influenced these changes?

After exploration through their "walking timeline", the group will come together and share their observations from the walking timeline first, then discuss opinions to the following questions:
-What is creativity?
-What is innovation?
-How can critical thinking and creativity influence innovation in photography and the changes in camera structure over time?

Explore - *In this phase, the students have experiences with the concepts and ideas of the lesson. Students are encouraged to work together without direct instruction from the teacher. The teacher acts as a facilitator. Students observe, question, and investigate the concepts to develop fundamental awareness of the nature of the materials and ideas.*

Mess Finding: In small collaborative groups, teacher will ask the groups of students to create a pinhole camera, after discussing basic instructions and criteria for building a successful pinhole camera.
Materials to choose from will include: shoeboxes of various sizes, large and small paper clips, black duct tape, clear scotch tape, black construction paper, aluminum foil, push pins, fast-developing photographic paper, scissors, pencils, cardboard, wax paper, styrofoam cups (various sizes), flashlight

Fact Finding: Students will gather information needed to construct a successful pinhole camera. They will examine the details, taking into consideration the mess finding from multiple viewpoints. The group will determine the most important information needed to successfully construct a pinhole camera. Students will then view the available materials for construction but may not touch them (may write them down if desired). Once they view materials, groups will come back together to gather to discuss what would be the valuable materials needed to construct a pinhole camera.

Explain - *Students communicate what they have learned so far and figure out what it means. This phase also provides an opportunity for teachers to directly introduce a concept, process, or skill to guide students toward a deeper understanding.*

Problem Finding: Groups will analyze and evaluate the data to determine the best design for a pinhole camera. They will develop their plan and align it to the data on how light affects the outcome of photographs. Groups will take into consideration problems that may occur and develop the structure by taking these concerns into account. This will help guide the groups towards accomplishing their objective.

Idea Finding: Groups are given 20 minutes to sketch interior and exterior pinhole camera designs based on innovation, materials provided, and creativity. Groups will complete their design and agreed upon the materials to be utilized to execute the design. All individual ideas will be considered, and most 4-6 ideas with the most potential will be utilized.

Elaborate —*Allow students to use their new knowledge and continue to explore its implications. At this stage students expand on the concepts they have learned, make connections to other related concepts, and apply their understandings to the world around them in new ways*

Solution Finding: A group discussion will follow to determine what elements of individual ideas will be most successful. Groups will brainstorm and narrow down multiple ideas to decide which would be most beneficial in constructing design. The group will then create a list of factors or criteria, and select 5 most important criteria, which will help to evaluate the level of successfulness of the pinhole camera design (criteria sheet to be utilized at the end of the Acceptance Finding step to deem overall success of design).

Evaluate: *This phase assesses both learning and teaching and can use a wide variety of informal and formal assessment strategies.*

Acceptance Finding: Group decides on one team member to retrieve the material needed for construction, after developing a "blueprint" for constructing their pinhole camera. This will be the only individual allowed to retrieve materials. Groups will be provided an hour (more time will be provided if needed) to construct their pinhole cameras. All group individuals should be participating as observed by the teacher, but no guidance will be provided. This is an appropriate time for the teacher to pose these questions:

-What design did your group develop, based on the materials available? How did your creativity influence the innovation of your camera's design?
-How does your group's pinhole camera design resemble that of other pinhole cameras that we viewed earlier in the lesson?
-What innovations are you using while designing and constructing your pinhole camera?

-What items are you utilizing in designing your pinhole camera? Why? What other items might you select that would help you during the design process?
-What are some issues that have arisen while designing your pinhole camera? How might this replicate some of the issues of creativity influencing innovations of camera development through the years?

Work time will be reevaluated at the hour mark. After a majority of the groups have finished, each group will discuss the design of their pinhole camera, and describe the innovations used in construction. Students will discuss materials they utilized, and provide a justification for those used.

While the construction phase has completed, the group will come back after the photo-taking and developing process has been completed on days 2 and 3, to reflect and discuss the outcomes of the camera designs. They will evaluate each other's ability to take photographs that focused on portrait, nature, and/or abstract photography, as well as an example of innovation. They will discuss obstacles they encountered, how they overcame and rectified these obstacles, and how such problems could be prevented in the future. Obstacles will be observable once the photographic paper has been developed. These may include, but are not limited to, the pinhole being too large, the box not being light-tight, exposing the film for too long, moving the camera while it is taking the picture, and improper loading/unloading of the photographic paper. Post-lesson questions will be presented by the teacher at this time:

-Why were images inverted inside your pinhole camera? How could you create a photograph which would show an image larger or smaller than it appears in-person?
-What were some challenges that your group encountered while constructing your pinhole camera?
-What did you do or what design elements did you modify while constructing to overcome these challenges?
-What materials would have helped to strengthen your pinhole camera design that were not available? How could they have helped you?
-What similarities and differences do you notice between your group's pinhole camera and the other group's?
-What design elements did you see with other groups that you thought worked well?
-How did creativity influence your innovation in design?

TEACHER NAME	Lesson #
Christina Davidson	2

MODEL	CONTENT AREA	GRADE LEVEL
Visual Thinking Model	Visual Arts	3

CONCEPTUAL LENS	LESSON TOPIC
Creativity	Pinhole Camera Photography

LEARNING OBJECTIVES *(from State/Local Curriculum)*

3.V.2.1: Create art through a process that includes generating ideas, planning solutions, and producing original art.
3.V.3.1: Understand how a single tool can be manipulated in multiple ways, safely and appropriately.

THE ESSENTIAL UNDERSTANDING ***(What is the overarching idea students will understand as a result of this lesson?***	THE ESSENTIAL QUESTION ***(What question will be asked to lead students to "uncover" the Essential Understanding)***
Creativity Influences Innovation	How does creativity influence innovation?

CONTENT KNOWLEDGE **(What factual information will students learn in this lesson?)**	PROCESS SKILLS **(What will students be able to do as a result of this lesson?)**
Students will know… ● Artwork is interpreted and communicated differently based on the prior knowledge and experiences of the individual viewing the piece. ● Artwork often allows for inferencing. ● Photographers are deliberate in their composition of a photograph. ● Creativity of the photographer influences the innovation of a photograph and its composition.	**Students will be able to…** ● Use creative problem-solving skills to express complex concepts. ● Use visual and written forms to communicate observations. ● Use prior knowledge to interpret and analyze a photograph. ● Use imagination to infer about elements of the photograph.

GUIDING QUESTIONS
What questions will be asked to support instruction?
Include both "lesson plan level" questions as well as questions designed to guide students to the essential understanding

Pre-Lesson Questions:	During Lesson Questions:	Post Lesson Questions:
● What do you see in this photograph? ● What do you see that makes you say that? ● Who sees something different? ● What else can you find?	● What do you think is happening? ● What else do you see? Does anyone see something different? ● Where do you think this is taking place? ● What season, time of year, and/or time of day do you think this is? What do you see that makes you say that? ● What about this photograph's composition is innovative? ● How did the photographer use his creativity to affect the composition?	● After all we have said, what's the story of this photograph? ● What do you think the artist wanted tell us about the place, time, and elements of the photograph? ● How does creativity influence innovation in this photograph?

DIFFERENTIATION
(Describe how the planned learning experience has been modified to meet the needs of gifted learners. Note: Modifications may be in one or more of the areas below. Only provide details for the area(s) that have been differentiated for this lesson.

Content	Process	Product	Learning Environment

● Exposure to the pinhole camera photograph "The Onion Field (1890) " by George Davison will likely be a new realm of exploration for the student. It will provide unique opportunity to explore and infer.	● Utilizing the Visual Thinking Skills model will provide open-ended questioning from the teacher, enabling each student to make his/her own inferences about the photograph. Students must support these inferences with evidence from the photograph.	● The result of sketching a country scene that each student has visualized will be individualized. Also, the caption created for each sketch will be unique to each student.	

PLANNED LEARNING EXPERIENCES

(What will the teacher input? What will the students be asked to do? For clarity, please provide detailed instructions)

Engage and Connect - *This phase focuses on piquing students' interest and helping them access prior knowledge. This is the introduction to the lesson that motivates or hooks the students.*

Students will be provided with a sheet of paper and a pencil. The teacher will ask each student to visualize a country landscape or scene that they may have seen before, or one that has left a lasting impression on them. She will ask each student to bring the visualized image to the paper, including important details of the scene. She will ask them to use their creativity, just as a photographer would, to focus on the composition of their drawing.

After several minutes of drawing (adjusted based on observation of student readiness), the teacher will begin the Visual Thinking Strategy by asking the following questions for the photograph "The Onion Field" by George Davison (without providing any information, so inferring must be made for observations):

-What do you see in this photograph?
-What do you see that makes you say that?
-Who sees something different?
-What else can you find?

Explore - *In this phase, the students have experiences with the concepts and ideas of the lesson. Students are encouraged to work together without direct instruction from the teacher. The teacher acts as a facilitator. Students observe, question, and investigate the concepts to develop fundamental awareness of the nature of the materials and ideas.*

After each student has had an opportunity to discuss the pre-lesson questions, the teacher will ask them to examine the photograph for several more minutes, writing down observations about the photograph, as well as questions they may have about the photograph. She will ask them to investigate comparisons and contrasts between the student's visual they have created to this pinhole photograph, and to take note of any connections between their drawing and the photograph.

Explain - *Students communicate what they have learned so far and figure out what it means. This phase also provides an opportunity for teachers to directly introduce a concept, process, or skill to guide students toward a deeper understanding.*

After students have been provided several minutes to observe and describe similarities, differences, and write questions that they may have, students will have an opportunity to share what they observed and wrote. The teacher will ask the during-lesson questions:

-What do you think is happening?
-What else do you see? Does anyone see something different?
-Where do you think this is taking place?
-What season, time of year, time of day do you think this is? What do you see that makes you say that?
-What about this photograph's composition is innovative?
-How did the photographer use his creativity to affect the composition?

It is important for the teacher to note that the focal point in the photograph is the house that is in the background. This placement of items using the "Rule of Thirds" (imaginary 3x3 arrays on the photograph--show the grid and discuss) provides a pattern that is visually pleasing to the eye with less predictability than had all the focal points of the photograph been placed in the center. The utilization of Impressionistic photography (this being one of the oldest noted) shows that creativity influences innovation. Discussion of what Impressionistic style is, and how it differed from other pinhole photographs we viewed previously, will allow for a compare and contrast discussion of how this creativity evolved the art of photography.

Elaborate —*Allow students to use their new knowledge and continue to explore its implications. At this stage students expand on the concepts they have learned, make connections to other related concepts, and apply their understandings to the world around them in new ways*

At this time, the teacher will solicit student discussion on the post-lesson questions:

-After all we have said, what's the story of this photograph?
-What do you think the artist wanted to tell us about the place, time, and elements of the photograph?
-How does creativity influence innovation in this photograph?

After final discussion of questions, the teacher will present information regarding this pinhole photograph by George Davison, titled "The Onion Field". It was taken in 1890 and is one of the first notorious Impressionistic pinhole photographs taken.

Evaluate: *This phase assesses both learning and teaching and can use a wide variety of informal and formal assessment strategies.*

Students will be provided with the following prompts as a formal assessment. They will work independently to answer the following questions:

-What connections can you make between your image and the one in the photograph?
-How else could the photographer have used creativity to influence the innovation within his photograph?
-How do you think creativity influenced innovation when the artist was composing this photograph? What do you mean by that? Why do you say that?

After informal discussion, teacher will provide students a formal evaluation using sticky notes. She will ask students to provide a caption for each of the "country" scene that the students drew at the beginning of the lesson. Each student will share the caption they provided for their own drawing afterwards, and compare it to the captions that others provided. This is an opportunity to discuss further how interpretation of art is truly up to the viewer, based on inferences, prior knowledge, and the feeling it evokes. This is also an opportunity to discuss creativity of the drawings, evidence of innovation in drawings, and comparing and contrasting innovation seen within the drawing to that of the photograph.

TEACHER NAME			Lesson #
Christina Davidson			3
MODEL	**CONTENT AREA**	**GRADE LEVEL**	
Socratic Seminar	Visual & Language Arts	3	

CONCEPTUAL LENS	LESSON TOPIC
Creativity	Pinhole Camera Photography

LEARNING OBJECTIVES *(from State/Local Curriculum)*

3.V.2.1: Create art through a process that includes generating ideas, planning solutions, and producing original art.
3.V.3.1: Understand how a single tool can be manipulated in multiple ways, safely and appropriately.
3.RI.3: Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedure in a text, using language that pertains to time, sequence, and cause/effect.

THE ESSENTIAL UNDERSTANDING ***(What is the overarching idea students will understand as a result of this lesson?***	**THE ESSENTIAL QUESTION** ***(What question will be asked to lead students to "uncover" the Essential Understanding)***
Creativity Influences Innovation	How does creativity influence innovation?

CONTENT KNOWLEDGE (What factual information will students learn in this lesson?)	**PROCESS SKILLS (What will students be able to do as a result of this lesson?)**
Students will know… ● Artwork (photography) is constructed and interpreted based on the prior knowledge and experiences of the individual composing the piece. ● Artwork often allows for inferencing. ● Experimenting with creativity allows for innovation in photography ● Creativity and innovation can shape and/or change perspective in photography.	**Students will be able to…** ● Work collaboratively. ● Create questions and maintain inquiry-based dialogue which helps to examine theme and concepts within the text. ● Explain reasoning and communicate assumptions, exploring various viewpoints.

GUIDING QUESTIONS
What questions will be asked to support instruction?
Include both "lesson plan level" questions as well as questions designed to guide students to the essential understanding

Pre-Lesson Questions:	During Lesson Questions:	Post Lesson Questions:

• What surprised you about this video? • What is innovation? • What is creativity? • What is the relationship between creativity influencing innovation? • How did this video depict a relationship between creativity and innovation? • Why would Wilson Bentley be described as creative? • What did Wilson Bentley do that was unique or innovative?	• How does creativity influence innovation? • What is the theme or important lesson of this text? • What is the most important sentence/paragraph in this story? • If Snowflake Bentley were alive today, how would he feel about photography and why? • What do you think were some long-term effects of Snowflake Bentley's creativity on the innovation of photography?	• What was one theme or "big ideas" of the text you discovered through conversation of the seminar? • Why is Snowflake Bentley a significant part of the history of photography? • How did Wilson Bentley's creativity influence the innovation of photography? • How did the seminar deepen your understanding that creativity influences innovation? • What questions did I have during the seminar? • What challenges did I experience during the seminar? How did being on the inner or outer circle influence my feelings? • What did I hear while in the outer circle that I felt was effective to keep the dialogue going? • How did my thinking change after participating in the seminar? • How did Snowflake Bentley's creativity influence innovation?

DIFFERENTIATION

(Describe how the planned learning experience has been modified to meet the needs of gifted learners. Note: Modifications may be in one or more of the areas below. Only provide details for the area(s) that have been differentiated for this lesson.

Content	Process	Product	Learning Environment
	Prior to Socratic Seminar, students will be responsible for creating open-ended questions regarding the text. During Socratic Seminar, students will facilitate the discussion through these questions.		Students will be working in a variety of learning environments: independently, in a small group and larger group during Socratic seminar.

PLANNED LEARNING EXPERIENCES ***(What will the teacher input? What will the students be asked to do? For clarity, please provide detailed instructions)***

Engage and Connect - *This phase focuses on piquing students' interest and helping them access prior knowledge. This is the introduction to the lesson that motivates or hooks the students.*

As students enter the room, the teacher will provide an index card. Each student to respond to the following question on their index card: "How does this video make you feel? What are your thoughts about what Wilson Bentley did as a 10-year-old as it relates to the innovation of photography". The teacher will then show the short documentary "The Snowflake Man" (https://www.youtube.com/watch?v=ptLmA263hlk). After the video, the teacher will solicit student's reactions, as well as propose the following questions:

-What surprised you about this video?
-What is innovation?
-What is creativity?
-What is the relationship between creativity influencing innovation?
-How did this video depict a relationship between creativity and innovation?
-Why would Wilson Bentley be described as creative?
-What did Wilson Bentley do that was unique or innovative?

Explore - *In this phase, the students have experiences with the concepts and ideas of the lesson. Students are encouraged to work together without direct instruction from the teacher. The teacher acts as a facilitator. Students observe, question, and investigate the concepts to develop fundamental awareness of the nature of the materials and ideas.*

Teacher will read the text "Snowflake Bentley" by Jacqueline Briggs Martin to the class. While the teacher reads, each student will construct a minimum of 5 open-ended questions. They may also make notes on the text, and write their thoughts regarding the essential question, **"how does creativity influence innovation?"**. Once the teacher finishes reading, students will have 3-5 minutes to review their notes and questions, and then construct two open-ended questions that they have about the story. They will then work with a partner to discuss the notes that they took, as well as questions they wrote. Each group will select two out of their four open-ended questions, which must require higher levels of thinking. These questions will be utilized during their time in the "inner-circle" discussion group.

Explain - *Students communicate what they have learned so far and figure out what it means. This phase also provides an opportunity for teachers to directly introduce a concept, process, or skill to guide students toward a deeper understanding.*

Once each group has selected two of their questions for Socratic Seminar, the teacher will provide/review the expectations for the seminar (attached). Once the guidelines have been clarified, the teacher will begin by asking students the essential question, "how does creativity influence innovation?" If time allows after students have presented their open-ended question, the teacher may ask the following questions:

-What is the theme or important lesson of this text?
-What is the most impactful sentence/paragraph in this story?
-If Snowflake Bentley were alive today, how would he feel about photography and why?
-What do you think were some long-term effects of Snowflake Bentley's creativity on the innovation of photography?

Elaborate —*Allow students to use their new knowledge and continue to explore its implications. At this stage students expand on the concepts they have learned, make connections to other related concepts, and apply their understandings to the world around them in new ways*

After answering the first questions, students will begin setting up for Socratic Seminar. They will be provided with etiquette guidelines. Teacher will discuss expectations and proper responses to the statements of others. Students will then be divided into two groups: an "inner circle" and an "outer circle". These roles will rotate after approximately 10 minutes of discussion. The teacher will pass out the participation sheet (attached) to the students in the outer circle. The teacher will then ask the leading group to begin with their first open-ended question.

*The teacher will have the following questions available, should the discussion need redirection:

-Where can you find evidence of that in the text?
-How might you clarify when you said…?
-How does that relate to (another student's) comment?
-What in the text seems unclear?
-Who has a different perspective?

Evaluate: *This phase assesses both learning and teaching and can use a wide variety of informal and formal assessment strategies.*

The seminar will conclude with the following with a closing discussion, as well as a personal written reflection. The teacher will ask the following questions:

-What was one theme or "big ideas" of the text that you discovered through conversation of the seminar?

-Why is Snowflake Bentley a significant part of the history of photography?
-How did Wilson Bentley's creativity influence the innovation of photography?
-How did the seminar deepen your understanding of how creativity influences innovation?

Each student will respond to following questions as a written reflection of the discussion and Snowflake Bentley's contributions to the innovation of photography, stemming from his creativity:

-What questions did I have during the seminar?
-What challenges did I experience during the seminar? How did being on the inner or outer circle influence my feelings?
-What did I hear while in the outer circle that I felt was effective to keep the dialogue going?
-How did my thinking change after participating in the seminar?
-How did Snowflake Bentley's creativity influence innovation?

Lesson Plan #4:

TEACHER NAME	**Lesson #**
Christina Davidson	4

MODEL	**CONTENT AREA**	**GRADE LEVEL**
Questioning	Visual Arts	3

CONCEPTUAL LENS	**LESSON TOPIC**
Creativity	Pinhole Camera Photography

LEARNING OBJECTIVES *(from State/Local Curriculum)*

3.V.2.1: Create art through a process that includes generating ideas, planning solutions, and producing original art.
3.V.3.1: Understand how a single tool can be manipulated in multiple ways, safely and appropriately.

THE ESSENTIAL UNDERSTANDING ***(What is the overarching idea students will understand as a result of this lesson?***	**THE ESSENTIAL QUESTION** ***(What question will be asked to lead students to "uncover" the Essential Understanding)***
Creativity Influences Innovation	How does creativity influence innovation?

CONTENT KNOWLEDGE **(What factual information will students learn in this lesson?)**	**PROCESS SKILLS** **(What will students be able to do as a result of this lesson?)**
Students will know… ● Artwork (photography) is constructed and interpreted based on the prior knowledge and experiences of the individual composing the piece. ● Artwork often allows for inferencing. ● Experimenting with creativity allows for innovation in photography ● What is Daguerreotype photography ? ● Creativity and innovation can shape and/or change perspective in photography	**Students will be able to…** ● Work collaboratively. ● Explain reasoning and communicate assumptions, exploring various viewpoints. ● Compare and contrast different photographic processes.

GUIDING QUESTIONS
What questions will be asked to support instruction?
Include both "lesson plan level" questions as well as questions designed to guide students to the essential understanding

Pre-Lesson Questions:	**During Lesson Questions:**	**Post Lesson Questions:**
● What do you already know about photography? ● What are some key photography terms we have discussed? ● What is innovation? ● What is creativity? ● How might innovation and creativity connect to the story you created using the Wordle cloud?	● Who was Robert Cornelius? When was this photograph taken? ● How would you describe this self-portrait to someone who cannot see it? ● If you could interview Cornelius, what would you ask him? ● What type of photograph is this? ● What is daguerreotype	● What is the significance of this photo for the time period depicted? ● What do you think is worth remembering about this photograph? ● What further questions does this image raise in your mind? ● What have you learned from exploring this photograph?

	photography? ● How did Cornelius make use of light in this self-portrait? How does this affect the way we view it? ● Pretend you are Robert Cornelius. What does it feel like to be inside this photograph? What do you think Cornelius thought about to pass the time? ● Describe the stages it took for Cornelius to produce the self-portrait that you see. ● What other photographs does this image remind you of and why? Does this remind you of another person (describe)? ● If you were to give this photograph a title, what would it be? Why did you decide on that for a title? ● What would you ask Cornelius if he were here with us today? ● What ways could Cornelius have photographed himself differently? Why? ● What compositional techniques were used to create interest and balance in this photograph? ● How did creativity and innovation affect this photograph?	● How did creativity influence innovation in this self-portrait?

DIFFERENTIATION

(Describe how the planned learning experience has been modified to meet the needs of gifted learners. Note: Modifications may be in one or more of the areas below. Only provide details for the area(s) that have been differentiated for this lesson.

Content	Process	Product	Learning Environment
Students will have a deep comprehension of how creativity influences innovation in photography through the use of early daguerreotype photography.	Students will respond to all levels of inquiry through Bloom's Taxonomy questioning.		

PLANNED LEARNING EXPERIENCES ***(What will the teacher input? What will the students be asked to do? For clarity, please provide detailed instructions)***

Engage and Connect - *This phase focuses on piquing students' interest and helping them access prior knowledge. This is the introduction to the lesson that motivates or hooks the students.*

Teacher will provide each student with an index card. She will have a Wordle word cloud on the screen and will ask students to observe the words for a couple of minutes. The teacher will ask, "how do these words all connect to each other? Create a story using all of the words in the Wordle cloud." Students will work together in small groups to create their hypothesis of how the words will be connected. After 5-10 minutes (observe for readiness), groups will share their ideas with the class. The Wordle word cloud will include:

Philadelphia
silversmith
lamp manufacturing
chemistry
October 1839
studio
Robert Cornelius
Paul Beck Goddard
family store
self-portrait
pioneer
Joseph Saxton
Smithsonian
silver plate
daguerreotype
photography
15 minutes

Explore - *In this phase, the students have experiences with the concepts and ideas of the lesson. Students are encouraged to work together without direct instruction from the teacher. The teacher acts as a facilitator. Students observe, question, and investigate the concepts to develop fundamental awareness of the nature of the materials and ideas.*

Groups will have the opportunity to share their ideas of how they believe the words connect together. They then will answer the following questions:

-What do you already know about photography?
-What are some key photography terms we have discussed?
-What is innovation?
-What is creativity?
-How might innovation and creativity connect to the story you created using the Wordle cloud?

Explain - *Students communicate what they have learned so far and figure out what it means. This phase also provides an opportunity for teachers to directly introduce a concept, process, or skill to guide students toward a deeper understanding.*

Teacher will then show the self-portrait of Robert Cornelius on the screen, and tell how the words connect to the photograph.

"Robert Cornelius (1809-1893) was a silversmith who was from Philadelphia, PA. In his early years of silversmithing, Cornelius was approached by Joseph Saxton to assist in creating a silver plate for his photographic ventures. This sparked Cornelius' interest in photography.
Cornelius eventually worked with his family at their lamp manufacturing company, no longer working as a silversmith. However, having a passion for chemistry and photography, Cornelius explored ways to incorporate the two hobbies. Soliciting the assistance from chemist Paul Beck Goddard, Cornelius attempted to perfect the daguerreotype photography process.
In October of 1839, Cornelius set up a studio outside of his family's store. Using the daguerreotype photography technique, he worked to perfect, Cornelius sat motionless for 15 minutes. What was produced was the first-known self-portrait, which is now preserved and displayed at the Smithsonian Institute in Washington, DC."

Questions to Follow:

-Who was Robert Cornelius? When was this photograph taken?
-How would you describe this self-portrait to someone who cannot see it?
-If you could interview Cornelius, what would you ask him?
-What type of photograph is this?
-What is daguerreotype photography?
-How did Cornelius make use of light in this self-portrait? How does this affect the way we view it?

Elaborate —*Allow students to use their new knowledge and continue to explore its implications. At this stage students expand on the concepts they have learned, make connections to other related concepts, and apply their understandings to the world around them in new*

ways

To enrich the understanding of the daguerreotype pinhole camera process, the teacher will present this video:
https://youtu.be/d932Q6jYRg8

After observing the process of daguerreotype photography, the teacher will ask the following questions about Cornelius' photograph:

-Pretend you are Robert Cornelius. What does it feel like to be inside this photograph? What do you think Cornelius thought about to pass the time?
-What were the stages it took for Cornelius to produce the self-portrait that you see?
-What other photographs does this image remind you of and why? Does this remind you of another person (describe)?
-If you were to give this photograph a title, what would it be? Why did you decide on that for a title?
-What would you ask Cornelius if he were here with us today?
-What ways could Cornelius have photographed himself differently? Why?
-What compositional techniques were used to create interest and balance in this photograph?
-How did creativity and innovation affect this photograph?

Evaluate: *This phase assesses both learning and teaching and can use a wide variety of informal and formal assessment strategies.*

Teacher will ask students to respond to the following questions to discuss as a whole group:
-What is the significance of this photo for the time period depicted?
-What do you think is worth remembering about this photograph?
-What further questions does this image raise in your mind?

The following questions will be individually-written responses:
-What have you learned from exploring this photograph?
-How did creativity influence innovation in this self-portrait?

VI) Unit Resources

Websites:

http://photodoto.com/camera-history-timeline/

This website provides an in-depth collection of camera bodies, beginning in 1500, which can be printed and used to create the walking timeline for lesson #1.

https://contrastly.com/the-evolution-of-photography/
https://petapixel.com/2015/05/23/20-first-photos-from-the-history-of-photography/

These websites provide a collection of notable early photographs. Select photographs from this collection to be printed and used to show the evolution of photographs, in conjunction with the camera bodies, for lesson #1.

http://www.clevelandart.org/art/1995.199.18.a

Provides high-resolution image of George Davison's "The Onion Field", for lesson #2.

https://www.youtube.com/watch?v=ptLmA263hlk

A short documentary about Wilson Bentley ("Snowflake Bentley") the first man to ever photograph a snowflake, used in lesson #3.

http://www.wordle.net/create

Used to create the daguerreotype vocabulary word cloud, used in lesson #4.

https://www.youtube.com/watch?v=d932Q6jYRg8&feature=youtu.be

A short informational video on the Daguerreotype history and photographic process, used in lesson #4.

https://publicdomainreview.org/collections/robert-cornelius-self-portrait-the-first-ever-selfie-1839/

Provides high-resolution image of Robert Cornelius' "Self Portrait", used in lesson #4.

http://www.lilblueboo.com/pinhole-photography

Provides a guideline for children of photograph exposure times and darkroom chemical timing, used during the performance task in the field, and in the darkroom.

Children's Book Used in Lesson #3:

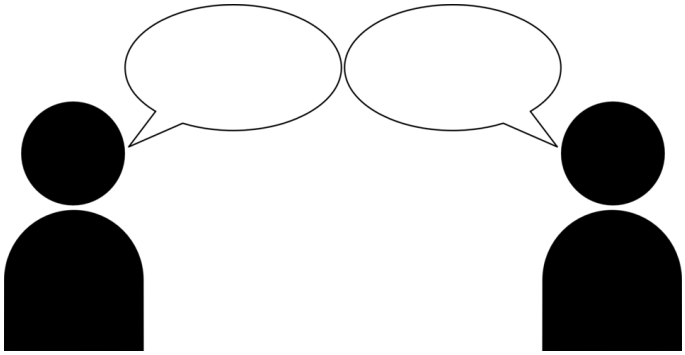
Martin, J. B., Azarian, M., & Houghton Mifflin Company,. (1998). *Snowflake Bentley*. Boston: Houghton Mifflin.

Other Books to Be Considered:

Honovich, N. (2015) *National Geographic Kids Guide to Photography.* Washington, D.C.: National Geographic Society.

Sullivan, G. (2011) *Click! Click! Click! Photography for Children.* New York: Prestel.

<u>Guidelines & Expectations for Socratic Seminar, Lesson #3:</u>



- One person speaks at a time. Listening is your opportunity to take notes and listen carefully to what others are saying.

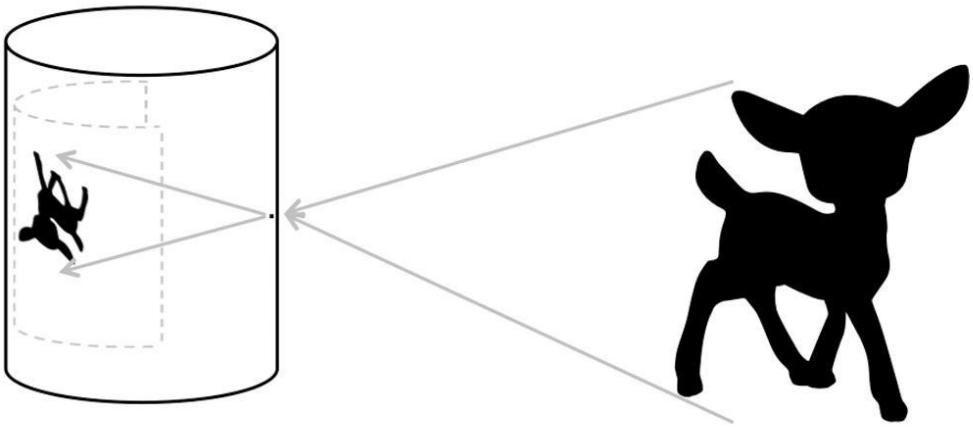
- Try to avoid raising your hand; think about this as more of a "conversation" with your group.

- Be respectful, even if you do not agree with another person's statement.

- Provide detail in your answers or text-based evidence. Explain your thinking.

- Ask for clarification if you do not understand what someone is saying.

Pinhole B&W Photography: Taking a Photo



Wide Angle Pinhole Sample Exposure Times*

Sunny	15 to 20 seconds
Overcast	60 seconds
Cloudy	2 minutes
Indoors	30 minutes to an hour
Nightime	A few hours

these will differ under many conditions so you'll be experimenting as you go. Keep track of exposure times so you can make your own more detailed chart.

www.lilblueboo.com/pinhole-photography

Pinhole B&W Photography: Dark Room 101

Instant dark room: add a Universal Red Junior 11 Watt Safelight to a small desk lamp.

Load and re-load your B&W paper into the pinhole camera while in the darkroom.

Glossy side of the paper should be pointed towards the shutter.

Tray #1: Developer

Place your B&W paper into tray. Rock tray gently until the paper develops to the desired darkness. Lift paper with tongs, drip, & place into Tray #2.

Tray #2: Stop Bath

Rock tray gently for about 10 seconds. Lift paper with tongs, drip, & place into Tray #3.

Tray #3: Fixer

Rock tray gently for at least 2 minutes. Lift paper with tongs, drip, & rinse film paper with warm water for 4 minutes.

Read more at lilblueboo.com/pinhole