

Running Head: S.T.E.M. AND THE VISUAL ARTS

Professional Development Program Plan Submitted by Caroline Wilson on

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Assignment for ADMN 8489

## **Integrating S.T.E.M. (Science, Technology, Engineering, and Math) and the Visual Arts**

### **Program Objectives**

- Participants will gain an understanding of recent research literature relevant to best practices in art education.
- Participants will discuss teaching strategies learned and collaborate using these tactics.
- Participants will gain knowledge of implementation of S.T.E.M. subjects in classroom and professional collaborative techniques.

### **Setting and Target Audience**

The professional development is to be held in a Virginia K-12 public school district setting with elementary art education teachers as the audience. Researchers have found lower attendance rates at after-school workshops than when workshops are held during the school day. This pattern is largely due to teachers feeling overextended (Rena, p. 7). Therefore, the sessions will be held during the professional development designated “early release days” in the school district.

The lessons reviewed during the professional development will emphasize the Virginia fine arts, science, technology, engineering, and mathematics standard course of study. These state-mandated instructional standards may be found on the Virginia Department of Instruction website (“Virginia Department of Education,” 2011).

### **Timeline for Program Delivery**

- 1: First week of school during teacher workdays
  - 2: PD early release day\*
  - 3: PD early release day
  - 4: PD early release day
  - 5: PD early release day
- \*Districts have early release days quarterly during the school year

**Program Design**

There are historical and constructive reasons for designing a teacher-focused professional development. Since 1950s to the present, we have held outdated notions such as the belief that all students learn in the same way and subject areas are best approached discrete bodies of knowledge. These changes as well as the recognition for the need to understand and address diversity in the classroom, have led to the current practice of teaching as a knowledge-driven endeavor, while embracing new knowledge and ways of contextualizing that knowledge (Charland, p.31).

There are several purposes for offering professional development. These motives include the intention of keeping teacher growth curve from falling flat, filling in gaps present in pre-service training, keeping instructors abreast of ongoing pedagogical research and social, economic, and political shifts in educational priorities, and the need for educators to periodically reexamine their beliefs and pedagogical approaches as a result of demographic changes in student populations (p.32).

**Content**

Combining the arts with the S.T.E.M. subjects facilitates student academic growth. Arts education is an essential part of a strong learning community. By establishing cross-curricular relationships in schools will promote the arts and further instructional improvement. Cross-curricular professional development will not take the place of content-specific learning, but offers an addition (Conway et al. p. 8)

A recent study that came out of Chicago found after an intervention of arts integration in math and science, student understanding of content area concepts improved in the three subject areas. Math improved at rate of 72%; Science improved at a rate of 90; and 68% in art (Hanson, p.77).

The elevation of the arts up to important academic standing is evident in the federal No Child Left Behind mandate. Under the legislative directive the arts are included as core subject areas. Professional development is encouraged by the availability of funding for faculty development in and through the arts. States that accepted NCLB funding have been forced to recognize the arts as core subjects, and meet the acts highly qualified teacher's provision (Charland, p.32).

### **Art and Science**

What is Science? According to Merriam-Webster (2012) it is the state of knowing; knowledge or a system of knowledge covering general truths or the operation of general laws especially as obtained and tested through the scientific method. What is art? Merriam-Webster (2012) states it is an occupation requiring knowledge or skill; conscious use of skill and creative imagination especially in the production of aesthetic objects.

From these two definitions we can infer they have knowledge in common. Both are in pursuit of knowledge. Artists interpret the world around them and recreate it through their art.

Students can study science and interpret it through artwork. By recreating what they have learned, students are reinforcing content memorization. Both give us insight into our environment (Weisskopf, p. 478). Both require experimentation (Jacob, p. 118)

Art and science both involve the process of discovery. First, they both ask essential questions. For the scientist it may be, “what is my prediction for my hypothesis?” For the artist it may be, “what drawing methods must I use to make what I am recreating look realistic?”) Second, they will research possible solutions. Third, they use their intuition and research-based knowledge to produce an answer. Fourth, they will reflect back on their experiences to make a conclusion. Lastly, the final product is produced. For the scientist this may be in the form of a published paper and for an artist it is expressed through in their artwork (Karwowski, 154).

In science class, students often conduct experiments to understand why particular outcomes occur. This interaction with their new knowledge assists them in becoming part of their learning. This engagement parallels to art class where students learn a technique and use it to create a product. In combining art and science, students can learn scientific facts and demonstrate their understanding by material reproduction using artistic practices.

Examples of lessons that cover the science element and art element include: 1) Science: Teaching optics, color, and light refraction. Art: Studying the color wheel and making a work of art placing certain colors beside one another to test scientific theories on how the eye views color. 2) Science: Teaching chemistry of paint (compounds and process). Art: Learning how to mix paint colors to achieve lighter or

darker shades and desired pigments for painting. 3) Science: Teacher kinetic energy. Art: Make mobiles based on artwork of Calder. 4) Science: Teacher life cycle of a frog. Art: Students draw or paint the life cycle and make clay frog (Appendix A-E).

Ways to have students reflect on the progress of their own artwork it to have student critiques. This is a time when students are able to review art terminology and peer observe. When we study, interpret, and evaluate art, we want to describe, analyze, interpret, and judge the artwork. There are numerous ways to conduct this part of a unit. One way is for students to assess their own artwork and document their findings (Appendix P). Another way is for them to pick a partner and each examine one another's artwork using terminology from the principals and elements of art (Appendix Q).

Assessment is an important part of the learning process. There are two types of assessments, informal and formal. Informal practices include student participation in class discussion during which questions outlined at beginning of the lesson are reviewed and student understanding is observed. Another informal tactic is when individual students have brief teacher conferences. This conference process involves teacher circulation around classroom assisting students with their art project and offering guidance to any questions they have while simultaneously assessing student process.

There are two sorts of formal assessments and they include student completion of a self-assessment worksheet written in kid-friendly language or a teacher completed rubric (Appendix R and S). Both kinds of assessment require teacher-student

feedback. Teacher feedback gives students guidance on how they are developing and areas for improvement.

### **Art and Technology**

What is technology? Merriam-Webster (2012) recalls it as practical application of knowledge especially in a particular area; a manner of accomplishing a task especially using technical processes, methods, or knowledge. What is art? Merriam-Webster (2012) note, it is an occupation requiring knowledge or skill; conscious use of skill and creative imagination especially in the production of aesthetic objects.

Both definitions highlight each subject's utilization of knowledge for innovative creations. These two fields place emphasis on generating new products or ideas. These inventive arenas benefit from integrating with one another. Art can implement technology into its process to form new art methods and technology can use artistic concepts to advance creativity and stimulate interest. Technology integration in school curriculum is essential for 21<sup>st</sup> century learners; art education is no different and must embrace this technology. Many art teachers have access to computer labs, Smartboards, iPads, and other electronic devices.

Integration of both subjects is not limited to students but may be a useful professional tool. Teachers are able to effectively and efficiently collaborate with fellow colleagues who teach at neighboring schools. Granger (2012) recognizes art educators are able to share best practices via wiki pages, websites, software, virtual meetings (Skype, Wimba, Go to Meeting, etc.), instant messenger, message boards, and blogs.

Examples of lessons that cover the technology component with the visual arts include: 1) Technology: Student interaction with interactive Smartboard, Art: Kindergartners learn colors and line patterns. 2) Technology: Students utilize Smartboard. Art: Students learn symmetry, pattern, shapes, and about Native American mask making. 3) Technology: Computer research and PowerPoint creation. Art: Students research art history on computers and create power points to share with class (Appendix F-I).

### **Art and Engineering**

What is engineering? Merriam-Webster (2012) states it is the application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people; the design and manufacture of complex products. What is art? Merriam-Webster (2012) recalls it as an occupation requiring knowledge or skill; conscious use of skill and creative imagination especially in the production of aesthetic objects. Engineering and art have the process of design in common. Many times, engineers must be creative in their problem-solving and structural design endeavors. Artists also must be inventive in their quest to create new artistic methods.

The link between these two fields is most evident in the engineering aspect of architecture. The architect makes a hypothesis for how people live their lives (Ames, p. 195). In other words, the architect must predict how humans want to use a space they build. The job of the engineer is to make this proposed function reality. The artistic component is revealed when the structure has aesthetic properties that make it

appealing to the eye. As architect, Louis Sullivan (1887) noted, “form follows function.”

Examples of lessons that join engineering with the visual arts include: 1) Engineering: Students learn about forms of transportation. Art: Students paint or draw a type of transportation in action. 2) Engineering: Students study buildings, their materials, and invention of steel. Art: Students create a city-scape collage emphasizing the creation of skyscrapers. 3) Engineering: Students learn about building design. Art: Students use the Google program “Sketch-Up” to create a room design using 2-point perspective (Appendix J-K).

### **Art and Mathematics**

What is mathematics? Merriam-Webster (2012) declares it as the science of numbers and their operations, interrelations, combinations, generalizations, and abstractions and of space configurations and their structure, measurement, transformations, and generalizations. What is art? Merriam-Webster (2012) refers to it as an occupation requiring knowledge or skill; conscious use of skill and creative imagination especially in the production of aesthetic objects. These definitions indicate the similarities between art and math. Both are concerned with spatial relationships, sequencing, measurements, and transformations. Many times artists are concerned with space present in their artwork, patterns, and the measurement of a particular medium or component. They use this information to determine how to configure their artistic creation. Mathematicians maybe expressed and demonstrated

with the use of artistic methods. Both subjects focus on harmony. In mathematics, harmony is expressed in the form of ratio or proportion (Farsi & Craft, p. 13). Artists have focused on harmony as exemplified with Georges Seurat's line and harmony study (Roslak, p. 387)

Lesson examples that link math and art together include: 1) Math: Fractions are taught. Art: Students create an underwater ocean scene with all creatures made out of parts of fractions or create a quilt design based on fractions. 2) Math: Volume, mass, and shape are studied. Art: Students create a collage using shapes learned or a clay sculpture illustrating various shapes and mass. 3) Math: Angles and lines studied. Art: Students create an abstract line design using the angles learned. 4) Math: Repetition, space, and shapes are studied. Art: Students create tessellations (Appendix L-O).

### **Delivery**

The delivery approach of this professional development is based on many factors. These facets include art teacher attrition, morale, areas for improvement, possible resolutions, professional needs, program benefits, and professional development assessment. Art teachers are at risk of leaving the profession. A study conducted 2004 by the National Center for Education Statistics (NCES) revealed evidence that points to arts and music teachers being at great risk for leaving their current teaching positions. The study results noted the profession as one with a history of burnout, job dissatisfaction, and teacher attrition (Scheib, p. 5). Human capital theory, alienation, and self-blame provide a useful lens to view arts educator professional longevity and job dissatisfaction. *Human capital theory* suggests there is a positive correlation

between the level of investment or ownership one has in a position or career and their propensity to remain in that position or career. For teachers, this is reflected in the decreased attrition rate after the first few years of teaching; with each passing year the teacher is less likely to leave the profession (p. 5). Especially for new teachers, where feelings of alienation or isolation can influence both job satisfaction and teacher attrition (p. 6).

Art educators hold job positions that are between organizations or systems, known as *boundary positions*. These individuals are more susceptible to stress. Like the teacher-coach, fine arts teachers also have dual roles: as artist and as teacher (p.7). Art teachers are entering into a work environment that does not necessarily encourage or support their own individual artistry or musicianship. Some arts teachers experience increased alienation and withdrawal as they struggle with their role-identity (p. 9).

There is much room for improvement in the area of art educator professional development. Art teachers do not get a lot as we have traditionally focused PD on the core subject areas. For the most part, states and districts remain at a loss regarding what to offer art teachers in the way of content-based professional development, and often turn such responsibility over to nonprofit arts agencies or advocacy organizations (Charland, p. 33). Professional development for art educators lacks subject-area relevance, consistency, rigor, and venues for disseminating new knowledge (p. 38).

Solutions exist to prevent unsatisfied art teachers. We need to engage their artistic side. Simply put, we will not get our best and brightest to buy into a teacher identity if

it is of lower status than the artist or musician identity. Vital to have hand's on PD for art teachers where they have opportunity to create and call upon their creative instincts (Scheib, p. 7). Because fine arts teachers value their identities as artists, in keeping them holistically fulfilled with their arts teaching career, professional development should not only include support of their arts teacher identity, but also their identity as artists (p. 9). Professional development activities for all teachers have been largely geared toward the "traditional" academic subject teachers, ignoring the different and sometimes unique needs of arts educators. Arts teachers need content-based professional development (Conway et al. p. 3).

Art teachers are aware of their professional development needs. When asked, they want workshop topics to cover expanding repertoires that lead to student achievement, addressing standards, discussing exciting and controversial curricular approaches, and desire learning and practicing innovative studio skills (Charland, p.36). Rena (2005) noted: work with teachers should include theory, demonstration, practice, and feedback. Information disseminated should be over multiple sessions, contain follow-up sessions, and be continual (p. 8).

Several benefits will be recognized from the professional development dissemination. These positives include better morale, relief of isolation, teacher collaboration opportunities, and professional engagement. The morale boost that comes from engaging with peers who share one's values and challenges (Charland, p. 32). Arts teachers are prone to alienation and isolation due the specialized nature of their subject area that results in fewer colleagues with matching backgrounds,

experiences, and interests (Scheib, p. 6). Regular professional meetings help to relieve the sense of isolation felt by many K-12 art educators, maintain an atmosphere of camaraderie and mutual support, and move the profession toward particular goals (Charland, p. 32). Art educators have little supportive networks within their place of employment as they often are one of the few (or only) teachers in their school that specializes in their respective field (Scheib, p. 6). Many of the teachers described how working collaboratively challenged them to listen to different points of view and caused them to question their once firmly held beliefs. During a phone interview, one teacher described it this way (Lind, p. 9). Being engaged in creating art can be the most effective and rewarding of all approaches to understanding and gaining knowledge in the discipline (Scheib, p. 9). Professional development opportunities facilitate self-examination and redirection, allowing peer educators to discuss educational issues in a learning-community situation composed of colleagues with diverse strengths and backgrounds (Charland, p. 32).

A pre-survey distributed to teachers prior to meeting will determine baseline. The information gathered will determine the effectiveness of the professional development. A post-test will follow the professional development program. More detailed, specific data can be collected at the conclusion of each workshop by providing attendees with an assessment instrument that allows them to rate the success of the workshop, the utility of the content, and the effectiveness of the instructor. Such reports can be compared to the instructor's goals and expectations (p. 38). There will be a survey determining participant's satisfaction and an opportunity for suggestions for

improvement. A short instrument containing two to five questions either mailed or available online is more likely to yield a positive response rate than a long questionnaire. The following are rules to keep in mind for questionnaires: Ask only for information that is essential for goal setting and program planning; Keep the language simple and clear; Avoid tendentious phraseology; Link the questions back to the objectives; and always provide opportunities for open-ended responses (Gillespie & Robertson, p. 103).

## **Five Modules Outline**

### **Module 1**

#### **Objectives**

- Teacher will understand the value in linking art education to the S.T.E.M. subject areas.
- Teacher will reflect on their own experience with correlating the arts with the S.T.E.M. subjects.
- Teacher will work collaboratively with colleagues to produce new lessons correlating the arts with the S.T.E.M. subjects.
- Teacher will learn new lessons to teach students that correlate the S.T.E.M. subjects with the arts.
- Teacher will produce their own product and share with fellow teachers.

**Duration:** 4 hours

#### **Activity Descriptions**

- i. Pre-test teachers for baseline knowledge

#### **Baseline Program Pre-Test**

- 1) **The workshop benefited my needs as an art educator by demonstrating ways to incorporate the S.T.E.M. subjects in my art lessons.**

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

**2) Current research reviewed during this session supports the notion that students academically benefit from integrating the fine arts with the S.T.E.M. subjects.**

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**3) Lack of access to materials and technology has hindered my ability to apply S.T.E.M. components to my art lessons.**

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**Table 1. Participant Pre-Test Questionnaire Results for Professional Development**

	<b>Total Number of Participants</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
<b>Question 1</b>						
<b>Question 2</b>						
<b>Question 3</b>						

- ii. Provide overview of program and objectives via PowerPoint. (Appendix T).
- iii. Discussion period where teachers brainstorm their own experiences
- iv. Collaborative Lesson Planning in groups
- v. Groups share out the lessons they created
- vi. Break-out session where teachers have independent time to create a piece of art out of one of the lesson ideas presented
- vii. Teachers share completed samples with the group
- viii. Wrap up: Homework is to bring their curriculum guides next meeting; bring assessment rubrics they use in their classroom; locate lesson plans that correlate the arts with the S.T.E.M. instruction; email all the grade level chairs and ask what time of year they teach their subjects. Ex) January 2<sup>nd</sup> grade teachers teach life cycle in science.
- ix. Teacher Module Evaluation

**Module 1 Evaluation**

**1) The workshop benefited me as an art educator by demonstrating ways to incorporate assessments in my art lessons.**

Strongly Agree  
Agree

Neutral  
Disagree  
Strongly Disagree

**2) I will use more lessons that combine art education with the S.T.E.M. subject areas.**

Strongly Agree  
Agree  
Neutral  
Disagree  
Strongly Disagree

**Table 2. Module 1 Participant Questionnaire Results for Professional Development**

	<b>Total Number of Participants</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
<b>Question 1</b>						
<b>Question 2</b>						

**Module 2**

**Objectives**

- Teacher will understand the value in linking art education to the science portion of the S.T.E.M. subject areas.
- Teacher will reflect on their own experience with correlating the arts with science.
- Teacher will work collaboratively with colleagues to produce new lessons correlating the arts with science.
- Teacher will learn new student lessons correlating science with the arts.
- Teacher will produce their own product and share with fellow teachers.
- Teacher will review rubrics and assessment strategies.

**Duration:** 4 hours

**Activity descriptions**

- i. PowerPoint presentation outlining how science and art are related (Appendix U).
- ii. Discussion period where teachers brainstorm their own experiences
- iii. Collaborative Lesson Planning in groups using the state curriculum guides and school-wide instruction chronology from grade level chairs
- iv. Groups share out the lessons they created
- v. Break-out session where teachers have independent time to create a piece of art out of one of the lessons ideas presented
- vi. Teachers share completed samples with the group
- vii. Discuss assessment types and review rubrics teachers bring in as requested from last meeting
  1. Brainstorm with teachers assessment practices that have worked
  2. Review types of informal and formal art education assessments.
- viii. Handout example student self-assessments and rubrics
- ix. Review the importance of teacher feedback for students
- x. Wrap up: Homework is to bring their curriculum guides next meeting and locate lesson plans that correlate the arts with the S.T.E.M. instruction.
- xi. Teacher Module Evaluation

**Module 2 Evaluation**

**1) The workshop benefited my needs as an art educator by demonstrating ways to incorporate science in my art lessons.**

Strongly Agree  
 Agree  
 Neutral  
 Disagree  
 Strongly Disagree

**2) I will use more lessons that combine art education with science.**

Strongly Agree  
 Agree  
 Neutral  
 Disagree  
 Strongly Disagree

**Table 3. Module 2 Participant Questionnaire Results for Professional Development**

	<b>Total Number of Participants</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
<b>Question 1</b>	4	3	1			
<b>Question 2</b>	4	4				

**Module 3****Objectives**

- Teacher will understand the value in linking art education to the technology portion of the S.T.E.M. subject areas.
- Teacher will reflect on their own experience with correlating the arts with technology.
- Teacher will work collaboratively with colleagues to produce new lessons correlating the arts with technology.
- Teacher will learn new lessons to teach students that correlate technology with the arts.
- Teacher will produce their own product and share with fellow teachers.

**Duration** 4 hours**Activity descriptions**

- i. Review of how science and technology are related via PowerPoint (Appendix V).
- ii. Discussion period where teachers brainstorm their own experiences
- iii. Collaborative Lesson Planning in groups using the state curriculum guides and school-wide instruction chronology from grade level chairs
- iv. Groups share out the lessons they created
- v. Break-out session where teachers have independent time to create a piece of art out of one of the lessons ideas presented
- vi. Teachers share completed samples with the group
- vii. Wrap up: Homework is to bring their curriculum guides next meeting and locate lesson plans that correlate the arts with the S.T.E.M. instruction.
- viii. Teacher Module Evaluation

**Module 3 Evaluation**

- 1) **The workshop benefited my needs as an art educator by demonstrating ways to incorporate technology in my art lessons.**

Strongly Agree  
 Agree  
 Neutral  
 Disagree  
 Strongly Disagree

**2) I will use more lessons that combine art education with technology.**

Strongly Agree  
 Agree  
 Neutral  
 Disagree  
 Strongly Disagree

**Table 4. Module 3 Participant Questionnaire Results for Professional Development**

	<b>Total Number of Participants</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
<b>Question 1</b>						
<b>Question 2</b>						

**Module 4**

**Objectives**

- Teacher will understand the value in linking art education to the engineering portion of the S.T.E.M. subject areas.
- Teacher will reflect on their own experience with correlating the arts with engineering.
- Teacher will work collaboratively with colleagues to produce new lessons correlating the arts with engineering.
- Teacher will learn new lessons to teach students that correlate engineering with the arts.
- Teacher will produce their own product and share with fellow teachers.

**Duration** 4 hours

**Activity descriptions**

- i.** Review of how engineering and art are related via PowerPoint (Appendix W).
- xii.** Discussion period where teachers brainstorm their own experiences
- xiii.** Collaborative Lesson Planning in groups using the state curriculum guides and school-wide instruction chronology from grade level chairs
- xiv.** Groups share out the lessons they created
- xv.** Break-out session where teachers have independent time to create a piece of art out of one of the lessons ideas presented
- xvi.** Teachers share completed samples with the group
- xvii.** Wrap up: Homework is to bring their curriculum guides next meeting and locate lesson plans that correlate the arts with the S.T.E.M. instruction.
- xviii.** Teacher Module Evaluation

**Module 4 Evaluation**

**1) The workshop benefited my needs as an art educator by demonstrating ways to incorporate engineering in my art lessons.**

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**2) I will use more lessons that combine art education with engineering.**

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**Table 5. Module 4 Participant Questionnaire Results for Professional Development**

	<b>Total Number of Participants</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
<b>Question 1</b>						
<b>Question 2</b>						

**Module 5****Objectives**

- Teacher will understand the value in linking art education to the mathematics portion of the S.T.E.M. subject areas.
- Teacher will reflect on their own experience with correlating the arts with mathematics.
- Teacher will work collaboratively with colleagues to produce new lessons correlating the arts with mathematics.
- Teacher will learn new lessons to teach students that correlate mathematics with the arts.
- Teacher will produce their own product and share with fellow teachers.

**Duration** 4 hours

**Activity descriptions**

- i. Review of how mathematics and art are related via PowerPoint (Appendix X).
- ii. Discussion period where teachers brainstorm their own experiences
- iii. Collaborative Lesson Planning in groups using the state curriculum guides and school-wide instruction chronology from grade level chairs
- iv. Groups share out the lessons they created
- v. Break-out session where teachers have independent time to create a piece of art out of one of the lessons ideas presented
- vi. Teachers share completed samples with the group
- vii. Resource and conference discussion (Appendix Y).

A valuable resource for teachers is the art education state conferences.

Conferences are able to concentrate more closely on the specific needs of art educators in each state and address specific regional and local policy issues that impact the teaching of art (Charland, p.33). National conferences, although logistically farther away from the school district, are tendered by national and state educational organizations and offer useful discipline-specific professional development opportunities (Charland, p.33).

- viii. Wrap Up: Recap of program and reflection
- ix. Post assessment and survey to determine teacher learning during professional development and their satisfaction with delivery

**Module 5 Evaluation**

- 1) The workshop benefited my needs as an art educator by demonstrating ways to incorporate mathematics in my art lessons.**

Strongly Agree  
 Agree  
 Neutral  
 Disagree  
 Strongly Disagree

- 2) I will use more lessons that combine art education with mathematics.**

Strongly Agree  
 Agree  
 Neutral  
 Disagree  
 Strongly Disagree

**Table 6. Module 5 Participant Questionnaire Results for Professional Development**

	<b>Total Number of Participants</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
<b>Question 1</b>						
<b>Question 2</b>						

**Program Post-Test**

- 1) The workshop benefited my needs as an art educator by demonstrating ways to incorporate the S.T.E.M. subjects in my art lessons.**

Strongly Agree  
 Agree  
 Neutral  
 Disagree  
 Strongly Disagree

- 2) Current research reviewed during this session supports the notion that students academically benefit from integrating the fine arts with the S.T.E.M. subjects.**

Strongly Agree  
 Agree  
 Neutral  
 Disagree  
 Strongly Disagree

**3) Lack of access to materials and technology has hindered my ability to apply S.T.E.M. components to my art lessons.**

Strongly Agree  
 Agree  
 Neutral  
 Disagree  
 Strongly Disagree

**Table 7. Participant Pre-Test Questionnaire Results for Professional Development**

	<b>Total Number of Participants</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
<b>Question 1</b>						
<b>Question 2</b>						
<b>Question 3</b>						

The data gathered from the teacher evaluation segment is beneficial for future professional delivery planning. The purpose of this program is to provide succinct information and methods to facilitate art education teachers in linking S.T.E.M. (Science, Technology, Engineering, and Math) lessons with the visual arts. Information teachers communicate will assist in identifying program areas in need of improvement and future topics to include.

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## Appendix A

### Science: Clay Frog

#### Objectives 2<sup>nd</sup> Grade

- The student will use environmental themes and historical events as inspiration for works of art. (Fine Arts VASOL 2.5)
- The student will create a work of art from observation. (Fine Arts VASOL 2.6)
- The student will identify and use a variety of sources for art ideas, including nature, people, images, imagination, and resource materials. (Fine Arts VASOL 2.9)
- The student will create a three-dimensional work of art, using a variety of materials. (Fine Arts VASOL 2.10)
- The student will create a work of art by manipulating clay. (Fine Arts VASOL 2.11)
- The student will investigate and understand that plants and animals undergo a series of orderly changes in their life cycles. Key concepts include some animals (frogs and butterflies) undergo distinct stages during their lives, while others generally resemble their parents. (Science VASOL 2.4)

Vocabulary Clay, Kiln, Shape, Texture, Pattern, and Line

Materials -Clay -Clay tools -Water cups -Newspaper print (9" x 12")  
-"Art smock"

#### Procedure

- 1) Discuss as a class where clay comes from.
- 2) Discuss what we are making and the procedures/process.
- 3) They are given an "art smock" to wear during the activity.
- 4) Students will pick up the clay that has been placed on their newsprint paper, twist and break it into two pieces and place it back down on the paper.
- 5) Students will pick up the largest piece out of the two and twist and break and place down on paper.
- 6) Students will pick up the largest piece out of the three and pinch off a dime-sized piece. Separate this piece into two parts.
- 7) Students will pick up the largest piece of clay and roll into a ball and then pinch the top of the ball until it is a "bowling ball" shape.
- 8) Flatten the piece on the surface (table). One side the "bowling ball" is not flat. Put down piece.
- 9) The remaining two large pieces of clay will be rolled into separate balls and then rolled into three "snake-like" shapes.

- 10) Throughout the lesson students may dip their fingers into the water (on the table) and use it to smooth out the cracks and crevasses of the clay.
- 11) Next, they will pick up one of the “snake like” shapes and place it on the flattened part of the bowling ball horizontally. Repeat the same step with the second one.
- 12) Students will gently press the snakes into the surface until it becomes flat again.
- 13) Turn the shape over and scrunch up the legs.
- 14) Take two small clay pieces remaining. Roll one into a ball and place it onto the head of the frog. Repeat with the other piece.
- 15) Students may use their clay tools to add lines for the feet and add shape and pattern to the frog. This process will help to create a look of texture. They will also use the tools to add the circles of the eye and mouth.
- 16) When they are finished creating their turtle they are to write their initials and teacher/grade on the bottom of the frog.
- 17) Next class period the students will paint their clay frogs.

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## Appendix B

### Science: Art and Frogs

#### **Objectives 2<sup>nd</sup> Grade**

- The student will use environmental themes and historical events as inspiration for works of art. (Fine Arts VASOL 2.5)
- The student will create a work of art from observation. (Fine Arts VASOL 2.6)
- The student will identify and use a variety of sources for art ideas, including nature, people, images, imagination, and resource materials. (Fine Arts VASOL 2.9)
- The student will create a three-dimensional work of art, using a variety of materials. (Fine Arts VASOL 2.10)
- The student will create a work of art by manipulating clay. (Fine Arts VASOL 2.11)
- The student will investigate and understand that plants and animals undergo a series of orderly changes in their life cycles. Key concepts include some animals (frogs and butterflies) undergo distinct stages during their lives, while others generally resemble their parents. (Science VASOL 2.4)

**Vocabulary** Life-Cycle, Illustrator, Two Dimensional, Three Dimensional, Pattern, Habitat, Clay, Kiln

#### **Materials**

-White construction paper (9" x 12") -Pencil -Eraser -Smartboard -Clay tools - Water -Clay -Markers -Visual examples of frogs in nature, frog drawings, completed clay frog -Auditory examples of frog calls/croaking -Clay paint/glaze - Sounds from Nature CD -"Frogs" by Gail Gibbons -Smocks

#### **Procedure**

- 1) Relate this lesson to chicks and life-cycles studied in classroom.
- 2) Read class questions on board and tell them by the end of the lesson they will know and be asked the following:
  - What are frog babies called?    -Do frogs have tails?    -Are frogs all green?
  - Do frogs have patterns on their skin?    -Where do they live?
  - How are art and science related?
- 3) Read "Frogs" by Gail Gibbons to class. Remind students it is an AR book and as they notice the pictures, illustrators are artists also.
- 4) Review life-cycles with Smartboard: Show pictures of different kinds of frogs while asking questions.
  - \*notice the adult frog has lost its tail

- \*where do they live? Ponds, streams, lakes
  - \*tell them to pay attention to the patterns, colors, and shapes on the frog's skin because we will be drawing and painting these shapes, colors, and patterns later.
  - \*what type of feet do they have?
  - \*using their art terms what do they notice about the shapes of adult frogs?
  - \*Colors?
  - \*Do they have patterns? If so, what do these patterns look like?
  - \*What is the shape of their eyes? How large are they?
- 5) Play various frog croaking patterns (downloaded from frog-themed website).
  - 6) Students are shown a 2-D drawing of a frog within its habitat. Using drawing materials and paper they will create their own.
  - 7) Play sounds from nature CD while they are working.
  - 8) Ask students how art and science are related?
  - 9) Students create a 3-D clay frog sculpture. The clay will represent our interpretations of frogs, what they look like, their shape, and their color. The clay is similar to way the skin of frog's feels.
  - 10) Students will follow teacher's steps in dividing and molding, pinching, and kneading clay.
  - 11) Using clay tools, students will add pattern and design to their piece.
  - 12) After they written their initials on the underneath portion of the frog, students leave frog on tray at their table and clean up.
  - 13) The next art class, students will paint the bisque fired clay frogs and review the life cycle.

### Useful websites

<http://en.wikipedia.org/wiki/Frog>  
<http://www.kiddyhouse.com/Themes/frogs/>  
<http://allaboutfrogs.org/weird/general/songs.html>  
<http://gets.gc.k12.va.us/elementary/lifecycles/frogs.htm>

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## Appendix C

### Science: Penguins

#### **Objectives 2<sup>nd</sup> Grade**

- The student will use literary sources to generate ideas for works of art. (Fine Arts VASOL 2.3)
- The student will identify and use: shapes—geometric and organic; three-dimensional forms—cube, cylinder, sphere, pyramid, and cone. (Fine Arts VASOL 2.4)
- The student will identify and use a variety of sources for art ideas, including nature, people, images, imagination, and resource materials. (Fine Arts VASOL 2.9)
- The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include effects on growth and behavior of living things (migration, hibernation, camouflage, adaptation, dormancy). (Science VASOL 2.7)

**Vocabulary** Pattern, Shape, Line, Cool colors, Warm colors, Overlap, Oval, Circle, Square, and Triangle.

**Materials** -4”x 12” white construction paper -12” x 18” colored construction paper  
 -Scissors -6” x 9” cool colored construction paper -2” x 2” white construction paper  
 -Markers -5” x 5” cool colored construction paper -3” x 3” assorted colored squares  
 -4” x 4” warm colored construction paper -2” x 2” warm colored construction paper  
 -3” x 3” assorted winter wrapping paper squares -Visual examples of penguin pictures

#### **Procedure**

- 1) Students discuss penguins and review what is learned in classroom. We read National Geographic’s “March of the Penguin” book together.
- 2) Tear white construction paper so one side has a jagged edge (snow) and glue onto bottom of 9”x 12” paper. Add name and teacher’s name on back of artwork.
- 3) Fold 6” x 9” paper in half and students cut half large oval out to create the penguin belly. Glue onto large 12” x 18” construction paper.
- 4) Cut large half circle out of 5” x 5” paper and glue onto belly for the head.
- 5) Fold 6” x 9” paper in half and students cut out (on open edge) a long skinny oval for the wings. Glue onto penguin.
- 6) Add pattern to belly and lines to wings with cool colored markers.

- 7) Fold a piece of 4" x 4" warm colored construction paper and cut out a half oval shape for the feet. Add lines using warm colored markers.
- 8) Overlap two 2" x 2" white construction paper pieces and cut out one circle for the eyes. Add pupils with dark markers. Glue onto head.
- 9) Using one piece of 2" x 2" warm colored construction paper, cut out a triangle. Using marker, add nostrils. Glue onto head.
- 10) Add pattern to the background of paper using cool colored markers.

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## Appendix D

### Science: Fall Leaves

#### **Objectives 4<sup>th</sup> Grade**

- The student will identify and use variety, repetition, and unity in a work of art. (Fine Arts VASOL 4.5)
- The student will identify and use a variety of lines in a work of art. (Fine Arts VASOL 4.6)
- The student will identify positive and negative space in works of art. (Fine Arts VASOL 4.8)
- The student will investigate and understand basic plant anatomy and life processes. Key concepts include the structures of typical plants (leaves, stems, roots, and flowers); processes and structures involved with reproduction (pollination, stamen, pistil, sepal, embryo, spore, and seed); photosynthesis (sunlight, chlorophyll, water, carbon dioxide, oxygen, and sugar); and dormancy. (Science VASOL 4.4)

**Vocabulary** Warm colors, Overlap, Line, Symmetrical, Texture, Negative Space

#### **Materials**

-11" x 11" white watercolor paper    -"Sharpie" marker   -Colored pencils  
 -12" x 18" colored construction paper for matting artwork   -Pencil   -Eraser   -  
 Smartboard   -Scratch paper for tracing leaves   -Brush   -Water container   -Markers  
 (fall colors)   -Visual examples of leaves and fall scenes

#### **Procedure**

- 1) Students are shown examples of real Fall leaves. They are asked to describe the texture of the leaves.
- 2) Students are shown examples and interact with virtual leaves (using technology) and asked questions. Ex) What are their shapes? Ex) Are the leaves symmetrical? Ex) What do they notice about these examples? Ex) What does symmetrical mean? Ex) Do they have lines? Ex) Are the leaves all green? Ex) Why not? Ex) What colors do leaves turn in the fall?
- 3) Using newsprint paper, draw 3-4 leaves the size of your hand.
- 4) Trace over the leaves with "sharpie."
- 5) Using a piece of watercolor paper, trace all of your leaves (onto the white paper).
- 6) Take a few of the leaves and retrace on the white paper again, but this time overlap some of the leaves. Also, make a few leaves continue off the page.
- 7) Repeat step 6 until there are at least 7 leaves on your white paper.

- 8) Using thick lines, go over outlines of leaves and veins with warm and brown color markers (oranges, browns, yellows, reds, magentas, purples, pinks, and iguana green).
- 9) Choose two color pencils in fall colors (same as above).
- 10) Turn them on their side and lightly shade the negative space around leaves.
- 11) Use water soaked paint brush to paint over leaves. This process is called “painting with marker.”
- 12) Once artwork is dry, students may mat artwork onto fall colored construction paper.

\*After initial class, read with class AR books on trees and leaves as a review. Ex) “Trees” by Peter Mellett; Ex) “It Could Still Be a Tree” by Allan Fowler

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## Appendix E

### Science: Solar System

#### Objectives 1<sup>st</sup> Grade

- The student will create art from real and imaginary sources of inspiration. (Fine Arts VASOL 1.5)
- The student will develop eye/hand coordination by drawing and constructing. (Fine Arts VASOL 1.8)
- The student will investigate and understand the basic relationships between the sun and the Earth. Key concepts include the sun is the source of heat and light that warms the land, air, and water; and night and day are caused by the rotation of the Earth. (Science VASOL 1.6)

#### Review/Anticipatory Set

What do you find in the sky? (night and day) --clouds, sun, moon, stars, birds, planets, planets, planes, spaceships, astronauts, hot air balloons, helicopters, etc. Review formal elements and vocabulary. .

#### Vocabulary

Composition, Line, Elements of the solar system, Planets, Design, and Balance

#### Materials

-12 x 18 white const. paper -"Changeable" Markers -CD -Pencil -"Sharpie"  
-6 x 6 scrap paper

#### Procedure

- 1) On 12 x 18 paper, trace a CD (with pencil).
- 2) On square scraps, draw a ray then cut out.
- 3) Go around circle and trace ray (and flip and continue around). Rays may go off page.
- 4) Draw half circle on scrap paper and cut out.
- 5) Trace half circle on two sides (for eye lids).
- 6) Now add detail and go over with "Sharpe" (eyeballs, eyelashes, nose, lips, eyebrows, and cheeks). Color in with marker.
- 7) Color, add design, (may use "Changeable" markers), and may add border.



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## Appendix F

### Technology: 1-Point Perspective

#### Objectives 5<sup>th</sup> Grade

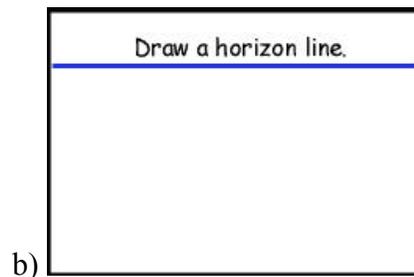
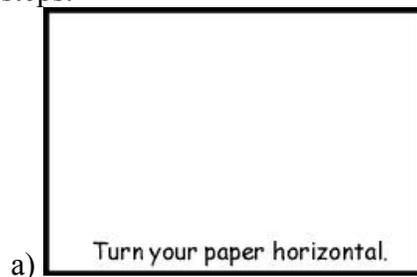
- The student will practice responsible use of technology systems, information, and software. (Technology VASOL 3-5.4)
- The student will use technology resources for solving problems and making informed decisions. (Technology VASOL 3-5.7)
- The student will synthesize information to produce works of art. (Fine Arts VASOL 5.1)
- The student will use linear perspective in a work of art. (Fine Arts VASOL 5.10)
- The student will use technology to produce a work of art. (Fine Arts VASOL 5.13)

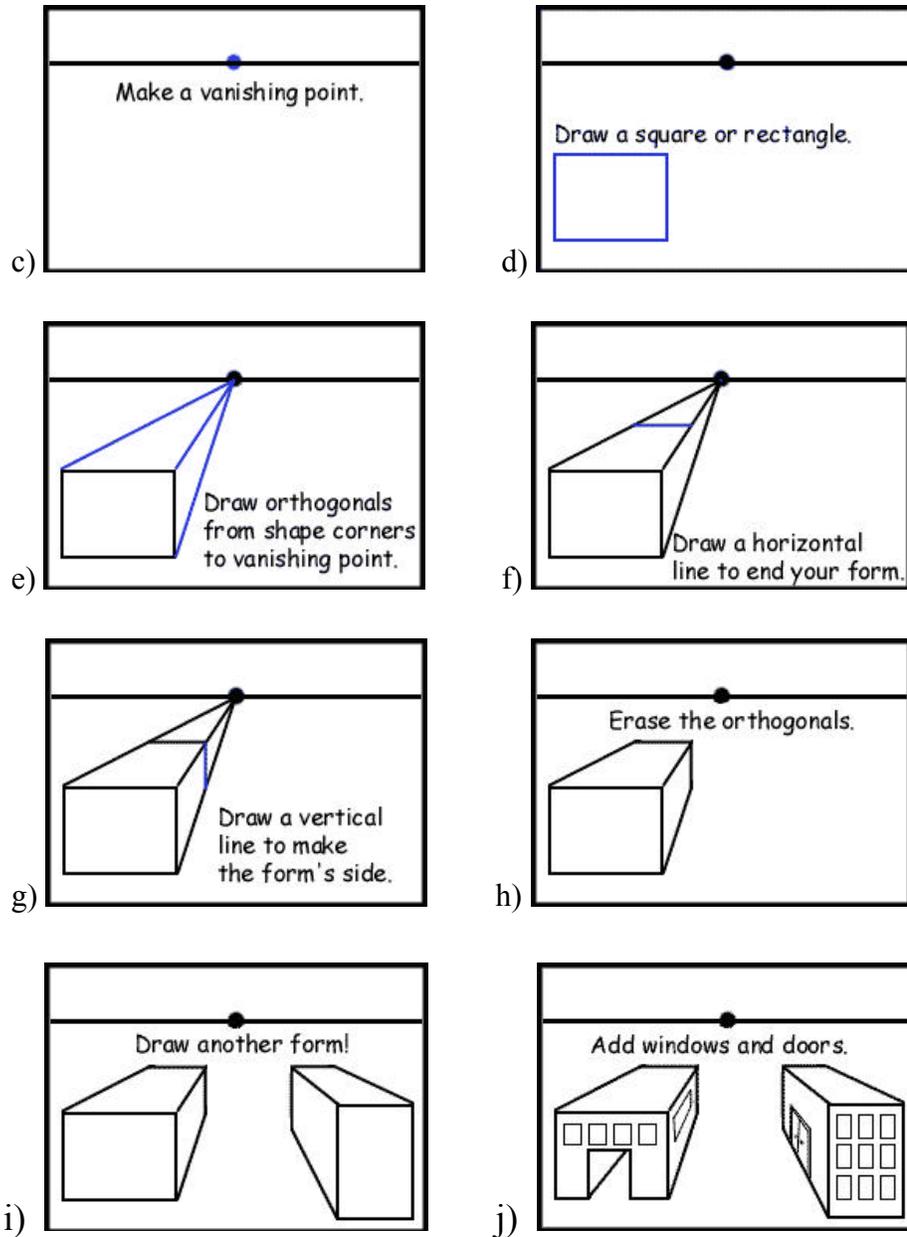
**Vocabulary** Linear Perspective/1-point perspective, 3-D, 2-D, Vanishing Point, Horizon Line, Orthogonal, Vertical, Interior

**Materials** -Computer Lab -Google “Sketch-Up” website:  
<http://sketchup.google.com/intl/en/download/gsuwentthankyou.html>  
 -Typing Paper -Printer -Drawing Paper -Ruler -Pencil

#### **Procedure**

- 1) Discuss as a class what is 1-point perspective.
- 2) Take students to computer lab where they will use “Google Sketch-Up” to create their own interior room using 1-point perspective.
- 3) Next they will create their own 1-point perspective drawing using the following steps:





Lesson Steps and images Courtesy of [http://www.princetonol.com/groups/iad/lessons/middle/lp\\_1pt\\_handout.pdf](http://www.princetonol.com/groups/iad/lessons/middle/lp_1pt_handout.pdf) copyright

## **Appendix G**

### **Technology: Color Theory**

#### **Objectives 3<sup>rd</sup> Grade**

- The student will demonstrate proficiency in the use of technology. (Technology VASOL K3-5.2)
- The student will practice responsible use of technology systems, information, and software. (Technology VASOL 3-5.4)
- The student will identify and use colors—red, blue, yellow, green, orange, violet, brown, black, and white; shape—circle, square, triangle, rectangle, and oval. (Fine Arts VASOL K.3)
- The student will develop art ideas from a variety of sources, including print, non-print, and technology. (Fine Arts VASOL 3.3)
- The student will identify and use intermediate colors; warm and cool colors. (Fine Arts VASOL 3.4)

**Vocabulary** Red, Blue, Green, Yellow, Purple, Orange, Primary Colors, Secondary, Warm/Cool Colors, Hue, Complementary, and Tertiary Colors

**Materials** -Smartboard -Smartboard tools (“wand”) -Computer  
-Colors Smartboard software -Color Wheel

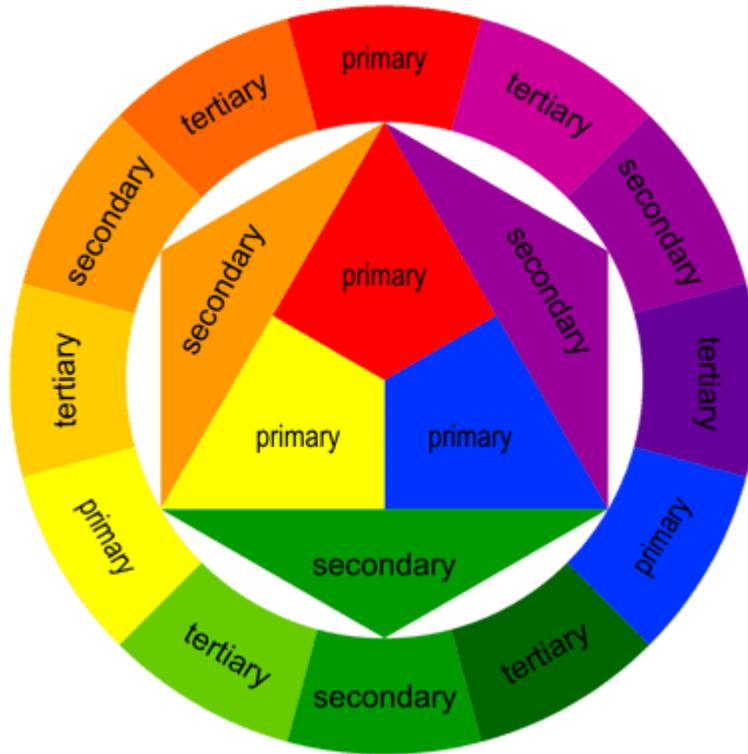
#### **Procedure**

- 1) Discuss as a class colors. What are the primary colors? What are the secondary colors?
- 2) Explain Warm, Cool, Complementary Colors, and Tertiary
- 3) Students take turns interacting with Smartboard technology and website (below) to recall colors and the categories they are under.
- 4) When one student is finished, they choose a classmate to come to the board. This process continues until every child has the opportunity to participate.
- 5) At the end of the lesson the class may discuss when in nature and their surroundings they find these colors.

#### **Websites for Smartboard interaction**

<http://express.smarttech.com/?url=http://exchangedownloads.smarttech.com/public/content/20/20a11e8e-4b6f-4563-ad8f-b283d93f5db9/Color%20theory.notebook#>

[http://www.artyfactory.com/color\\_theory/images/colours/colour\\_wheel.gif](http://www.artyfactory.com/color_theory/images/colours/colour_wheel.gif)



## Appendix H

### Technology: Research Artist and Art History

#### **Objectives** 4<sup>th</sup> Grade

- The student will use technology to locate, evaluate, and collect information from a variety of sources. The student will enter data into databases and spreadsheets. (Technology VASOL 3-5.6)
- The student will use a variety of media and formats to communicate information and ideas effectively to multiple audiences. Produce documents demonstrating the ability to edit, reformat, and integrate various software tools. Use technology tools for individual and collaborative writing, communication, and publishing activities. (Technology VASOL 3-5.8)
- The student will investigate artists and their work, using research tools and procedures. (Fine Arts VASOL 4.16)

**Vocabulary** Art History, PowerPoint, Research

**Materials** -Computer Lab -PowerPoint software -Typing Paper -Printer

#### **Procedure**

- 1) Discuss as a class what is art history.
- 2) Discuss as a class how we research artists, their style of art, their lives, and appropriate websites to use.
- 3) Students go choose an artist that interests them. Get teacher approval.
- 4) Students research artists in the computer lab and generate a PowerPoint to share with the class from their findings.
- 5) Students print out PowerPoint (after making corrections).
- 6) Students take turns presenting their projects to the class. They may dress up as their artists.
- 7) When one student is finished, they choose a classmate to come to the front of class. This process continues until every child has the opportunity to participate.

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## Appendix I

### Technology: Colors and Shapes

#### **Objectives Kindergarten**

- The student will demonstrate proficiency in the use of technology. Use multimedia resources such as interactive books and software with graphical interfaces. (Technology VASOL K-2.2)
- The student will identify and use colors—red, blue, yellow, green, orange, violet, brown, black, and white; shape—circle, square, triangle, rectangle, and oval. (Fine Arts VASOL K.3)
- The student will classify objects in the environment by using art vocabulary (e.g., color, texture, shape). (Fine Arts VASOL K.15)

**Vocabulary** Red, Blue, Green, Yellow, Purple, Orange, Triangle, Square, Oval, Rectangle, Diamond, Star, Heart, Circle

**Materials** -Smartboard -Smartboard tools (“wand”) -Computer  
-Colors and Shapes Smartboard software

#### **Procedure**

- 1) Discuss as a class shapes and if they have sides, how many?
- 2) Discuss as a class colors.
- 3) Students take turns interacting with Smartboard technology to recall shapes and colors they see.
- 4) When one student is finished, they choose a classmate to come to the board. This process continues until every child has the opportunity to participate.
- 5) At the end of the lesson the class may discuss when in nature and their surroundings they find these shapes and colors.

#### **Websites for Smartboard interaction**

[http://express.smarttech.com/?url=http://exchangedownloads.smarttech.com/public/content/4b/4b2f1a96-deac-46ff-914d-10c082bfe1df/shape%20recognition%20\(j.clausell\).notebook#](http://express.smarttech.com/?url=http://exchangedownloads.smarttech.com/public/content/4b/4b2f1a96-deac-46ff-914d-10c082bfe1df/shape%20recognition%20(j.clausell).notebook#)

<http://express.smarttech.com/?url=http://exchangedownloads.smarttech.com/public/content/d0/d0895531-a0b0-4b81-b05d-120bbffa8973/cause%20and%20effect%20shapes.notebook#>

[http://exchange.smarttech.com/search.html?q=art&subject=Art+and+Design&grade=Grade+6&grade=Kindergarten&grade=Grade+1&grade=Grade+2&grade=Grade+3&grade=Grade+4&grade=Grade+5&region=en\\_US](http://exchange.smarttech.com/search.html?q=art&subject=Art+and+Design&grade=Grade+6&grade=Kindergarten&grade=Grade+1&grade=Grade+2&grade=Grade+3&grade=Grade+4&grade=Grade+5&region=en_US)



## Appendix J

### Engineering: Cityscape Collage

#### Objectives 5<sup>th</sup> Grade

- The student will demonstrate knowledge of how the nation grew and changed from the end of Reconstruction through the early twentieth century by explaining the relationship among territorial expansion, westward movement of the population, new immigration, growth of cities, the role of the railroads, and the admission of new states to the United States. (VA and the U.S. VASOL VUS.8)
- The student will use the elements of art—line, shape, form, color, value, texture, and space—to express ideas, images, and emotions. (Fine Arts VASOL 5.3)
- The student will emphasize spatial relationships in works of art. (Fine Arts VASOL 5.11)
- The student will express ideas through artistic choices of media, techniques, and subject matter. (Fine Arts VASOL 5.12)

Vocabulary Architecture Cityscapes Urban Collage Texture

Materials 9"x18" black paper Assorted smaller colored paper pencils scissors Elmer's glue construction paper crayons Sharpie markers

#### Procedure

- 1) Students learned about cityscapes and architecture.
- 2) They created a cityscape collage using textured paper and colored construction paper, with at least three buildings created from geometric shapes.
- 3) Students add objects to their city using collaged paper and glue.
- 4) Students are encouraged to think interesting things to put in their cityscape that would make their city unique.



Courtesy of <http://www.mrsbrownart.com>

## Appendix K

### Engineering: Transportation Collage

#### Objectives 2<sup>nd</sup> Grade

- The student will identify and compare changes in community life over time in terms of buildings, jobs, transportation, and population. (History VASOL 2.3)
- The student will use environmental themes and historical events as inspiration for works of art. (Fine Arts VASOL 2.5)
- The student will create a work of art from observation. (Fine Arts VASOL 2.6)

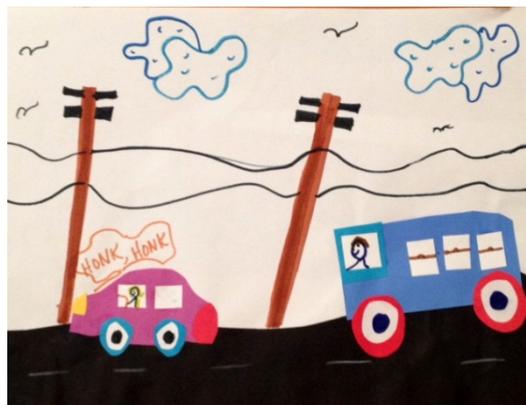
**Vocabulary** Water, air, land, boats, cars, automobiles, ships, bicycle, airplane, truck, school bus, tires, dump truck, pick-up truck, sports car, tractors, texture, collage, road,

**Materials** 9"x18" white paper Assorted smaller colored paper pencils scissors Elmer's glue Colored markers Sharpie markers Textured paper

#### Procedure

- 1) Students learn about transportation and collage.
- 2) They create a collage using transportation-themed items.
- 3) Using textured paper and colored construction paper they create a picture with "movement."
- 4) Students add objects to their scene using collaged paper and glue.
- 5) Students are encouraged to think interesting things to put in their collage that would make their picture unique.

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## Appendix L

### Mathematics: Fraction Fish

#### Objectives 3<sup>rd</sup> Grade

- The student will use various art processes and techniques to produce works of art that demonstrate craftsmanship. (Fine Arts VASOL 3.2)
- The student will compare, contrast, and use organic and geometric shapes in works of art. (Fine Arts VASOL 3.5)
- The student will name and write fractions (including mixed numbers) represented by a model; model fractions (including mixed numbers) and write the fractions' names. (Math VASOL 3.3)

Vocabulary Shape, Overlapping, Color, Collage, Texture, Ocean creatures/life

Materials -12"x18" blue construction paper -Assorted colored construction paper - Pencils -Circle tracers -Elmer's glue -Googly eyes

#### Procedure

- 1) Review fractions briefly with class.
- 2) Students will use their knowledge of fractions to create an underwater picture using cut paper circles.
- 3) They will identify different fractions in their pictures, such as 1 whole, 1/2, 1/4, 1/8, 1/16.

Courtesy of <http://www.mrsbrownart.com>



## Appendix M

### Mathematics: Vertical, Horizontal, and Diagonal Line Design

#### **Objectives** 4<sup>th</sup> Grade

- The student will identify and use variety, repetition, and unity in a work of art. (Fine Arts VASOL 4.5)
- The student will identify and use a variety of lines in a work of art. (Fine Arts VASOL 4.6)
- The student will identify positive and negative space in works of art. (Fine Arts VASOL 4.8)
- The student will identify and describe representations of points, lines, line segments, rays, and angles, including endpoints and vertices; and identify representations of lines that illustrate intersection, parallelism, and perpendicularity. (Math VASOL 4.10)

**Vocabulary** Line, Horizontal, Vertical, Diagonal, Parallel, Pattern, Design, Repetition, Negative Space, and Positive Space.

#### **Materials**

-White paper (12" x 12") -Pencil -Eraser -Visual examples -Elements of design software -Permanent markers (fine and thick point) -Crayola "Changeable markers"  
-Colored construction paper for matting artwork (14"x 14") -Ruler -Smartboard

#### **Procedure**

- 1) Students are shown examples of artwork (using technology) that contain the types of lines being discussed.
- 2) Discuss as a class the differences between lines and their direction. Remind students this is part of their current common formative assessment and they will be expected to learn the difference between the lines by the end of the project.
- 3) Students place a dot on their white paper away from the center of page.
- 4) From that point they will draw two (only a few inches apart) diagonal lines. (These two lines create a set that will later be filled in with permanent marker. Students may use a pencil to lightly fill in the space to remind them of the area that will later be filled.)
- 5) They repeat step #3 two more times. All three sets of lines will be coming from a different side of the original point.
- 6) Students will draw a set of horizontal lines that intersect the lines from steps #3 and #4.

- 7) Further down the page the student repeats step #5. Note: A set of the horizontal lines may end before crossing the entire page.
- 8) Students will draw a set of vertical lines that intersect the lines from steps #3 and #4.
- 9) Further over the page the student repeats step #7. Note: A set of the vertical lines may end before crossing the entire page.
- 10) Trace over lines using a fine-tipped “Sharpie.”
- 11) Erase stray pencil marks.
- 12) Color in lines with thick-tipped permanent marker.
- 13) Using “Changeable markers,” students will choose 3 or 4 colors to fill in the negative space. Avoid placing same colors next to one another.
- 14) After all negative space is filled in, students will use the “magic wand” to add pattern and design to the already placed colors.
- 15) Mount artwork on colored paper.

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## Appendix N

### Math: Fraction Winter Quilt

#### Objectives 1<sup>st</sup> Grade

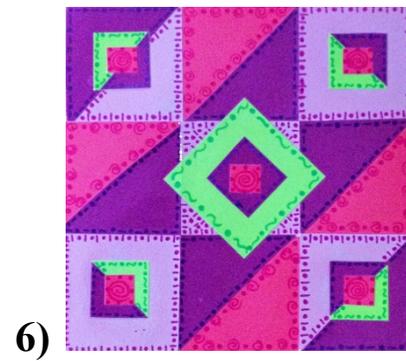
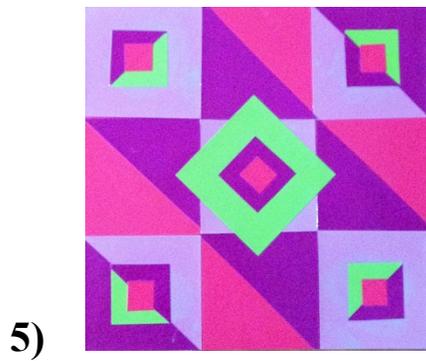
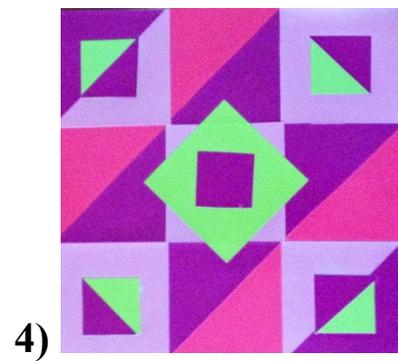
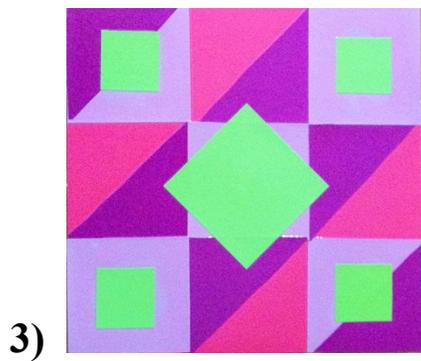
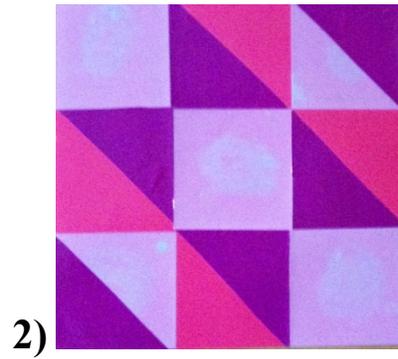
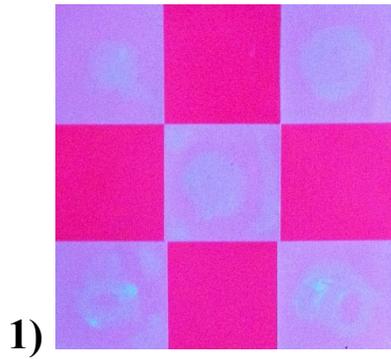
- The student will identify and use: line and line variations—zigzag, dotted, wavy, and spiral; shape—geometric and organic; and patterns—alternating and repeating. (Fine Arts VASOL 1.3)
- The student will develop eye/hand coordination by drawing and constructing. (Fine Arts VASOL 1.8)
- The student will identify the parts of a set and/or region that represent fractions for halves, thirds, and fourths and write the fractions. (Math VASOL 1.3)

#### Vocabulary Quilt, Symmetry, Design, Pattern, Texture, Overlap, and Fractions

**Materials** -9" x 9" assorted colored construction paper -Glue -Markers -Scissors  
-3" x 3" assorted colored squares -paper for matting artwork -Fractions  
-3" x 3" assorted winter wrapping paper squares -Smartboard  
-Visual examples of quilt patterns -Large paper for table collaboration

#### Procedure

- 1) Students are shown examples of quilt designs using the Smartboard and real quilts. Class discusses uses for quilts and what the patterns may represent.
- 2) Students are also shown visual paper examples of quilt designs.
- 3) Students review fractions.
- 4) Students begin with a 9" x 9" square. Add five 3" x 3" squares (one in each corner and one in the middle of square.)
- 5) Take three 3" x 3" squares and cut them into six triangles (in half). Remind students that in terms of fractions this is  $\frac{1}{2}$ . Arrange and glue onto square (inside and on edges).
- 6) Using two matching patterned winter wrapping paper 3" x 3" squares, take one square and place in center, turned diagonally. Fold the remaining square into four small squares and cut on the folded line. Remind students they are making  $\frac{1}{4}$  cuts. Place one small square into each corner.
- 7) Using a different winter wrapping paper pattern 3" x 3" square, fold and cut into four small squares. Each square is  $\frac{1}{4}$ . Glue one onto center square. Cut the remaining into triangles and glue over small squares created in Step #7.
- 8) Repeat Step #8 using a different winter wrapping paper pattern 3" x 3" square. Students cut five small (1" x 1") squares out of the one square and glue one into the center and in each corner. Remind students each square is  $\frac{1}{5}$ .
- 9) Decorate quilt with pattern using markers.



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## Appendix O

### Mathematics: Tessellations

#### Objectives 4<sup>th</sup> Grade

- The student will identify and use variety, repetition, and unity in a work of art. (Fine Arts VASOL 4.5)
- The student will identify and use a variety of lines in a work of art. (Fine Arts VASOL 4.6)
- The student will identify positive and negative space in works of art. (Fine Arts VASOL 4.8)
- The student will identify and describe representations of points, lines, line segments, rays, and angles, including endpoints and vertices; and identify representations of lines that illustrate intersection, parallelism, and perpendicularity. (Math VASOL 4.10)

**Vocabulary** Horizontal/Vertical/Diagonal/Parallel lines, Pattern, Repetition, Polygons, Angles

**Materials** -White paper (16” x 16”) -Pencil -Eraser -Visual examples -Black “sharpie” - Colored markers -Cardstock -Ruler

#### **Procedure**

- 1) Students are shown examples of artwork that contain the types of lines, angles, and shapes being discussed. Review geometry terms: angles and types of lines.
- 2) Students examine the artwork of M.C. Escher and his tessellation patterns.
- 3) Students use a piece of cardstock to create a shape.
- 4) On a larger piece of paper, students will begin at the top of the corner and trace the shape using a pencil.
- 5) The shape is then turned over and retraced underneath so that the two shapes touch and are side by side (with no space in between).
- 6) Students repeat this step until their paper is filled.
- 7) Trace over the pencil with black sharpie marker.
- 8) They may add pattern, colors, and design to the shapes.



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## Appendix P

## Student Self-Critique of Artwork

<b>Art Criticism Assessment</b>	<i>Name</i> _____ <i>Date</i> _____			
<b>Art Criticism</b>	<b>Rubric and Checklist</b>	<b>Good</b>	<b>Average</b>	<b>Needs Work</b>
<b>1. DESCRIBE</b>	I have described everything that I have seen in two examples of art. I have included a list of specific details of each example. My list includes 10 details of each work. My spelling is correct.			
<b>2. ANALYZE</b>	I have analyzed the work and used complete sentences to give examples of how each work uses the elements and principles of design. My sentences use correct spelling, punctuation and grammar.			
<b>3. INTERPRET</b>	I have interpreted...			
<b>4. DECIDE</b>	Three to five sentences are used to convey the personal judgment or feelings you have about each piece of work. These sentences tell why you decided to like or dislike the works.  These opinions are based on personal experience as well as informed judgment			

**Appendix Q****Student Name:** \_\_\_\_\_**Student Critique of Artwork**

When we study, interpret, and evaluate art, we want to **describe**, **analyze**, **interpret**, and **judge** the artwork. We followed these procedures during our class discussion. Choose a partner and look at their artwork. Think about our discussion and answer the following questions. If you need more space, please write on back of paper. Do your best!

**Describe:**

Describe what you see in your classmate's artwork.

What type of artwork does your classmate make?

**Analyze:**

Explain how one of the elements of art is used in the artwork? (line, color, shape, texture, value, space)

Explain how one of the principles of art is used in the artwork? (unity, pattern, balance, rhythm, contrast, emphasis)

**Interpret:**

Why do you think the artist placed these items in the artwork?

How does the artwork relate to you and your life?

**Judge:**

Do you like the artwork? Why or why not?

What could make the artwork better?

**Appendix R**

**Student Name:** \_\_\_\_\_

**Student Written Self-Assessment**

**1) How do you think you did? Circle the face that shows what you think?**



**2) How would you change your artwork if you had the chance to make it again?**

**3) What is the title of your artwork?**

**4) How are art and science related? Circle the best choice.**

- a) Learn about nature and can recreate in art projects.
- b) What we find in nature (frogs) can be found in our artwork.
- c) We can show what we learn about science through drawings, sculptures, and other forms of art.
- d) All of the above.

**5) Draw a pattern in the space below.**

**6) We use wooden tools in the clay “frog making” process. Circle the best choice.**

True    False

**7) We can shape clay using our fingers and hands. Circle the best choice.**

True    False

**8) Art can be two dimensional and three dimensional. Circle the best choice.**

True    False

**9) We can express ourselves through our artwork. Circle the best choice.**

True    False

**10) Why do we make art?**

- a) to express ourselves
- b) to have something we can look at that shows how we feel and/or what we learned
- c) to learn more about ourselves and the world around us
- d) All of the above.

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## Appendix S

2<sup>nd</sup> Grader's Art Making: Art and Science Scoring Rubric

- 2.6 Student created a work of art from observation. (VA standard)**  
**2.9 Student recognizes and uses a variety of sources for art ideas, including nature, imagination, and resource materials. (VA standard)**  
**2.10 Student creates a three-dimensional work of art, using a variety of materials. (VA standard)**  
**2.11 Student creates a work of art by manipulating clay. (VA standard)**

	<b>Needs (1) Improvement</b>	<b>Good (2)</b>	<b>Excellent (3)</b>	<b>Notes</b>	<b>Student Score</b>
<b>2.6 Student created a work of art from observation. (O, T, Q, P)</b>	Unsuccessfully created a work of art from observation	Somewhat created a work of art from observation	Successfully created a work of art from observation		
<b>2.9 Student recognizes and uses a variety of sources for art ideas, including nature, imagination, and resource materials. (O, T, P, C, Q)</b>	Unsuccessfully recognizes and uses a variety of sources for art ideas, including nature, imagination, and resource materials.	Somewhat recognizes and uses a variety of sources for art ideas, including nature, imagination, and resource materials.	Successfully recognizes and uses a variety of sources for art ideas, including nature, imagination, and resource materials.		
<b>2.10 Student creates a three-dimensional work of art, using a variety of materials. (O, P, Q)</b>	Unsuccessful in creating a three-dimensional work of art, using a variety of materials	Somewhat creates a three-dimensional work of art, using a variety of materials	Successfully creates a three-dimensional work of art, using a variety of materials		
<b>2.11 Student creates a work of art by manipulating clay. (O, Q, P)</b>	Unsuccessful in creating a work of art by manipulating clay	Somewhat creates a work of art by manipulating clay	Successful in creating a work of art by manipulating clay		
<b>TOTAL</b>					

**Assessment Key: (Explains assessment of each standard)**

**O=Teacher visually observing content and application of technique in artwork (Teacher/Student conference)**

**T=How students titled their artwork**

**C=Their contributions to art class critique/discussion**

**Q=Questions on self assessment**

**P=Their 2-D project drawing and 3-D clay frog completion**

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**Appendix T****S.T.E.M. and the Visual Arts****Famous Quote**

"The rapidly evolving global economy demands a dynamic and creative workforce. The arts and its related businesses are responsible for billions of dollars in cultural exports for this country. It is imperative that we continue to support the arts and arts education both on the national and local levels. The strength of every democracy is measured by its commitment to the arts."

—Charles Segars, CEO of Ovation

## **Module 1: Program Overview**

### **Objectives:**

- Teacher will understand the value in linking **art education** to the **S.T.E.M.** subject areas.
- Teacher will reflect on their own experience with correlating the **arts** with the **S.T.E.M.** subjects.
- Teacher will work collaboratively with colleagues to produce new lessons correlating the **arts** with the **S.T.E.M.** subjects.
- Teacher will learn new lessons to teach students that correlate the **S.T.E.M.** subjects with the **arts**.
- Teacher will produce their own product and share with fellow teachers.

### **What is S.T.E.M.?**

S.cience

T.echnology

E.ngineering

M.athematics

### **Why Do We Want to Combine Art Education with the S.T.E.M. Subjects?**

- Combining the arts with the S.T.E.M. subjects facilitates student academic growth.
- Arts education is an essential part of a strong learning community. Establishing cross-curricular relationships in schools will promote the arts and further instructional improvement.
- Cross-curricular professional development will not take the place of content-specific learning, but offers an addition (Conway et al. p. 8).

### **Why Do We Want to Combine Art Education with the S.T.E.M. Subjects?**

- A recent study that came out of Chicago found after an intervention of arts integration in math and science, student understanding of content area concepts improved in the three subject areas. Math improved at rate of 72%; Science improved at a rate of 90; and 68% in art (Hanson, p.77).

## **The Arts and No Child Left Behind**

- The elevation of the arts up to important academic standing is evident in the federal No Child Left Behind mandate.
- Under the legislative directive the arts are included as core subject areas.
- Professional development is encouraged by the availability of funding for faculty development in and through the arts.
- States that have accepted NCLB funding have been forced to recognize the arts as core subjects, and meet the acts highly qualified teacher's provision (Charland, p. 32).

## **Room for Improvement**

- Art teachers do not get a lot of professional development as we have traditionally focused on the core subject areas.
- For the most part, states and districts remain at a loss regarding what to offer art teachers in the way of content-based professional development, and often turn such responsibility over to nonprofit arts agencies or advocacy organizations (Charland, p. 33).

## Art Teachers are Unique

- You are not only instructors but artists as well.
- Art educators hold job positions that are between organizations or systems, known as *boundary positions*. These individuals are more susceptible to stress. Like the teacher-coach, fine arts teachers also have dual roles: as artist and as teacher (Scheib, p. 7).
- Art teachers are entering into a work environment that does not necessarily encourage or support their own individual artistry or musicianship.
- Some arts teachers experience increased alienation and withdrawal as they struggle with their role-identity (Scheib, p. 9).

## Solutions

- We need to engage and nurture your artistic side. Simply put, we will not get our best and brightest to buy into a teacher identity if it is of lower status than the artist or musician identity.
- Vital to have hand's on professional development for art teachers where they have opportunity to create and call upon their creative instincts (Scheib, p. 7).
- These sessions will provide this time.

## **Over the Course of These Sessions You Will:**

- Gain an understanding of recent research literature relevant to best practices in art education.
- Discuss teaching strategies learned and collaborate using these tactics.
- Gain knowledge of implementation of S.T.E.M. subjects in classroom and professional collaborative techniques.

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## Appendix U

## S.T.E.M and the Visual Arts



## Famous Quotes

- All great scientists have, in a certain sense, been great artists; the man with no imagination may collect facts, but he cannot make great discoveries. — [Karl Pearson](#)
- The great men of science are supreme artists.  
— [Martin H. Fischer](#)

## Module 2: Art and Science

### Objectives:

- Teacher will understand the value in linking **art** education to the **science** portion of the S.T.E.M. subject areas.
- Teacher will reflect on their own experience with correlating the **arts** with **science**.
- Teacher will work collaboratively with colleagues to produce new lessons correlating the **arts** with **science**.
- Teacher will learn new student lessons correlating **science** with the **arts**.
- Teacher will produce their own product and share with fellow teachers.
- Teacher will review rubrics and assessment strategies.

## What is Science?

- “The state of knowing.”
- “Knowledge or a system of knowledge covering general truths or the operation of general laws especially as obtained and tested through the scientific method.”

Merriam-Webster. (2012). Science. Retrieved from <http://www.merriam-webster.com/dictionary/science>

## **What is Art?**

- “An occupation requiring knowledge or skill.”
- “Conscious use of skill and creative imagination especially in the production of aesthetic objects.”

Merriam-Webster. (2012). Science. Retrieved from <http://www.merriam-webster.com/dictionary/art>

## **These definitions indicate art and science have similarities:**

- Both are in pursuit of knowledge.
- Artists interpret the world around them and recreate it through their art.
- Students can study science and interpret it through artwork. By recreating what they have learned, students are reinforcing content memorization.

### Similarities cont.:

- Both give us insight into our environment (Weisskopf, p. 478).
- Both require experimentation (Jacob, p. 118).

### How Art and Science Are Related:

- Art and science both involve the process of discovery.
- First, they both ask essential questions.  
Scientist asks, “What is my prediction for my hypothesis?”  
Artist asks, “What drawing methods must I use to make my creation look realistic?”
- Second, they will research possible solutions.
- Third, they use their intuition and research-based knowledge to produce an answer.
- Fourth, they will reflect back on their experiences to make a conclusion.
- Lastly, the final product is produced. For the scientist this may be in the form of a published paper and for an artist it is expressed through their artwork (Karwowski, 154).

### **How Art and Science Are Related cont.:**

- In science class, students often conduct experiments to understand why particular outcomes occur.
- This interaction with their new knowledge assists them in becoming part of their learning.
- This engagement parallels to art class where students learn a technique and use it to create a product.
- In combining art and science, students can learn scientific facts and demonstrate their understanding by material reproduction using artistic practices.

### **Lesson Examples:**

- 1) **Science:** Teaching optics, color, and light refraction  
**Art:** Studying the color wheel and making a work of art placing certain colors beside one another to test scientific theories on how the eye views color.
- 2) **Science:** Teaching chemistry of paint (compounds and process)  
**Art:** Learning how to mix paint colors to achieve lighter or darker shades and desired pigments for painting

## Lesson Examples cont.:

- 1) **Science:** Teach kinetic energy  
**Art:** Make mobiles based on artwork of Alexander Calder
  
- 2) **Science:** Teach life cycle of a frog  
**Art:** Students create a clay frog and draw or paint life cycle

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**Appendix V****S.T.E.M and the Visual Arts****Famous Quotes**

“Technology, like art, is a soaring exercise of the human imagination. But art and technology are not separate realms walled off from each other. Art employs technology, but for its own ends. Technology, too, is a form of art that bridges culture and social structure, and in the process reshapes both.”

-Daniel Bell

“The art challenges the technology, and the technology inspires the art.”

-John Lasseter

## Module 3: Art and Technology

### Objectives:

- Teacher will understand the value in linking art education to the technology portion of the S.T.E.M. subject areas.
- Teacher will reflect on their own experience with correlating the arts with technology.
- Teacher will work collaboratively with colleagues to produce new lessons correlating the arts with technology.
- Teacher will learn new lessons to teach students that correlate technology with the arts.
- Teacher will produce their own product and share with fellow teachers.

## What is Technology?

- “Practical application of knowledge especially in a particular area.”
- “A manner of accomplishing a task especially using technical processes, methods, or knowledge.”

Merriam-Webster. (2012). Technology. Retrieved from <http://www.merriam-webster.com/dictionary/technology>

## **What is Art?**

- “An occupation requiring knowledge or skill.”
- “Conscious use of skill and creative imagination especially in the production of aesthetic objects.”

Merriam-Webster. (2012). Science. Retrieved from <http://www.merriam-webster.com/dictionary/art>

## **These definitions indicate art and technology have similarities:**

- Both definitions highlight each subject’s utilization of knowledge for innovative creations.
- These two fields place emphasis on generating new products or ideas.

### **Similarities cont.:**

- These inventive arenas benefit from integrating with one another.
  - Art can implement technology into its process to form new art methods and technology can use artistic concepts to advance creativity and stimulate interest.
  - Technology integration in school curriculum is essential for 21<sup>st</sup> century learners; art education is no different and must embrace this technology.
- Many art teachers have access to computer labs, Smartboards, iPads, and other electronic devices.

### **Art and Technology: Not only for Students:**

- Integration of both subjects is not limited to students but may be a useful professional tool.
- Teachers are able to effectively and efficiently collaborate with fellow colleagues who teach at neighboring schools.
- Granger (2012) recognizes art educators are able to share best practices via wiki pages, websites, software, virtual meetings (Skype, Wimba, Go to Meeting, etc.), instant messenger, message boards, and blogs.

### **Lesson Examples:**

- 1) **Technology**: Student interaction with interactive Smartboard  
**Art**: Kindergartners learn colors and line patterns.
  
- 2) **Technology**: Students utilize Smartboard.  
**Art**: Students learn symmetry, pattern, shapes, and about Native American mask making.

### **Lesson Examples cont.:**

- 3) **Technology**: Computer research and PowerPoint creation.  
**Art**: Students research art history on computers and create power points to share with class.

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**Appendix W****S.T.E.M and the Visual Arts****Famous Quotes**

- "Engineering is the art or science of making practical."  
—Samuel C. Florman (1976)
- "GE hires a lot of engineers. We want young people who can do more than add up a string of numbers and write a coherent sentence. They must be able to solve problems, communicate ideas and be sensitive to the world around them. Participation in the arts is one of the best ways to develop these abilities."

– Clifford V. Smith, President of the General Electric Foundation

## Module 4: Art and Engineering

### Objectives:

- Teacher will understand the value in linking art education to the engineering portion of the S.T.E.M. subject areas.
- Teacher will reflect on their own experience with correlating the arts with engineering.
- Teacher will work collaboratively with colleagues to produce new lessons correlating the arts with engineering.
- Teacher will learn new lessons to teach students that correlate engineering with the arts.
- Teacher will produce their own product and share with fellow teachers.

## What is Engineering?

- “The application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people.”
- “The design and manufacture of complex products.”

Merriam-Webster. (2012). Engineering. Retrieved from <http://www.merriam-webster.com/dictionary/engineering?show=0&t=1332868218>

## **What is Art?**

- “An occupation requiring knowledge or skill.”
- “Conscious use of skill and creative imagination especially in the production of aesthetic objects.”

Merriam-Webster. (2012). Science. Retrieved from <http://www.merriam-webster.com/dictionary/art>

## **These definitions indicate art and engineering have similarities:**

- Engineering and art have the process of design in common.
- Many times, engineers must be creative in their problem-solving and structural design endeavors.
- Artists also must be inventive in their quest to create new artistic methods.

### Similarities cont.:

- The link between these two fields is most evident in the engineering aspect of architecture.
- The architect makes a hypothesis for how people live their lives (Ames, p. 195). In other words, the architect must predict how humans want to use a space they build.
- The job of the engineer is to make this proposed function reality.
- The artistic component is revealed when the structure has aesthetic properties that make it appealing to the eye.
- As architect, Louis Sullivan (1887) noted, “form follows function.”

### Lesson Examples:

- 1) **Engineering**: Students learn about forms of transportation.  
**Art**: Students paint or draw a type of transportation in action.
- 2) **Engineering**: Students study buildings, their materials, and invention of steel.  
**Art**: Students create a city-scape collage emphasizing the creation of skyscrapers.

## Lesson Examples cont.:

3) **Engineering**: Students learn about building design.

**Art**: Students use the Google program “Sketch-Up” to create a room design using 2-point perspective.

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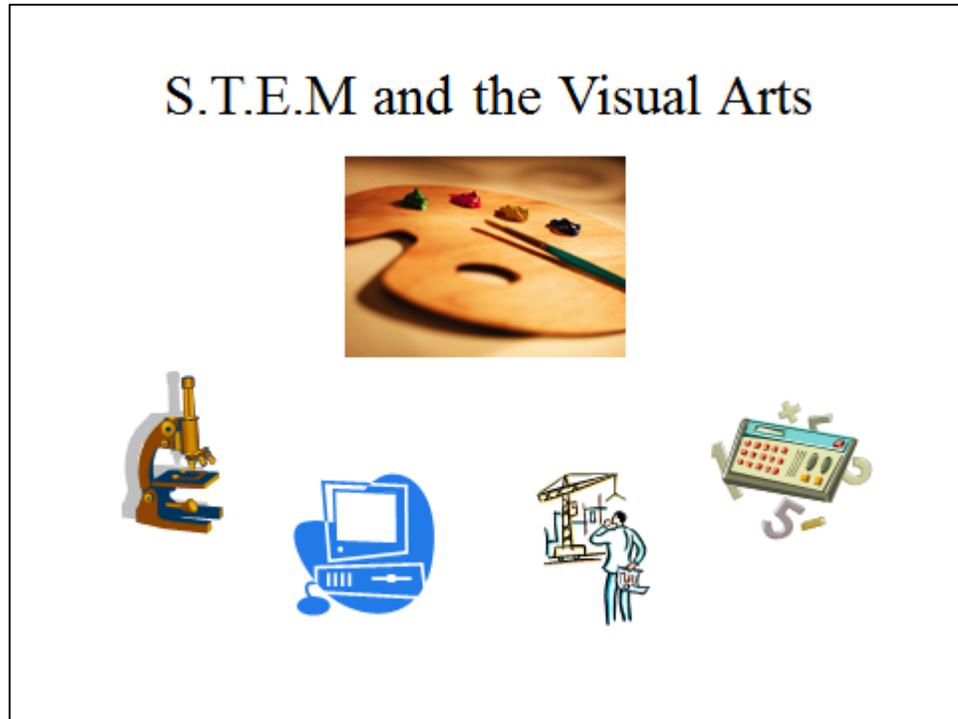
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**Appendix X**



**Famous Quote**

Geometry is the foundation of all  
painting.

- Albrecht Durer

## Module 5: Art and Mathematics

### Objectives:

- Teacher will understand the value in linking art education to the mathematics portion of the S.T.E.M. subject areas.
- Teacher will reflect on their own experience with correlating the arts with mathematics.
- Teacher will work collaboratively with colleagues to produce new lessons correlating the arts with mathematics.
- Teacher will learn new lessons to teach students that correlate mathematics with the arts.
- Teacher will produce their own product and share with fellow teachers.

## What is Mathematics?

“The science of numbers and their operations, interrelations, combinations, generalizations, and abstractions and of space configurations and their structure, measurement, transformations, and generalizations.”

Meriam-Webster. (2012). Mathematics. Retrieved from <http://www.merriam-webster.com/dictionary/mathematics>

## **What is Art?**

- “An occupation requiring knowledge or skill.”
- “Conscious use of skill and creative imagination especially in the production of aesthetic objects.”

Merriam-Webster. (2012). Science. Retrieved from <http://www.merriam-webster.com/dictionary/art>

## **These definitions indicate art and mathematics have similarities:**

- Both are concerned with spatial relationships, sequencing, measurements, and transformations.
- Many times artists are concerned with space present in their artwork, patterns, and the measurement of a particular medium or component.
- They use this information to determine how to configure their artistic creation.
- Mathematicians maybe expressed and demonstrated with the use of artistic methods.

### **Similarities cont.:**

- Both subjects focus on harmony.
- In mathematics, harmony is expressed in the form of ratio or proportion (Farsi & Craft, p. 13).
- Artists have focused on harmony as exemplified with Georges Seurat's line and harmony study (Roslak, p. 387)

### **Lesson Examples:**

- 1) **Math**: Fractions are taught.  
**Art**: Students create an underwater ocean scene with all creatures made out of parts of fractions or create a quilt design based on fractions.
- 2) **Math**: Volume, mass, and shape are studied.  
**Art**: Students create a collage using shapes learned or a clay sculpture illustrating various shapes and mass.

### **Lesson Examples cont.:**

3) **Math**: Angles and lines studied.

**Art**: Students create an abstract line design using the angles learned.

4) **Math**: Repetition, space, and shapes are studied.

**Art**: Students create tessellations.

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## Appendix Y

### Conference and Resource Information

- State conferences:  
Virginia Art Educator Association  
<http://www.vaea.org/>  
Upcoming conference Norfolk, Virginia Nov. 1<sup>st</sup>-3<sup>rd</sup>
- National conferences or conventions:  
National Art Education Association (NAEA)  
<http://www.arteducators.org/>  
Upcoming Fort Worth, Texas conference March 7<sup>th</sup>- 10<sup>th</sup>
- Organization: National Assessment on Learning Through the Arts
- Art Magazines: (Great lesson plans/ideas)  
  
“Arts and Activities”  
<http://artsandactivities.com/>  
  
“Scholastic Art”  
<http://art.scholastic.com/>  
  
“School Arts”  
<http://www.davisart.com/portal/schoolarts/sadefault.aspx>  
  
“Magic Dragon”  
[http://www.magicdragonmagazine.com/?page\\_id=123](http://www.magicdragonmagazine.com/?page_id=123)