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Interdisciplinary Infusion in the Discipline Based Middle School Art Classroom

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INTERDISCIPLINARY INFUSION IN THE DISCIPLINE BASED MIDDLE SCHOOL ART CLASSROOM

by

MARY BREAZEALE

Under the Direction of Melody Milbrandt, PhD

Abstract:

This research has a primary focus on the middle school setting and how schools, students, and art educators might benefit from an interdisciplinary art curriculum. In this thesis I outline how cross-curricular inclusions in art lessons have the potential to be a fantastic advocacy tool for fine arts departments. I also investigate the differences between interdisciplinary inclusions in the visual art classroom and arts integrated school models as well as the beneficial relationship that can exist between these two pedagogical approaches. Additionally, I examine through literary review and curriculum development, some of the positive and negative influence in academic subject areas and more importantly art disciplines. My final and primary aim in examining various methods of cross-curricular inclusion is to shed light upon the immense potential for student development via dynamic interdisciplinary art curriculum.

INDEX WORDS: Discipline Based Art Education, interdisciplinary education, STEAM
INTERDISCIPLINARY INFUSION IN THE DISCIPLINE BASED MIDDLE SCHOOL ART CLASSROOM

by

MARY BREAZEALE

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Arts in the College of Arts and Sciences Georgia State University 2015
INTERDISCIPLINARY INFUSION IN THE DISCIPLINE BASED MIDDLE SCHOOL ART CLASSROOM

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Georgia State University
May 2015
DEDICATION

I would like to dedicate this thesis to my husband, Michael, who has always whole-heartedly supported my endeavors in art. In addition, I would like to dedicate this thesis to my parents, Christine and David Fountain, as well as my grandma, Ann Lamond who have always encouraged me to work hard and be creative. All of these wonderful people have provided me the support I have needed throughout this process, I am forever grateful.
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I would like to extend my deepest gratitude to Melody Milbrandt for her guidance and support throughout the preparation of this thesis, her patience and commitment to my success was unwavering and I am truly grateful. I would also like to thank Melanie Davenport and Kevin Hsieh for providing additional encouragement, new insights and constructive commentary throughout this process.
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1 INTRODUCTION

1.1 Need for the Study

To understand my inspiration for this research, I must explain how I became interested in teaching and learning. Visual art has been my passion for as long as I can remember. The plethora of information I have learned from making and discussing art has made me an empathetic individual, which has fueled my desire to teach. I gained inspiration for this research as a result of a reflection upon my public school experiences. Retrospectively, in public school, I never made the connection from art (the main class that had my attention), to the real world or even to the other classes that I attended daily; these entities always seemed to exist separately in my mind. From this realization, I began to think about how my cognitive development might have been impacted if I made connections between the art and academic arenas of school culture at the K-12 level. I concluded that I could have greatly benefitted from a more dynamic art teaching approach that incorporated explicit instruction that revealed the connections between art, academic subjects, and real world experiences. This concept is pivotal to the art teaching approach I wish to advocate. This reflective conclusion is the driving force behind my interest in constructivist education and more specifically the cross-curricular potential for art lessons.

In undertaking this research, I aim to develop a nine-week curriculum for 6th-8th grade students that has well-balanced, mutually beneficial, cross-curricular, discipline based art lessons at its core. In developing this curriculum, I intend to create a classroom environment that encourages the building of knowledge with sensitivity for the specific needs of students at each grade level. I also intend to construct this curriculum in a manner that makes the relevance and
necessity of art blatantly obvious within school culture; acting as an advocacy tool to gain school-wide recognition and support.

First, it is very important to note the specific definition of cross-curricular education around which I have developed my curriculum. As Kelly (2012) describes in her article, cross curricular approaches are informed by a constructivist view of learning. This is based on the proposition that learning is an active mental process in which connections are made between experience, prior knowledge and new ideas, to develop and refine children’s knowledge and understanding of the subject or topic.” (p. 4, para 2).

I admittedly partly ascribe to the ideas and theories of both Piagetian psychological constructivism as well as Vygotsky’s social constructivism. The primary reason that I am concerned with both of these constructivist view points is that the implications of educational psychology and social cognition are highly important due to the specificity of the ages and grade levels examined. In this research, cognitive psychology and social cognition are considered momentous influences upon what goes on in the middle school classroom. This study recognizes middle school as a particularly sensitive time for students and the conclusions drawn from this research reflects such sensitivity, citing various theories in educational psychology and social cognition for support based upon internal and external factors that influence the middle school aged learner. Psychological constructivists see “the purpose of constructivist teaching being to lead toward higher levels of understanding and analytic capabilities” (Richardson 1992, p. 5). These theorists believe that the teacher should encourage their students to think at a higher level by “devising tasks that hopefully lead to a reorganization of existing cognitive maps” (Richardson 1992, p. 5). Social
constructivists see “the social as instrumental, if not essential, in both construction and appropriation of knowledge” (Richardson 1992, p. 74). This study exhibits how educational psychology can be used to directly affect the middle school aged learner and the implications of that impact on teaching visual arts education. Though inherently different from psychological theories on cognition, social cognition is another major proponent of this curriculum development and literary review. Middle school students are often at a critical point in their education where their social lives and interests greatly influence their learning.

Richardson (1997) notes how certain traditional pedagogical methods are the cause for disjuncture between subject areas and topics. Richardson (1997) states “the transmission model- promotes neither the interaction between prior and new knowledge nor the conversations that are necessary for internalization and deep understanding” (p. 3). As a pre-service art teacher, knowing this causes me to worry, as I desire my art classes to have excellent potential for inspiring students to think at an elevated level. In the past I have seemingly become consumed by the idea of building vast knowledge via art lessons. Through this research my goal was to develop a curriculum that uses a better, more dynamic pedagogical approach.

The major issue to be addressed in this research regards one specific group of learners, those at the middle school level. Middle school aged learners are often the most over-looked group of students in educational research. Since elementary school students are becoming acquainted with the world of academia, where their teachers often represent very strong and important roles in their lives, and have a heavy impact on their cognitive development, research abounds that focuses on this age group. There is also a frequent
and major emphasis on educational research at the high school level since the students are preparing for perhaps furthering their education and/or career paths. One can generally conclude that researchers and teachers as action researchers spend a considerable amount of time focusing on these two specific groups, and that is no different when specifically examining the research in visual arts education. Conversely, I found fewer studies which focus on middle school art curriculum that exhibits explicit connections to academic disciplines.

The second half of the issue to be addressed in this research involves the perception that many art educators are not comfortable using cross-curricular educational methods in their classrooms. Many art educators believe there is a potential for such inclusions to overtake their curriculum. Visual arts educators fear that development within the arts will be inhibited if other subjects become the foci of their curricula. Since visual art teachers already frequently have to advocate for their programs in order to gain funding or recognition in their schools and districts, this really becomes a problem. I, however, argue that a more, mutually supportive cross curricular education falls in line with what Dewey (1915) cites as effective;

Whenever we have in mind the discussion of a new movement in education, it is especially necessary to take to take the broader, or social, view. Otherwise, changes in the school institution and tradition will be looked at as the arbitrary inventions of particular educators, at the worst transitory fads, and at the best merely improvements in certain details—and this is the plane upon which it is too customary to consider school changes (p.4, para. 2).
This study and curriculum development encourages art teachers to consider the broader picture of student learning rather than partake in “arbitrary inventions” as Dewey (1915) mentions.

1.2 Purpose of the Study

Constructivist education is a popular student centered school of thought that regards building knowledge as the pathway to greater student achievement. An interdisciplinary approach to curriculum development is an aspect of this educational model that can have a major and positive impact on the visual art classroom and art teaching techniques. This study aims to exhibit previous research that suggests ways which middle school aged students can greatly benefit from curriculum construction methods that incorporate interdisciplinary infusions. There is a need to compile these methods into a curriculum and utilize them in education as there is a hole in the literature about these approaches at the middle school level. The purpose of this study is to examine a method of middle school visual art education that has had very little attention from the realm of academic research. Despite there being very specific instances of interdisciplinary art research published, I found little to no comprehensive curriculum research and development that fall within this grade level and content specific area. This research compiles and analyzes various articles and studies that have interdisciplinary art curriculum at their core. The ideas and understandings obtained from this analysis are heavily considered and transferred into the curriculum development. The final curriculum includes art driven lessons with explicitly stated connections to other subject areas as a means to illustrate to other educators, the value of such an approach.
This study also sheds light on another area of arts education, which has had little research recognition: advocacy for extensive art programs in schools via curriculum planning. Arts advocacy is a major proponent of pre-service art teacher education yet little research has been done to exhibit the ways in which interdisciplinary art curriculum development can be a means in which art teachers can showcase their classes and gain more support in their schools. This research presents the idea that cross curricular inclusions in lesson planning is an effective way for art teachers to play a more active role in the school environment as a whole, beyond the fine arts department which can make visual art a more indispensable enrichment area. This interdisciplinary relationship is also examined for its value in mutually benefitting both general academic curriculum as well as art curriculum via new and different topics in studio, art history, aesthetics, and criticism that art educators might never develop without such partnership.
2 LITERATURE REVIEW

Though interdisciplinary education is a long-standing teaching approach, it has infrequently been utilized in American classrooms until a recent “renewed interest” (Wood 2009, p. 2). Interdisciplinary education’s reintroduction into American teaching spheres has apparently spurred from the tighter governmental regulations on academic performance in schools. Teachers are looking for ways to keep their students competitive in this global economy and are turning to interdisciplinary education for the answers. Though interdisciplinary education has been picking up support in the US, art education programs have seemingly had less involvement. Through this research I hope to encourage art educators to implement an interdisciplinary approach in their classrooms.

The following information examines benefits and prior successes that have resulted from interdisciplinary teaching methods across the academic spectrum; there is a specific emphasis on cross curricular ties with the visual arts. This research also examines how an art curriculum that incorporates other subject area connections can greatly contribute to developing innovative, interesting, and expressive lessons for the visual arts. This research and curriculum development is primarily focused on middle school aged learners since there are few existing publications that focus on the implications of utilizing interdisciplinary inclusions in middle school art lessons.

2.1 Defining Cross Curricular

Since drawing connections across disciplines in education is not new, there are multiple interpretations of exactly what the relationship between disciplines should look like and how these connections should be defined. “Cross curricular teaching and learning in the current educational context is likely to be interpreted in a variety of ways
in different schools and other learning arenas” (Savage 2010, p. 29 para. 5); as a result of there being so many different and globally known perspectives of pedagogy existing in today’s highly connected digital world.

The Consortium of National Arts Education Association describes this teaching approach succinctly; “Interdisciplinary education enables students to identify and apply Juliano between two or more disciplines and/or to understand essential concepts that transcend individual disciplines” (Consortium 2002, p. 3). “Parallel instruction, cross disciplinary instruction, and infusion” (Consortium 2002, p. 7-9) are three approaches to pedagogy that connect two disciplines. Parallel instruction involves the cooperation of two teachers to focus on a specific subject and partake in “synchronization of instruction” (Consortium 2002, p. 7) in order to connect the disciplines. Team teaching is at the core of cross disciplinary instruction, “students begin to use the characteristic ways of thinking in a particular discipline outside of that discipline” (Consortium 2002, p. 8). Infusion, is an approach to interdisciplinary instruction in which the art teacher has an appropriate level of knowledge in various subjects. “One project or activity may show students’ learning in both areas since the relationship is so integral to both” (Consortium 2002, p. 9). The degree to which academic subjects are infused into this curriculum is based upon the knowledge of the art teacher in that particular non-art subject. The digital age in which we live enables us to be connected to any information we may desire at the touch of a button, making interdisciplinary infusions incredibly simple. The nature of art allows for infusion to take place fluidly in planning and researching for curriculum development. Art has inherent connections to all of academia because it requires higher order thinking, which can lead to or be derived from other intellectual areas such as math, science, social
studies or language arts. I plan to use the infusion approach in constructing my interdisciplinary visual art curriculum.

For the purpose of this research, I draw the teacher’s role as the leader to higher thinking via challenging and probing lessons that require the recall of other, existing knowledge; this being the aspect of this curriculum supported by psychological constructivism. I also developed this curriculum based upon social factors inherent to the middle school classroom setting; this being another aspect drawn from a constructivist base. In the true sense of constructivist education, the lessons manufactured in this study cohesively rely upon art practices as the vehicle for greater understanding of non art topics through educator guidance and social interpretations.

Beyond the educational theory that supports this research, a further explanation of the term “interdisciplinary” is necessary. Moran (2010) states “Interdisciplinarity to mean any form of dialogue or interaction between two or more disciplines: the level, type, purpose and effect of this interaction remain to be examined.” The relationship between art and other disciplines within this curriculum is strong yet balanced. “The Consortium recommends that arts specialists seek a balance between disciplinary and interdisciplinary learning emphases in their classrooms and in their work with other teachers in school” (Consortium, 2002, p.3). Since these lessons are based in the art classroom it is imperative that they still include the art disciplines of an effective and meaningful art curriculum; studio practices, art history, and art criticism are all included throughout. For the purpose of this research on interdisciplinary curriculum is further defined by Sandell (2011) as she describes that an effective interdisciplinary art curriculum would “involve
engaging all learners with diverse, big ideas about the past and present that are connected to meaningful interdisciplinary relationships” (p. 53).

The art lessons to be developed from this research draw from all of these definitive notions about teaching information through interdisciplinary methods. Each lesson is based around one (or more) visual arts disciplines while featuring a connection to an academic discipline. The curriculum consists of three units: two dimensional design, three dimensional design, and ceramics. Within each unit there are four lessons, each lesson features one academic subject connection relevant to the performance standards for the 8th grade level and subject area of focus. The instructional approach derived from this curriculum considers the constructivist theory as important for student success.

2.2 Why use art to teach other subjects?

Since visual arts education and interdisciplinary teaching offer benefits both individually and when combined, students who participate in such curriculum stand to gain a significant amount of knowledge across academic disciplines. The question may arise as to why art can be such an effective vehicle for explaining topics across other subjects disciplines; Sandell (2011) offers some insight as to why interdisciplinary art teaching can be so effective: “Quality visual arts instruction gives students opportunities to be proactive learners through direct, firsthand experiences that involve transformative creative processes as well as informative critical thinking processes that apply to learning for life” (p. 50); an aspect at the foundation of Piaget’s constructivist theory.

When considering this question of art as a vehicle for interdisciplinarity, Goldonowicz (1985) states that, “art can communicate that which is universal and that for
which there are no words” (p. 17). Art as a visual language is an aspect that can help students fill in the gaps of understanding across disciplines. Art also provides many opportunities for educators to teach to the various modes of learning that Gardner (1991) outlines in his theory of multiple intelligences. When teaching art lessons, the visual, linguistic, written, and kinesthetic requirements are so often inherent to the lessons that these aspects are often overlooked as a benefit to teaching other subject disciplines through art activities; this notion is proven through educational/developmental theory to be discussed later in this research.

Through this research I aim to shed light on the possible benefits that middle school aged students may gain as a result of participating in a well developed, interdisciplinary art curriculum. “An interdisciplinary focus promotes learning by providing students with opportunities to solve problems and make meaningful connections within their hearts and across disciplines. Interdisciplinary curriculum encourages students to generate new insights and to synthesize new relationships between ideas” (Juliano Jr. et al., 2002 p. 3). The interdisciplinary art curriculum developed from this research is a knowledge promoting way to connect art to other academic areas. By simply drawing connections, and specifically showing students these connections, a plethora of knowledge is available throughout each cross-curricular lesson. This also gives students good practice in making connections from other subject areas to their lives and things that matter and have meaning to them. By making explicit connections from art to other subject areas, art educators should be able to make a greater impact upon their students’ lives.
2.3 **Interdisciplinary Teaching as Student Centered Teaching**

"The challenge of the teacher is not to truncate, deflect, or otherwise correct an approach to art, but to augment it with multiple points of view. A teacher learns alongside her students" (Stokrocki 2005, p. 254). Despite there being aspects of teaching an interdisciplinary art curriculum that seem difficult or interfering, these minor obstacles should not hinder the end goal of all teachers: to help students succeed. Karakas (2010) pointedly stated:

> While it is important to acknowledge our differences, it is also important not to lose sight of those things that we share in common, and to recognize that, as educators, we are not only providing our students with specialized knowledge to help them succeed in their chosen field of study. We are also engaged in a collective effort to help our students learn to think more clearly, critically and creatively than they did before coming under our care” (p. 6-7).

Harish et al (2011) provide a solid epistemological reason for using cross curricular teaching, noting that teachers “should connect the subject with all disciplines so that rather than opening the new memory location the information will store on the location which was already created on the brain” (p.1). Beyond this notion of building knowledge, Piaget’s (1952) constructivist theory offers further reasoning that present interdisciplinary teaching as a positive and effective method for student learning in multiple disciplines.

2.4 **Piaget’s Constructivist Theory**

Beyond contemporary examples, which support the use of interdisciplinary education, there is solid historical educational theory that suggests positive attributes of
teaching through the arts. Constructivist teaching is a method that requires the learning environment and teaching approach to support constructivist theory. Accredited to Jean Piaget, constructivist theory involves accommodation and assimilation of cognitive comprehension. This theory is essentially grounded on the idea that people learn by experience and reflection of experience (Piaget 1952). This method of teaching is helpful, as Ackerman (2001) succinctly stated, because “Piaget’s theory provides a solid framework for understanding children's ways of doing and thinking at different levels of their development” (p.3).

2.4.1 Assimilation

Assimilation refers to the process in which a learner incorporates a new idea into their existing breadth of knowledge without violating the principles of said existing knowledge (McLeod, 2009). When students have information reiterated to them, no matter what academic area it may exist in, the student is more likely to retain the given information. Providing information in a new manner and giving a different point of view allows for students to have information both reinforced as well as assimilated. In an interdisciplinary art classroom, students should partake in arts based activities that incorporate an element from another subject area class. Students will likely assimilate both arts related information and academic subject information through this approach as a different perspective usually reveals new, unknown information.

2.4.2 Accommodation

Accommodation in constructivist theory refers to when a learner gains a new understanding from the failure of a previous understanding (McLeod, 2009). Art provides a way for the students to work through problems and accommodate new
knowledge; whether it is fixing the structural elements of a sculpture or correcting an incorrectly drawn line of an illustration, studio art processes provide ways for students to practice accommodating new information through hands on exploration. When it comes to the addition of other subject areas into the art classroom, accommodation also plays a key role in how students learn the non-art information. Students may enter an art lesson with specific established schema related to the academic subject to be explored in that particular art lesson. By exploring that subject through the arts, the student may require accommodation of new information learned through this new different mode of teaching/reinforcing topics in math, science, social studies, or language arts.

This theory provides insight as to why a cross-curricular approach might lead to greater student success. “To Piaget, knowledge is not information to be delivered at one end, and encoded, memorized, retrieved, and applied at the other end. Instead, knowledge is experience that is acquired through interaction with the world, people and things” (Ackerman 2001 p.3). The art room is an excellent vehicle for this type of learning to take place, so why not incorporate more diverse information? “In constructivism, students have to learn how to problem-solve, collaborate, and manage themselves—all assets to be fostered in arts education” (Saraniero, Unknown Date, p. 2). When students are given the opportunity to learn something about a non-art topic, in an art classroom, the student is given a new way to interact with that information.

Piaget further believed that “A theory of learning that ignores resistances to learning misses the point” (Ackerman, 2001, p. 3). The visual arts have, on many occasions, proven that student engagement is increased when there is an art element involved; just as Logan (2013) notes her findings through research prove the idea that
“Fine Art education was found to have particular strengths in: developing learner identities; personalizing learning to support independence; and promoting student engagement” (p. 33). When both of these aspects of constructivist theory are at play, “Kids don’t just take in what’s being said. Instead, they interpret what they hear in the light of their own knowledge and experience. They transform the input.” (Ackerman, 2004, p. 21)

2.5 **Psychological and Biological Factors**

It is also important to note, when specifically considering middle school aged learners, that it is imperative to understand the unique outside influences upon cognition and development of this age group. Middle school students must transition into and out of this stage of life rather quickly and a transition often “includes changes in school climate and size, peer relationships, academic expectations, and degree of compartmentalization” (Cauley and Jovanovich, 2006, p. 1).

Middle school students are undergoing biological and environmental changes that impact their performance in school. Puberty can greatly influence emotional behavior (Dahl, 2004, p. 18) in the classroom while other social factors further impact student achievement. Buchanan et al. (1992) describe how changing peer relationships are the major social influence upon student performance in the classroom. It is also important to note that once students enter middle school, many new environmental demands require their attention; for example, changing classes for each subject, higher teacher expectations and grading standards, more difficult work, and more pressure to perform well (Midgley et al. 1995).
2.6 Connections Between Disciplines

Another definitive aspect of the interdisciplinary curriculum to be developed through this research is the teacher’s instructional responsibility of distinctly drawing connections between subjects. Taylor (2014) describes her interest in stretching her students’ imaginations through guiding them in digital activities so that they might make connections between disciplines. Taylor (2014) states, “It all started with the idea that student connections—among visual art and other modes of learning, thinking, working, making, and knowing—could be readily visibly clarified” (p. 14). I believe the need for explicit connection between subjects, concepts, etc. is important, and as Taylor (2014) explains is straightforward and easily to elucidate. Taylor (2014) describes the successes as “students who make relevant connections among their study in and outside of school are compelled to learn and know beyond the curriculum guidelines” (p. 14).

In order for an art educator to be successful in reaching positive outcomes from students through their interdisciplinary teaching, they must understand the need for connecting these elements of their teaching into a seamless, well-developed art curriculum. Teachers must also understand the necessity of specifically discussing with students this connection between domain specific and general learning in the art classroom. Recognizing this connection is a higher order thinking task that students must often be guided to, rather than it being an element that they naturally discover.

2.6.1 Social Studies

Social studies classes at the middle school level encompass a wide range of topics; art can generally relate to most of these topics because of the nature of art as a visual language. Art has provided a method of communication throughout the history of
man where words could not be used and in place images can. Art’s relationship with social studies is inherently strong because art is deeply ingrained in the human experience is therefore an easily relevant topic in social studies and visa-versa. Art provides a fantastic way for participants to connect the past to the present, as Dewey (1934) states “art celebrates with peculiar intensity the moments in which the past reinforces the present in which the future is a quickening of what now is” (p.17). Totten and Feinburg (2001) state “unlike the printed text, which unfolds over time, pictorial art can speak volumes at a glance” (p.239).

There is much research that proves how arts integration in academic classrooms helps better teach difficult topics. Though little research exists which shows how an art classroom can provide support to these subjects, integrative classrooms prove how art is a good vehicle for teaching topics in varying disciplines. Courtney Kosky and Reagan Curtis (2008) determine, through action research, the effects of integrating arts into a sixth grade social studies class. The researchers described their curriculum approach: “A typical lesson consisted of students copying vocabulary terms into their notebooks, a classroom read of background information and a follow-up Arts integrative activity corresponding to the new information ” (p. 23). The student teacher researcher noted “from the start that student participation was very high on days where the Arts were integrated” (Kosky and Curtis, 2008, p. 24). I feel that this success can be transcribed into an interdisciplinary art curriculum. If students are more engaged in art activities, this proves the special nature of art lessons and their ability to gain a learners attention via appreciation for creative expression or thinking. Having greater engagement means that
students will find deeper meaning and understanding of topics that utilize art as the vehicle for instruction.

Kiddy and Woodward (2013), professors at Albright College, participated in an interdisciplinary teaching model that combined Latin American history and printmaking. The authors explained “We wanted to use a different kind of technology to help students understand the past, and use Latin America’s revolutionary past to help students understand the different ways that art has been used to promote social change” (p. 169). The benefits of this model became evident to the authors through formative and summative assessment. As these students are at a more mature level in their education, the authors identified that they enjoyed the fact that “they have been pushed out of their comfort zones (and majors) and that they have benefitted from seeing the interdisciplinary connections” (Kiddy and Woodward, 2013, p. 188).

Thorsen (2010), a high school history teacher was interested in utilizing the arts as a method for teaching about genocide. Thorsen (2010) collaborated with the art teachers at his school to provide them with content information relevant to the topic he was interested in teaching through art. Thorsen (2010) stated “I worked with three of my colleagues AP Studio Art instructors in photography, graphic design, and drawing and painting, in a collaborative effort to design curriculum implemented within the art classes” (p. 4). Thorsen (2010) felt that the need for this curriculum cross over because of the “complexity” of the topic of genocide, stating that he “felt that the inclusion of arts based sources offered perhaps the best hope for truly engaging curriculum” (p. 5). Thorsen (2010) stated that this curriculum was successful because “the use of aesthetics allowed for students to gain understanding through a variety of media” and was also able
“to represent the critical shades of meaning that they gained through the study of such human experience” (p. 5).

The developed curriculum associated with this research is oriented towards 8th graders in Georgia; the State Performance Standards for social studies at this age level are primarily associated with George history. Georgia’s (somewhat) short history is connected to art in a plethora of ways; agriculture and industrialization during the Colonial period are two topics in which there is a strong connection. The curricula developed from this research also aims to incorporate multiculturalism as a bridge between the discipline of art and that of Georgia’s history. Native American and Chinese history will help connect art to important topics in Georgia history.

2.6.2 Language Arts

Artists are often required to write about or verbally articulate information regarding their artwork; this fact exhibits change to how the language arts have an existing relationship with the visual arts. When an art teacher can specifically point out the various connections between art and language, students are put in a position that allows them to develop higher order thinking skills. Indicating that this specific connection exists is as simple as stating that fact, however including other, more specific language arts material can be done with just a little effort.

Abby Newland (2013), an art educator for a K-5 public school, describes the manner in which she utilizes interdisciplinary art education:“Within the art classroom I use a parallel instruction model of interdisciplinary instruction centered on concepts of visual arts and language arts” (p.47). It is important to note that parallel instruction requires the participation of other, non-art teachers. Visualization, visual idioms,
narrative, and metaphor were the four topics that Newland (2013) covered in her exploration of interdisciplinary connections in the art classroom. In her unit on visual idioms Newland (2013) noted that one of the fourth-grade teachers at her school requested she repeat the lesson where interdisciplinary infusion was used the following year; this particular teacher saw her students succeed at a greater. This is excellent evidence for how interdisciplinary arts education can provide students with a greater potential for achievement in visual art as well as language art. Within her narrative unit, Newland (2013) found that students were sincerely engaged in the writing and the art making portion of this unit. I knew my students were genuinely engaged when they willingly worked well beyond the stated objectives, asking if they could stand up and read their stories for the class even before I suggested sharing” (p.48). This is another piece of evidence that supports cross-curricular arts education as an effective model for greater student achievement and higher order thinking via greater student engagement. The author describes the occurrence of major, positive changes in the artworks her students produced as a result of the cross-curricular methodology. The author explained how the students’ artworks were utilized as a vehicle for understanding and obtaining information for the language arts aspects of this lesson, which subsequently inspired students to incorporate more detail (Newland 2013). Newland (2013) summarized her experience with interdisciplinary teaching by stating that the lesson made a greater impact on her students in both their language arts and visual art classes; this statement aligns well with the foundations of constructivist theory since the meaning making experiences are a key to student success.
2.6.3 Science

Art and science are connected in many ways and numerous artists throughout history are exemplars of this junction of disciplines. Artists often operate in a scientific manner through close investigations of their world, which are then translated into an artistic form. Leonard da Vinci and Johannes Vermeer are examples of artists who produce works through meticulously observing their surroundings while also incorporating expressive elements that are inherent to the process of creating art.

Eskridge (2003) provided interesting insight into one of Vermeer’s paintings: “The globe at which the astronomer gazes evidences the link between science and art most pointedly, for it demonstrates this astronomer’s—and his culture’s—combined interest in finely crafted objects and scientific systems, such as cartography and astronomy” (p. 1).

Karakas (2010) gives another example of an artist who used scientific inquiry in his artistic studies: “as seen in his creation of the painting Guernica, Picasso’s innovations in style often came as a result of research, analysis and experimentation” (p. 7).

Contemporary artist Nathalie Miebach (2011) explains that her “work focuses on the intersection of art and science and the visual articulation of scientific observations...using the methodologies and processes of both disciplines” (Miebach, 2011).

Art and science are tied together and impact one another in a way that cannot easily be measured because both disciplines allow for practicing “critical and creative thinking” (Karakas 2010, p. 1), an aspect of learning that cannot be so easily assessed. In the book The Art of Thought, Wallas (1926), describes the four “stages of control” in creative thinking:

1. Preparation: a problem is investigated consciously and systematically; 2.
   Incubation: a period of abstention from conscious thought about the problem; 3.
Illumination: the creative idea appears in a sudden “flash” of inspiration, following a series of subconscious trains of association; 4. Verification: the validity of the new idea is tested, and the idea is reduced to exact form (p. 79-107).

Each of these steps can be applied to artistic and scientific thinking methods. Since both art and science promote thinking at a higher level “We argue that interdisciplinary work in the arts and sciences can lead to curricular components that combine aesthetic and analytical modes of thinking to the betterment of both science and art” (Bequette et. al 2012, p. 43).

Some K-12 educators who have employed an interdisciplinary connection between art and science exhibit how this relationship can exist so fluidly in the classroom and thus positively impact student performance. Through action research in an interdisciplinary art classroom, Irvin (2008) described the results of implementing science topics in her elementary art class: “Based on student responses, the researcher was able to conclude that the study validates the importance of interdisciplinary learning between science and art, and notes the enthusiasm students clearly expressed” (p. 36). Irvin further explains the results of her research; “Students experience a connection between investigating a topic for scientific purpose, and exploring a subject for artistic reasons” (p. 39).

2.6.4 Math

Math is seemingly the most difficult subject area to incorporate into an art classroom since math is based on the concrete and art offers a much more organic method to solving a problem. Despite this perception, art and math are interconnected in multiple
ways. Artists benefit from math skills primarily during studio practices. Perspective, for example, is an aspect of drawing that is quite mathematical; perspective employs transversals and orthogonals to create the perception of three dimensional space on a two dimensional plane. Pattern, a principle of design, relies on meticulous measurement to create accurately. Through measurement and placement calculation, an artist can determine pattern design choices to a very precise degree. Ceramic artists can calculate the volume of created vessels through mathematical equations. Mathematics learning can be enhanced in the art classroom since students will be able to see certain mathematical problems in a more visual manner. A math infused art lesson might include a studio activity where students create geometric paper sculptures then calculate the polyhedra net; the latter activity is an example of making math more visual.

Though there is seemingly sparse information on the topic of utilizing math in an interdisciplinary capacity in the art classroom, various articles reveal the success of integrating art practices into the math classroom. Despite the fact that integration does not exhibit the interdisciplinary benefits which art may receive from another subject, it offers some insight into how the subject areas can interact to the benefit of the learner. DeLeo (2003) explains: “Integrating the arts into other subject areas such as math fosters development of the whole brain, linking and strengthening both the cognitive and affective regions of the mind” (p. 4).

2.7 **Convincing Art Educators**

Despite the fact that there are numerous proven benefits to teaching an interdisciplinary curriculum in the visual art classroom, many educators are hesitant to
participate. As a result of the required demands inherent to the interdisciplinary model, the concern for art becoming submissive is at the forefront of most art teachers’ minds.

The Consortium (2002) noted that “For many teachers, interdisciplinary work is satisfying but challenging in that it requires new ways of thinking about content, students’ engagement, and often, collaborative planning with other teachers” (p. 5). Though these negative factors seem daunting, developing and implementing an interdisciplinary curriculum is simpler than it appears, as art is so connected to everything; it is essentially a visual language. The level of thinking required to develop an interdisciplinary curriculum should not me seen as difficult, especially in today’s incredibly well connected, digital world. With just a little bit of research art can be connected to nearly anything, not only because it is a visual language but because it is a major part of any long standing culture. Student engagement should not be considered severely problematic as many arts integrated general education classrooms have proven that student engagement is higher during arts based lessons. Though it may still be argued that other subjects infused into the art classroom setting is too difficult or different and can negatively impact student engagement, it should be noted that a balanced approach to interdisciplinary teaching would provide the best opportunity to prevent such phenomena. In describing her research in a number of arts integrated public school classrooms, DeMoss (2011) stated (about her students): “They often made comparisons between their arts activities and more traditional lessons, greatly preferring the arts as a host of students made clear” (p. 15). It should also be noted that in this digital age, connecting with other subject area educators is simpler than ever. These factors nearly dispel the difficulties in thinking about lesson development in an interdisciplinary capacity yet if an art educator
is still unsure of how or where to start, there is a plethora of free interdisciplinary
resources available online. The National Gallery website has numerous, very detailed
interdisciplinary lessons that are freely available to teachers.

Another reason that many art pedagogues do not have an enthusiasm for teaching
interdisciplinary art education are because of the potential for art to become subservient
to other subject areas. Savage et al (2010) outline the risks involved in including cross-
curricular topics in art classrooms. These authors were particularly concerned with art
becoming a “handmaiden” to other disciplines, however, they go on to state that
interdisciplinary art education can become “multilayered and symbiotic with other
learning” if the educator can transcend the individualism associated with multiple subject
matters (p. 28). Newland (2013), a teacher employing interdisciplinary approaches in her
elementary classroom stated: “I feel confident I am not focusing solely on what art can do
for other disciplines, but what the inclusion of other disciplines can add to my art
instruction.” (p. 50). Newland (2013) also brings up a valid point regarding cross-
curricular instruction: “Interdisciplinary art education helps students recognize that the
segregation of subjects within a school day is not indicative of what happens in life
outside of school” (p. 47). By pointing out this fact Newland (2013) addresses how
interdisciplinary education impacts both domain specific and general learning.

Further reason why art teachers are reluctant to employ cross-curricular practices
in their classrooms is a result of state mandated tests. Since these visual arts tests,
“Student Learning Objective” (SLO) tests, have come into fruition, art educators are now
being impacted by the need to specifically teach art content efficiently. These SLO tests
impact how teachers are “graded” through Teacher Keys (TKEs) in the state of Georgia
which will later help determine teacher pay. Since TKEs will (in the future) impact teacher compensation, and TKEs grading is impacted by SLOs, art teachers are more likely to keep focus solely on the content included on these tests. This is a good reason why many art teachers are, in fact, less than eager to include cross-curricular connections in their art lessons. This research advocates for the practice of interdisciplinary curriculum implementation within the middle school art classroom that effectively teaches the necessary information for students to be successful in the visual art disciplines and further on SLO tests. As previously stated, the visual arts do not become subservient to the other subjects, rather the other subjects serve as an enhancer to the visual arts lessons. Though there are now content specific tests that art educators must teach to, using interdisciplinary approaches would not hinder student success in visual art disciplines. The curriculum that is designed based on this research is fully tied to art performance standards as well as state performance and Common Core standards of math, science, social studies, and language arts.

2.7.1 Strengthening Art’s Value in Schools

In the past decade, the visual arts have somewhat been on the chopping block in public school districts because the major value that the field of art has to offer is not often immediately seen by those who create school budgets. Eubanks (2012) succinctly put it: “As education budgets shrink, art teachers need to find ways to position the study of art closer to mainstream academics by exploring concepts that cut across disciplinary boundaries” (p. 48). Fang (2013) describes the state of arts education in the city of Chicago, Il as having been “dealt a blow…as a result of it’s decision to close 50 schools. Among the most affected areas was arts education— nearly 10 percent of teachers taught
art or music” (p. 1). Fang (2013) also states that, “Philadelphia city schools are dealing with a $304 million budget shortfall by completely eliminating funding for art and music programs, among other painful cuts” (p. 1). As cases like these have been abundant over the last number of years, art teachers are having to greatly rely on arts advocacy as a means to fight for the visual arts to remain important in schools. Using interdisciplinary approaches in education is becoming a good reason why art is solidly in the “fight.”

Surprisingly, academic subject areas are coming to the rescue.

The Science, Technology, Engineering, and Math programs, otherwise known as the STEM program, is becoming very popular throughout the United States and is proving why art is so important to a child’s success in school. President Obama has an initiative to place more focus on these STEM subject areas in schools so that the United States can remain as a global leader in education. The U.S. Board of Education has projected large percentage increases in STEM job fields by 2020, which also plays a key role in the popularity of STEM programs (US DOE, p. 1). The best part about this STEM initiative is that many of these programs are realizing that art plays a major role in developing the critical thinking and problem-solving skills that are necessary for students to be successful in science, technology, engineering, and math. Many of these STEM programs are actually adding art to the list of important subject areas because of the creativity and problem skills that develop in the art classroom. This initiative, “STEM to STEAM is a RISD-led initiative to add Art and Design to the national agenda of STEM (Science, Technology, Engineering, Math) education and research in America. STEM + Art = STEAM. The goal is to foster the true innovation that comes with combining the mind of a scientist or technologist with that of an artist or designer” (RISD+Arts
When art is added to a STEM program, it becomes a more effective STEAM program. A successful STEAM program allows these subject areas to provide support for one another. An Atlanta high school, participating in the STEM program, chose to incorporate the arts into a major project that had students designing and creating gumball machines. One high school student working through this STEAM project stated “I've always been hands on, but I'm also very interested in working in the design field and this is both, I liked the creative process of it” (Cauley 2015, p. 1). This student’s teacher, Mervich, also stated “It's the art component— that’s the heart of the design process, it's the artistic bent that draws people in. Here we focus on STEAM and work on efforts to introduce kids to the art of engineering and technology” (Cauley 2015, p. 1).

In regards to STEAM, some art teachers may still argue that the arts are only seen as the introduction of STEM relevant content, rather than playing a fully immersed role in STEAM curriculum. Bequette et al. (2012) argue that “when the arts are seen as an end goal, not just an entryway to presumably more important STEM topics, thoughtfully developed STEAM curricula can truly engage sustained cross-disciplinary student learning in PK-12 settings and informal education” (p.43). These STEAM programs are truly a good reason why art educators should become more open to interdisciplinary curriculums as art plays an important role in developing successful global citizens.
3 CURRICULUM CONSTRUCTION

3.1 Overview

The content of the curriculum to be developed in this research involves the four major disciplines in the study of visual arts as well as the four major traditional academic subject areas (language arts, science, social studies, and math). This curriculum provides evidence for the importance of a relationship between visual art disciplines and academic disciplines via constructivist methods. This curriculum also allows for language arts, science, social studies, and math to be included in each of the following visual studio art units: two-dimensional design, three-dimensional design, drawing, and ceramics. There are art production, art criticism, art history, and aesthetics activities throughout each studio unit; it is important to note that these elements cross over with one another throughout each unit as that is an inherent aspect of teaching art.

This curriculum uses studio art practices as a vehicle for supporting and establishing relationships with other subject areas via visual and kinesthetic learning. The studio art lessons developed in this curriculum are designed so that the lessons are art centered yet well balanced, with a clear relationship between subjects. Development of art studio skills is the major proponent of art production based interdisciplinary lessons, however, the use of other subject areas provides students the opportunity to be expressive based on the parameters set by or inspiration drawn from the other subject area.

Art criticism activities employed in this curriculum provide for interesting and relevant discussions that promote higher order thinking. With there being a new cited connection (the interdisciplinary element) to the art side of these lessons, the proximal zone of development is extended and students stand to gain more information in both
domain specific and general capacities. Students are further expected to show understanding of the connection between subjects, further exhibiting critical thinking skills. It should also be noted that the art criticism activities are designed to be facilitated in group settings, which Mims (1994) cites as a means to heighten higher order thinking skills: “Critical thinking skills can best be developed by creating an environment conducive to full participation by the group in which everyone works together to seek answers” (p 12). A common method used in this dynamic curriculum is to cater to the social obligation of learning through not only teaching art criticism lessons in a group setting but production, history, and aesthetics lessons as well.

Art history lessons incorporate production, criticism, and aesthetics activities as a means to aid in the development of greater student understanding across multiple subjects covered. These art history lessons take the notion of different learning styles into consideration in both the instructional methods and lesson design. Though history/social studies topics are relatively similar (interchangeable) and easily related to art history, there is still a plethora of ways in which math, language arts, and science can provide for an interesting interdisciplinary connection to art history.

Topics on aesthetics have a primary focus on visual culture and the implications associated with each interdisciplinary subject matter. Students should be expected to participate in various activities that examine visual culture and it’s relationship with specific societies and time periods; there are specific connections to the other academic subject areas in each aesthetics based lesson. Other explorations in aesthetics stem from the aesthetic stances of students and how they are implicated by the culture and outside influences that exist within their lives while again, exhibiting a connection to another
subject discipline.

The following figures illustrate the organization of this curriculum. Figure 3.2.1 is a basic time line of the curriculum; each lesson is labeled by number. Figures 3.2.2 a-d are visual representations of the relationship between art disciplines and interdisciplinary subjects in each specific lesson.
Figure 1 Curriculum Timeline
Figure 2 Language Arts and Art Disciplines

- **Language Arts**
  - Studio Production Lessons: 1.3, 2.1, 3.4
  - Art History: 2.1, 3.4
  - Art Criticism: 2.3, 3.4
  - Aesthetics: 1.1

Figure 3 Social Studies and Art Disciplines

- **Social Studies**
  - Studio Production: 1.3, 2.1, 3.2
  - Art History: 1.4, 2.1
  - Art Criticism: 1.3, 3.2
  - Aesthetics: 3.2
Figure 4 Science and Art Disciplines

Science

Art History: 2.2
Art Criticism: 1.2
Studio Production: 1.2, 2.2, 3.1
Aesthetics: 3.1

Figure 5 Math and Art Disciplines

Math

Art History: 3.3
Art Criticism: 1.4
Studio Production: 1.4, 2.4, 3.3
Aesthetics: 2.4
3.2 **Explicit Acknowledgement of Connection**

A very important aspect of this curriculum development was to include explicit instructions for educators that involve citing connections between these art lessons and their students’ other academic subjects. Heywood et al. (2012) note, “The successful implementation of a cross-curricular curriculum depends on teachers’ abilities to integrate knowledge so that pupils are able to make productive links between subjects” (p. 90). Without explicit acknowledgment of the connection between these interdisciplinary art lessons and their general education classes, students might not benefit from such curriculum. The age of middle school learners requires there be such a distinct acknowledgment of the connection between subject areas, since their cognitive ability might not recognize this otherwise.
4 CURRICULUM

4.1 Implementing Unit 1: 2D Design

The lessons in unit one are all developed around either discussing or making two-dimensional art. These lessons require the middle school art educator to be familiar with other discipline topics: comparative writing, chemical changes, Georgia history, and mathematical transformations. Though an art teacher might not immediately be familiar these topics and their correlating performance standards, the necessary information to understand them is provided within each lesson. The links listed in the “Resources” section of each lesson are either corresponding videos or tutorial articles that can be used to inform the art teacher on the non-art content. The performance standards are also listed in each lesson for both art content and the other disciplines’ content.

Lesson one is based on comparatively writing about two dimensional linear perspective art. Familiarity with linear perspective and comparative writing is necessary for the success of this lesson. Though most middle school art educators are familiar with linear perspective, some may be less familiar with teaching about comparative writing. Ehrenworth’s (2003) book Looking to Write is an excellent resource for any art educator interested in incorporating writing activities into their classrooms. For the purpose of this lesson, a good place to start would be in chapter one of this book, page 31, under the heading “Teaching Children to Look Closely.” Ehrenworth (2003) provides excellent information about helping students see details in artwork as well as compare more than one image.

The second lesson in this unit incorporates a studio activity that some middle school art teachers might be unfamiliar with: cyanotype printing. Obtaining the correct
materials is imperative for this lesson; pre-coated, sun print cyanotype paper should be purchased. The process for creating cyanotype prints is very simple and is described in the lesson instructions. This lesson additionally requires the art teacher to be familiar with chemical and physical changes. There are links provided in the “Reference” section of this lesson that contain the basic information necessary to successfully implement the science portion. The art educator should be able to easily apply the information on chemical and physical changes to more than one art making process, for example: cyanotype printing is a chemical change, while cutting paper (for collage making, perhaps) is a physical change.

Lesson three of unit one involves an understanding of shibori dyeing history and processes as well as Georgia history and it’s involvement in the textile industry. The tutorial web page listed in the lesson plan is comprehensive with both written and video instructions on making Shibori dyed fabric. Links to information about Georgia’s early textile industry can also be found within the lesson plan. Art educators should be able to easily decipher the content of these online resources as they are very quick and easy to read. The primary piece of Georgia history content that the art instructor should be knowledgeable on is the role of indigo dye within the textile industry. The dye, which is the primary dye in Japanese shibori, was a major industry in Georgia during the pre-Revolution period.

The final lesson of unit one involves an understanding of the batik dyeing process as well as mathematical transformations. The math transformations within this lesson include translations, rotations, and reflections, all of which are simple “movements” that can be easily understood by visiting the resource web pages included in the lesson. For
better understanding, the instructor should complete the worksheet associated with this lesson.
4.1.1  Unit 1, Lesson 1: Art History and Perspective: Past, Meet Present

GPS Standards or District:

VAHSPACU.1 Articulates ideas and universal themes from diverse cultures of the past and present.

VAHSPACU.2 Demonstrates an understanding of how art history impacts the creative process of art making.

VAHSPAAR.2 Critiques artwork of others individually and in groups settings.

ELACC8W1 Text Types and Purposes: Write arguments to support claims with clear reasons and relevant evidence.

Lesson Themes:

Perspective, art history, contemporary art,

Objectives:

The student will write a one-page letter to an historical artist describing at least two contemporary examples of art that uses linear perspective and draws at least three comparisons from the contemporary art to the artwork of the artist they are writing.

The student will identify one point, two point, and or atmospheric perspective in the artworks they are describing.

Sample:

See section 4.1.1 1 for sample.

Resources:

http://www.artic.edu/aic/education/sciarttech/2d1.html

http://legacy.mos.org/sln/Leonardo/ExploringLinearPerspective.html


http://www.complex.com/style/2012/06/25-young-painters-you-need-to-know/os-gemeos
See section 4.1.1.2 and 4.1.1.3 for project worksheets.

**Introduction/Motivation:**

A presentation, which includes historical and contemporary art that clearly uses linear perspective, will be given to start this project.

**Content Paper or PowerPoint:**

http://prezi.com/h66bmkywv2it/linear-perspective/

See attached for project handout.

**Instructor’s Procedures:**

1. The instructor will begin this lesson by presenting a Prezi on both historical and contemporary art that exhibits perspective. One point and two point linear and atmospheric perspective must be outlined and delineated for clarification.

2. During the presentation the instructor should call upon students to determine which images employ which type(s) of perspective.

3. The instructor will then provide students with the assignment outline via a small handout (see content paper section for handout). The assignment will also be verbally explained. The instructor should clearly state that the students should write a letter to a historical artist that was studied in the presentation. Further details of the assignment should also be detailed: a description of two contemporary artworks that employ perspective, one picture of the described artworks that is no larger than 1/4 page, as well as three direct comparisons between the recipient’s work and the contemporary artworks described.

4. Upon completion of instructional time, the teacher should prompt students to begin writing their letters by hand and once complete, type them.
5. Before the students may print their letters, the instructor should be notified for review.
6. The instructor should conclude this lesson with a “ticket out the door” activity.

**Materials and Materials Management:**

- Computers
- Printer
- Printer paper
- School letterhead

Students will be allowed to work on computers that are present in the classroom after they have hand written a draft of their letter. Once each student has finished their draft, they must bring it to the instructor for approval or feedback. Once approved, students may individually log onto the computers to begin typing their letters on the school letterhead. Students will be instructed on how to obtain the letterhead file from the shared class folder on the school’s network.

**Student Procedures:**

1. To start this lesson the students should remain attentive during the presentation on historical art that employs perspective.
2. The student should listen for prompts to participate in an exercise that requires them to identify perspective in artworks in front of the class. When this activity concludes, the assignment parameters will be given.
3. The student should develop a well-written letter addressed to a historical artist discussed in the presentation (da Vinci, Breugel, Perugino, or Dai Jin). In the letter, (a) at least two examples of contemporary art that uses perspective should be described in detail; this part of the letter should also discuss the type of perspective depicted in the
contemporary imagery, (b) at least three comparisons between contemporary art and the work of the artist in which the student is writing, (c) at least one contemporary image (no larger than 1/4 of the page, set in line with the text) should be included (The contemporary image included must be one that is being described in the letter.

4. After the assignment information been presented, students should ask questions for further clarification.

5. Students will then begin to work on their letters, beginning by handwriting them.

6. Once the student has finished hand writing their letter, they may then proceed to log onto the computers available in the classroom. Once logged on, the student must find the school’s letterhead file in the class’ folder, open, copy and paste it into a new document.

7. The student should then proceed to type their letter.

8. A contemporary artist’s image must be found online and then added to the letter. The found image must be cited by: stating the artist’s name, title of work and date.

9. The student must submit the letter to the instructor for review.

10. Once approved, the letter should then be printed and submitted.

11. To conclude this lesson the students complete a “ticket out the door activity.”

**Closure/Review:**

This lesson will close with a “ticket out the door” activity. The students will be asked a series of three questions regarding perspective within art and the artists who depict them

**Assessment:**

This lesson will be assessed using a rubric assessing the following parameter:
A detailed description of two contemporary artworks that employ perspective, one picture of the described artworks that is no larger than 1/4 page, as well as three direct comparisons between the recipient’s work and the contemporary artworks described.

**Assessment Questions:**

What is the difference between one and two point perspective?

What artist, famous for painting the Mona Lisa, employs perspective drawing?

Name one artwork by Pieter Breugel.

**Assessment Instrument:**

<table>
<thead>
<tr>
<th></th>
<th>Descriptions</th>
<th>Comparisons</th>
<th>Image</th>
<th>Ticket out the Door</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Detailed descriptions of two contemporary artworks are clearly present.</td>
<td>Three distinct comparisons are drawn.</td>
<td>Image is present, labeled correctly, and sized correctly.</td>
<td>All three answers are correct.</td>
</tr>
<tr>
<td>B</td>
<td>Semi-detailed descriptions of two contemporary artworks are clearly present.</td>
<td>Two distinct comparisons are drawn.</td>
<td>Image is present, labeled partially, and sized correctly.</td>
<td>Two answers are correct.</td>
</tr>
<tr>
<td>C</td>
<td>Descriptions of two contemporary artworks are present but not detailed.</td>
<td>One distinct comparison is drawn.</td>
<td>Image is present, labeled partially, and sized incorrectly.</td>
<td>One answer is correct.</td>
</tr>
<tr>
<td>D</td>
<td>A description of one contemporary artworks is present.</td>
<td>One comparison is vaguely drawn.</td>
<td>Image is present but not labeled or sized correctly.</td>
<td>No answers are correct, student made attempt.</td>
</tr>
<tr>
<td>F</td>
<td>No description is evident.</td>
<td>No comparisons are evident.</td>
<td>Image is not present.</td>
<td>No ticket turned in.</td>
</tr>
</tbody>
</table>
EXTENSION/ Differentiation or Adaptation:

Gifted students will also be held to a higher standard regarding their writing composition, vocabulary usage, and syntax.

A student with physical disabilities will be allowed to skip the hand writing portion of the lesson and do their draft on a computer. Adaptive tools may be provided in order to make typing easier for said student. The student will also be given additional time to complete their assignment.

A student with emotional or behavioral disabilities will be given some additional time to complete the assignment. This student will also be frequently checked upon to ensure they are on task and working towards finishing the assignment. This student will also be allowed a short break halfway through the writing process.
4.1.1.1  Sample Letter

Beasley Middle School

Dear Mr. Bruegel,

I am writing to you because I sincerely appreciate and enjoy your artwork. I have been learning about linear perspective in my art class and I wanted to tell you about some contemporary artists that I enjoy who use the principles of perspective in their artwork. Known as Os Gemos, twin brothers from Brazil, are the ones who painted the image I have included. The beautiful rainbow “burst” employs linear perspective and gives the optical illusion of three dimensional space on a two dimensional plane. These brothers also incorporate atmospheric perspective by making the background become more hazy as it disappears into the horizon. I particularly like these artists because they create their artwork in public spaces where anyone can walk by and see it. Brendan Moore, another contemporary artist whose work I admire, incorporates perspective into many of his works. A mostly green painting that depicts abstract, tall “lumps” receding into the distance while on the brink of sinking into a large separation is an image I find quite interesting. Called Divide, this work reminds me of your piece, The Harvesters. Both seemingly have a visual divider across the plane of the image while both of them also incorporate atmospheric perspective to achieve three-dimensional space on the two-dimensional plane. Repetition is another element of art that is also playing both of these images. While your image is much more realistic, and Moore’s image is pure abstraction, the eye moves around each image in a similar fashion. I hope you find these contemporary examples interesting, the world has changed so much!

Always in Art,

Mary Breazeale
4.1.1.2 Lesson 1.1 Worksheet

Develop a well-written letter addressed to a historical artist! DUE DATE:
Choose from: Leonardo da Vinci, Pieter Breugel, Pietre Perugino, or Dai Jin

- In the letter, at least two examples of contemporary perspective art should be described in detail; this part of the letter should also discuss the type of perspective depicted in the contemporary imagery.

- This letter should include at least three comparisons between contemporary perspective art and the art of the artist in which you are writing.

- The letter should include one contemporary image (no larger than \( \frac{1}{4} \) of the page), set in line with the text, that incorporates perspective. (This image must be one that is not being described in the letter.)

- You must also state the name of the artist, the artwork, and the date of the image you include as well as why you chose to include that particular image.
4.1.1.3 Ticket out the Door
4.1.2 Unit 1, Lesson 2: Cyanotypes and Chemical Changes

GPS Standards or District:
VA8PR.1 Engages in art making process with care and craftsmanship.
Explores the properties of art materials and various techniques/processes in preparation for art making.
VA8AR.1 Critiques personal artworks as well as artwork of others using visual and verbal approaches.
Provides respectful and constructive criticism to peers in formal class critiques.
S8P2. Students will be familiar with the forms and transformations of energy.
Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation of precipitate, and change in color).

Lesson Themes:
Cyanotypes, photograms, principles of design, chemical and physical changes

Objectives:
The student will create a cyanotype print correctly while using the photogram method to create a composition that incorporates two principles of design.
The student will exhibit understanding of the principles of design by writing an explanation of the principles used in the composition.
The student will exhibit an understanding of the chemical changes by completing the “chemical changes” mini worksheet (see worksheet in section 4.4.2).
The students will create three “photogram” sketches.
Sample:

Resources:

http://antoine.frostburg.edu/chem/senese/101/matter/faq/physical-chemical.shtml

http://pinhole.stanford.edu/images/class09/pam.jpg

http://thephotographersgallery.org.uk/images/14_a_chemistry_and_art_connection_54fee37ff77.pdf

See section 4.1.2.1 for worksheet.

Introduction/Motivation:

This lesson will begin with a Prezi that introduces the photogram and cyanotype printing. This presentation will incorporate the scientific concepts of physical and chemical changes. Students will have a short worksheet to complete as the presentation is given.

Content Paper or PowerPoint:

https://prezi.com/sp5-wdafpbdg/cyanotypes-and-chemical-changes/

Instructor’s Procedures:

1. Before this lesson begins the instructor should prepare materials for the students to easily access during studio time. Special cyanotype paper should be purchased in preparation for this lesson. Cyanotype paper should be cut to the appropriate size (based on quantity available) and stored in a light tight bag until the class is ready to use. Objects
to be used in the photograms should be set out on supply tables. The instructor should
have examples and a teacher sample prepared before the lesson, as well.
2. The instructor will begin this lesson by giving a presentation on photogram and
cyanotype printing. The instructor should describe cyanotype and black-and-white
darkroom printing as chemical changes. Photogram samples that employ various
principles of design should be shown and an oral activity where students identify the
principles of design are at play in the given examples.
A document camera should be used to exhibit how a photogram might be set up in the
dark room or outside on cyanotype paper.
3. The instructor should facilitate a discussion about the differences between chemical
and physical changes not only in science but also in making art.
4. The instructional time should wrap up with an explanation of the assignment
requirements. The student will create a cyanotype print correctly while using the
photogram method to create a composition that incorporates two principles of design.
The instructor should further explain that students will be expected to write a brief
statement on how they employed these principles of design.
5. Next, the students should be prompted to participate in a quick exercise that requires
students to obtain various shaped objects, which their outline can be traced. This exercise
will help students build the compositions on regular paper before they use photographic
paper. This exercise also helps students preemptively incorporate at least two principles
of design into their artwork. The instructor should require students to complete three
traced compositions before they may utilize their photographic paper to create an actual
photogram.
6. Once all students have completed their traced compositions the instructor should lead the students outside with their objects and photographic paper to create the photogram compositions.

7. When the students have exposed their cyanotype paper for approximately 10 to 15 minutes (based on the sunlight), the instructor should lead the class back inside to rinse out all the prints.

8. After the prints have rinsed and are drying, the instructor should direct students to write a statement explaining the use of design principles in their composition.

9. This lesson will end with a short large group critique

**Materials and Materials Management:**

- Cyanotype paper
- Paper
- Marker
- Small objects with varying shapes
- Sink with running water

The cyanotype paper will be handled only by the instructor until the students are ready to make their prints. All of the cyanotype paper will be precut by the instructor and kept in a light tight bag until ready for use. All of the photogram objects will be in bins that are laid out on the supply tables for students to easily access.

**Student Procedures:**

1. The student should begin this lesson by remaining attentive throughout a presentation on photograms, cyanotypes, physical and chemical changes, and the principles of design.
During this presentation the student should complete the given worksheet that reiterates the most important information from the Prezi.

2. Once the instructional time is complete, the student should begin working on their “composition sketches” by outlining objects to create a mock photogram composition. The student will incorporate at least two principles of design into their composition.

3. The student should complete the studio project by writing a brief explanation of how the principles of design are at play in their artwork.

4. Once the student has completed three of these sketches, they should wait for the instructor to hand out the cyanotype paper and direct them to exit the class.

5. While outside, the student should assemble their compositions in the sunlight. The student should wait at least 10 minutes before they return their paper to the instructor and re-enter the classroom.

6. Next, the student should rinse out their cyanotype paper and hang it up to dry.

7. Following the studio activity, the students should complete a written statement explaining how the incorporated two design principles into their artwork.

8. The student should conclude this lesson by participating in a large group critique that requires them to identify the principles of design at play in their classmates’ compositions.

**Closure/Review:**

This lesson will conclude with a large group critique that involves students identifying the principles of design at play in their classmates’ artwork.

**Assessment Questions:**

How well did the student meet the assignment requirements?
Did the student sketch three artworks that varied both compositionally and in content?

Can the student identify the difference between a physical and a chemical change?

**Assessment Instrument:**

<table>
<thead>
<tr>
<th></th>
<th>Sketches</th>
<th>Principles of Design</th>
<th>Critique Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>All three sketches are present and exhibit nice variation, i.e. different objects used in each, different compositional approaches evident.</td>
<td>Two principles of design are clearly evident in the composition. The student articulated in a written statement how they achieved this.</td>
<td>Student offered numerous insights and productive criticisms.</td>
</tr>
<tr>
<td>B</td>
<td>Three sketches are present but offer less variety.</td>
<td>Two principles of design are somewhat evident in the composition. Student did not articulate clearly how they utilized their design principles in their written statement.</td>
<td>Student offered some insights and productive criticisms.</td>
</tr>
<tr>
<td>C</td>
<td>Two sketches are present.</td>
<td>One principle of design is evident in the composition. Student incorrectly articulated the use of design principles in their written statement.</td>
<td>Student offered few insights and productive criticisms.</td>
</tr>
<tr>
<td>D</td>
<td>One sketch is present.</td>
<td>One principle of design is vaguely evident in the composition. Student did not complete a written statement.</td>
<td>Student was disengaged, spoke rarely.</td>
</tr>
<tr>
<td>F</td>
<td>No sketches submitted.</td>
<td>Student did not submit cyanotype print or written work.</td>
<td>Student did not participate.</td>
</tr>
</tbody>
</table>
EXTENSION/ Differentiation or Adaptation:

Gifted students will be challenged to incorporate at least four principles of design into their compositions.

Students with physical disabilities will be given an adaptive marker to draw the outlines for the sketches. The student will be allowed additional time to complete their sketches. A peer assistant will be assigned to this student to aid them with carrying their photogram objects and cyanotype paper outdoors.

Students with behavioral disabilities will be assigned a peer mentor to help them stay focus on their tasks. The student will be allowed a small amount of additional time to complete their sketches.
4.1.2.1 Lesson 1.2 Worksheet

**Name:__________________________**

**Draw a quick sketch of the “change” and label it as chemical or physical.**

<table>
<thead>
<tr>
<th>Melting Wax</th>
<th>Tearing Paper</th>
<th>Firing a Clay Jar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burning Cardboard</td>
<td>Baking a Cake</td>
<td>Printing a Cyanotype</td>
</tr>
<tr>
<td>Adding a Petina to Copper</td>
<td>Frozen Ice</td>
<td>Evaporating Water</td>
</tr>
</tbody>
</table>

**Name:__________________________**

**Draw a quick sketch of the “change” and label it as chemical or physical.**

<table>
<thead>
<tr>
<th>Melting Wax</th>
<th>Tearing Paper</th>
<th>Firing a Clay Jar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burning Cardboard</td>
<td>Baking a Cake</td>
<td>Printing a Cyanotype</td>
</tr>
<tr>
<td>Adding a Petina to Copper</td>
<td>Frozen Ice</td>
<td>Evaporating Water</td>
</tr>
</tbody>
</table>
4.1.3  Unit 1, Lesson 3: Shibori Dying and Georgia

GPS Standards or District:

VA8PR.1 Engages in art making process with care and craftsmanship.

VA8PR.3 Produces an array of two-dimensional and three-dimensional artistic processes and techniques using a variety of media and technology.

Produces original two-dimensional artworks using a variety of media.

SS8H5 The student will explain significant factors that affected the development of Georgia as part of the growth of the United States between 1789 and 1840.

Explain how technological developments, including the cotton gin and railroads, had an impact on Georgia’s growth.

Lesson Theme:

textile history, Georgia history, fabric dying techniques

Objectives:

The student will exhibit an understanding of how textiles create a connection between Georgia and Japan by completing a written statement explaining three aspects that these two places/cultures have in common related to the topic.

The student will exhibit an understanding of shibori dying processes by dyeing a piece of fabric using one of the shibori techniques presented in class and exhibiting a high level of craftsmanship (bound correctly, dyed for an adequate time) in the process.

Sample:
Resources:

http://www.designsponge.com/2014/05/diy-project-shibori-designs-4-ways.html

See section 4.1.3.1 for worksheet.

Introduction/Motivation:

This lesson will begin with a presentation on the history of the textile industry and it’s connection to the state of Georgia. There will be a worksheet for students to complete as they follow along with the presentation.

Content Paper or PowerPoint:

https://prezi.com/2y8js_jflbgs/global-connections-through-art/

Instructor’s Procedures:

1. Before this lesson begins, the instructor should prepare a few colors of dye in large containers (no larger than the size of a 5 gallon bucket) for students to use during class.

2. The instructor will begin this lesson by presenting a Prezi on the textile industry and its role as the connection between the state of Georgia, Japan, and the art world. The instructor should remind students of the importance of the cotton gin’s invention during the pre-civil war period. The instructor should refer to this connection between the visual arts and history numerous times throughout the presentation.

3. Once the presentation is completed a demonstration on Shibori dying techniques should be given. Square accordion fold, triangle accordion fold, fan fold, and resist circles should be shown during the presentation. The instructor should utilize a document camera to show students how to complete the folding techniques (The resource link above has gifs that show each folding/binding process). The instructor should have the students use notebook paper to practice these folding techniques as they are being
demonstrated, labeling each as they are shown. These practice pieces can be used for reference once the student is ready to bind their fabric.

4. The traditional names for each process should be discussed next. The instructor should explain that Nui Shibori is made from a simple running stitch that is pulled very tightly which causes the fabric to bunch. Kumo Shibori can easily be demonstrated by pleating and binding the fabric with rubber bands. Arashi shibroi (pole wrapping technique) should also be shown.

5. Next the teacher should explain the distinction between the traditional process and the process that will be slightly altered for the class. Students will be using rubber bands to bind their Shibori designs but should be made aware that traditional techniques require the fabric binding to be stitched tightly using needle and thread.

6. After the binding portion of the demonstration is completed, the instructor should show students how to dye the fabric and rinse it out. Depending on the strength of the fabric dye the student may leave their project for 10-25 minutes.

7. The instructor should wrap up the demonstration by reminding students of how well-connected Georgia history is to traditional Japanese art making. Once the instructional time is over this instructor should allow students to complete their Shibori dying projects; the instructor should make themselves available to students they have any questions or issues.

8. As students are completing the project, the teacher should direct them to write a statement explaining three different connections between Japan and Georgia have through textiles.
Materials and Materials Management:

paper
2’x2’ pieces of muslin
rubber bands
cardboard
fabric dyes
large containers
tongs
paint brushes

The instructor will pass out the pieces of muslin, and rubber bands to all students. Fabric dyes will be available in large containers at the supply table for students to use once they finish the binding/folding portion of this assignment.

Student Procedures:

1. The student should begin this lesson by remaining attentive during the presentation, exhibiting this by completing the worksheet given by the instructor.

2. When the presentation has finished the students will turn in their worksheet and be instructed to take out sheets of notebook paper and follow along with the demonstration.

3. The student should complete three different folding techniques using their notebook paper, labeling each folded piece.

4. The instructor will hand out the pieces of muslin fabric and instruct the students to write their name (small) in the bottom corner of their fabric with a permanent marker.

5. The student should then determine which technique(s) they would like to use for their piece of fabric; the student may then begin working on folding/binding their fabric.
6. Once the binding portion is completed the student will take their fabric to the dying station and either dip or paint their fabric with dye.

7. When the fabric has been saturated with dye, the student may let it sit for 10 to 20 minutes depending on the desired color intensity.

8. The student should then rinse the fabric until the water comes out clear.

9. As the fabric dries, the student should complete a written statement explaining three ways that Japan and Georgia are connected through textiles.

10. The student will wrap up this project by participating in a class wide discussion and mini critique on the process of folding/binding

**Closure/Review:**

This lesson will close with a discussion and mini critique of the student created shibori pieces. As students line up to leave class a short review should be given. Students should be asked:

How do Georgia and Japan connect in this lesson?

List the steps to create a square fold in shibori dying.

Vocabulary words for this review will include:

Nui Shibori
Kumo Shibori
Arashi Shibori
binding
indigo
resist
Assessment Questions:

How well did the student explain three commonalities between Georgia and Japan as a result of textiles?

How well did the student use one of the demonstrated shibori processes to dye a piece of fabric?

Assessment Instrument:

<table>
<thead>
<tr>
<th>Craftsmanship</th>
<th>Practice Folds</th>
<th>Written Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> Student exhibits a high level of craftsmanship. Folding and binding appear to be done correctly in final product and the dye was used correctly (piece was saturated well, time saturated also appropriate).</td>
<td>Student correctly completed all three practice activities.</td>
<td>Student articulated clearly and correctly how Japan and Georgia connect through textiles in two distinct ways.</td>
</tr>
<tr>
<td><strong>B</strong> Student exhibits an adequate level of craftsmanship. Folding and binding appear to be done mostly correct in final product and fabric was saturated in dye adequately.</td>
<td>Student completed three practice activities, not all correct.</td>
<td>Student somewhat articulated how Japan and Georgia connect through textiles in two ways, explanation was not completely correct.</td>
</tr>
<tr>
<td><strong>C</strong> Student exhibits a sub par level of craftsmanship. Folding and binding appear to be done haphazardly in final product, dying exhibits similar qualities.</td>
<td>Student completed two practice activities, one correctly.</td>
<td>Student somewhat articulated how Japan and Georgia connect through textiles in two ways, explanation was not correct.</td>
</tr>
<tr>
<td><strong>D</strong> Student exhibits poor craftsmanship. Folding and binding are hardly evident in final product, dye was handled incorrectly.</td>
<td>Student completed one practice activity.</td>
<td>Student somewhat articulated how Japan and Georgia connect through textiles in one way, explanation was not correct.</td>
</tr>
<tr>
<td></td>
<td>Craftsmanship</td>
<td>Practice Folds</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>F</td>
<td>Student did not complete assignment.</td>
<td>Student did not complete any practice work.</td>
</tr>
</tbody>
</table>

**EXTENSION/ Differentiation or Adaptation:**

Gifted students will be expected to incorporate at least two types of Shibori folding onto a single piece with consideration for color.

Students with physical disabilities will be given additional time to finish this assignment.

Students with behavioral disabilities will be assigned a peer mentor to help them stay focused on the studio task; these students will also be given additional time.
4.1.3.1 Lesson 1.3 Worksheet

Textiles in Georgia History  Name:_____________________

1) During the mid to late 1700s, what was the main type of textile being produced?

2) The city of Canton, GA was named after what city and why?

3) Give one reason why cotton became the dominating crop in Georgia.

4) What invention helped cotton production? Who invented it?

5) Like Georgia, Japan was a leading ______________ producer.

6) Shibori is often done using _______________ colored dye.

7) How does this particular color relate to Georgia?

8) List 2 Shibori methods:

9) What are the three types of fabrics most commonly used for Shibori?

10) How many methods should you use in your project?
4.1.4  Unit 1, lesson 4: Batik Designs and Math

GPS Standards or District:

VA8PR.1 Engages in art making process with care and craftsmanship.
VA8AR.1 Critiques personal artworks as well as artwork of others, using visual and verbal approaches.
MCC8.G.1 Verify experimentally the properties of rotations, reflections, and translations

Lesson Theme:

Textile art, batik, reflections, translations, and rotations

Objectives:

The student will identify and apply their knowledge of the three math concepts: translations, reflections, and rotations by successfully completing the worksheet.

The student will complete a highly detailed, well-crafted batik design on a 12" x 12" piece of muslin that incorporates all three of the discussed “math moves.”

The student will explain in writing their understanding of the connection between art, math, and social studies.

Sample:

Resources:

http://www.educationalunits.com/africa/batik.jpg

See section 4.1.4.1 and 4.1.4.2 for worksheets.

**Introduction/Motivation:**

At the start of this lesson, students will be reminded of the distinct connection that Georgia has to the fabric dye industry. This lesson will proceed with a presentation on the history of batik and pattern design.

**Content Paper or PowerPoint:**

https://prezi.com/qfc5ukj0qne1/textiles-20-batik-and-georgia/Instructor’s

**Procedures:**

*Day 1*

1. The instructor will begin this lesson with a warm up activity that requires students to remember the ideas discussed in the previous fabric design lesson. (see attached worksheet). This warm up activity will be partially completed at the beginning of the lesson and will be completed during this lesson’s wrap up. The first portion of this worksheet will be completed using the following parameters. Students will be asked to write down a fact (in the box which is labeled social studies) that in someway connects Georgia history to textile art. Then the student will be asked to write types of textile art processes in the box labeled art.

2. Once this warm-up activity is completed the instructor will proceed with a presentation on batik dying processes. This presentation will incorporate information about how certain math processes such as translations, reflections, and rotations play a role in artistic design. The students will then be given a demonstration on how to create batik art using hot wax and fabric dyes.
3. The instructor should hand out a graph work sheet that requires the students to reflect, translate, and rotate a shape using the grids for guidelines.

Days 2

4. During the following class day, each student will be given a 12" x 12" piece of muslin. The instructor will then prompt students to sketch shapes and symbols that incorporate all three of the previously practiced mathematical “moves” into their composition.

5. As students complete their sketching, the instructor should closely monitor both the use of hot wax and irons.

Day 3

6. The instructor will begin the third day of this assignment by helping students with ironing the excess wax of their batik compositions.

7. After studio time, the instructor should ask the students to complete their discipline connections worksheet that was started at the beginning of this lesson. As a “line up at the door activity” students can present their designs to the class and describe their process. The instructor will collect the artwork as the students exit the classroom.

Materials and Materials Management:

12”x12” pieces of muslin
wax
hot plate
paint brushes
fabric dyes (various colors)
iron
absorbent paper
plastic trays

Each student will be given one square of muslin, while all other materials will be on designated tables. Students will be allowed to visit the supply tables to use wax/hot plate/paint brushes in groups with direct supervision from instructor. There will be a separate area for students to add dye to their batik drawings and another area for students to iron off the wax using absorbent paper.

**Student Procedures:**

*Day 1*

1. The student will begin this lesson by completing a warm-up activity that asks them to recall information from the previous class. The student will be required to fill in two thirds of the worksheet the instructor hands out during the warm-up.

2. The student will proceed by being attentive throughout the presentation on the history of batik, it’s connection to Georgia, the Far East, and math practices. The students will further be attentive to the demonstration on how to complete the studio assignment, using hot wax, fabric dye, and irons.

3. Once the instructional time is over, the student should begin using the graph worksheet to demonstrate their understanding of translations, reflections, and rotations by drawing an example of each using organic or geometric shapes as well as symbols to complete the warm up activity.

*Day 2*

4. The student will then begin to lightly sketch similar designs onto their muslin cloth. The student should copy their symbols or shapes at least one additional time; this should be done so that students can exhibit the “math moves” in these batik designs.
5. The student will carefully use paintbrushes and other hand tools to apply hot wax over the desired areas. The student should take special care when working with the hot wax—the student should work quickly so that the wax does not dry. The wax may clump on the brush—dipping the brush in the hot wax will help clean the brush for more precise strokes.

6. Once the waxing is completed and dry, the student will choose a fabric dye and then apply the dye to the fabric carefully.

*Day 3*

7. After the dyes are mostly dried, the student will then proceed to the ironing station where they will sandwich their fabric between sheets of paper and iron off the wax.

8. The student will conclude this lesson by finishing the worksheet they began at the beginning of the lesson. The student should be able to identify how math connects to art as well as to social studies, based on the information they obtained in this lesson.

9. Students will participate in an informal critique at the conclusion of this lesson as well.

**Closure/Review:**

This lesson will close with an informal critique where students can line up at the door only if they volunteer to describe their design. The instructor should ask the following questions during this time:

What is a reflection?

What is a rotation?

What is a translation?

Describe the batik process.

Where does batik originate?
Students will turn in their designs as they exit the classroom.

**Assessment Questions:**

How well did the student complete the worksheet identifying the three math concepts: translations, reflections, and rotations?

How well did the student complete a highly detailed, well-crafted batik design that incorporates all three of the discussed math moves?

How well did the student explain, in writing, their understanding of the connection between art, math, and social studies?

**Assessment Instrument:**

<table>
<thead>
<tr>
<th></th>
<th>Craftsmanship</th>
<th>Detail</th>
<th>Math Transformations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>The student exhibits exemplary craftsmanship. All wax has been removed, designs are neat, and dyes are rich in color.</td>
<td>The student exhibits a high degree of detail in their final art piece. The entire piece of fabric is utilized.</td>
<td>All three moves are clearly evident in the final design.</td>
</tr>
<tr>
<td>B</td>
<td>The student exhibits above average craftsmanship. Most wax has been removed, designs are neat, and dyes are mostly rich in color.</td>
<td>The student exhibits an adequate level of detail in their final art piece. Most of the piece of fabric is covered.</td>
<td>All three moves are apparent but somewhat unclear in the final design.</td>
</tr>
<tr>
<td>C</td>
<td>The student exhibits an average level of craftsmanship. Some wax has been removed, designs are somewhat neat, and dyes are slightly rich in color.</td>
<td>The student exhibits a below par level of detail in their final art piece. At least half of the fabric is covered in designs.</td>
<td>Two moves are evident in the final design.</td>
</tr>
<tr>
<td>D</td>
<td>The student exhibits below average craftsmanship. Little wax has been removed, designs are not neat, and dyes are not rich in color.</td>
<td>The student exhibits a sparse level of detail in their final art piece. At least a quarter of the fabric is covered in designs.</td>
<td>One move is evident in the final design.</td>
</tr>
</tbody>
</table>
**Craftsmanship** | **Detail** | **Math Transformations**
---|---|---
F | Student exhibited little consideration for craft. Art piece appears to be thrown together/rushed. | Very little, if any, surface design is apparent. | No rotation, translation, or reflection is evident.

**EXTENSION/ Differentiation or Adaptation:**

Gifted students will be required to exhibit all three mathematical design moves as well as write a short description of their design and color use.

Students with physical disabilities will be given a peer assistant to aid them in completing the batik studio processes. This student will also be given additional time to complete the assignment.

Students with behavioral disabilities will be required to work with a peer assistant and will be further checked upon more frequently by the instructor. The student will be given additional time for this assignment as well.
Draw a shape and its corresponding reflection, translation, or rotation. There should be one example of each of these represented.
4.1.4.2 Lesson 1.4 Worksheet 2

Connecting Disciplines

Use the graphic organizer to draw connections between disciplines.
4.2 Implementing Unit 2: 3D Design

Unit two lessons are based around three dimensional studio projects. As this is the second unit within this interdisciplinary curriculum, some of the content will begin to overlap; this approach is taken as a means to reiterate/review previously discussed topics. These lessons require the middle school art educator to be familiar with other discipline topics: cotton production in early Georgia, narrative in writing, mass and gravity, and math transformations (see unit one, lesson four).

Lesson one of the second unit is founded with the history of Georgia textile mills and the invention of the cotton gin. An effective art educator implementing this curriculum should become familiar with these topics by utilizing the included online resources while also seeking information from local sources. There are also numerous local resources relevant to this lesson that should be taken advantage of by art educators in Georgia. For example: Sweetwater Creek State Park, in Lithia Springs, GA, provides historical information on the New Manchester textile mill and the Cherokee County History Museum provides information the silk industry in early Georgia; both places can be a destination for a supplemental field trip. The successful interdisciplinary art teacher should explicitly draw the connection between making fabric art to the history of making fabric and it’s specific impact on Georgia.

For successful implementation of the second lesson in this unit, a revisit of Ehrenworth’s (2003) book, is necessary. There are a couple of small activities throughout this lesson that require knowledge of poetry and chapter one of this book is a great place to start. The final studio activity in this lesson involves narrative, and story-telling;
chapter three has a plethora of information to aid in implementing this portion of the lesson.

Lesson three requires the instructor to have knowledge on mobile sculptures as well as the scientific concepts of mass and gravity. The art and science topics in this lesson are very closely connected, as mass and gravity are what keep mobile sculptures balanced or unbalanced; the instructor should identify this relationship numerous times throughout the lesson. As with the other lessons, there are online resources listed within the lesson plan that can help clarify the related science oriented information.

The fourth lesson in this unit includes an interdisciplinary topic that has been previously discussed in the first unit. A review of material should be completed when implementing this lesson. Explicitly stating how math transformations exist in art, especially in radial design, should be an element of this lesson that should be repeated.
4.2.1  Unit 2, Lesson 1: Georgia History and Weaving

GPS Standards or District:

VA8PR.1 Engages in art making process with care and craftsmanship.

VA8PR.3 Produces an array of two-dimensional and three-dimensional artistic processes and techniques using a variety of media and technology.

Develops three-dimensional artworks from materials such as clay, papier-mache, plaster, wood, wire, found objects and/or combinations of materials.

SS8H5 The student will explain significant factors that affected the development of Georgia as part of the growth of the United States between 1789 and 1840.

Explain how technological developments, including the cotton gin and railroads, had an impact on Georgia’s growth.

Lesson Themes:

Weaving, color as symbolism, Georgia textile industry

Objectives:

The student will create a well-crafted 8”x12” piece of hand woven fabric that incorporates at least three colors that are representative of different family members.

The student will write an explanation for the colors they chose to represent their family members.

Sample:
**Resources:**

https://www.youtube.com/watch?v=QDCgldHpSFs  
http://research.library.gsu.edu/c.php?g=115684&p=751981

**Introduction/Motivation:**

This lesson will begin with a presentation on the Georgia textile industry during the pre-Civil War and how textiles were made during that time. Additionally, there will be a video demonstrating how to create a woven piece of fabric using a simple cardboard loom.

**Content Paper or PowerPoint:**

https://prezi.com/li5ta0utcx8c/weaving-and-textiles-georgia-connections/

**Instructor’s Procedures:**

*Day 1*

1. The instructor should begin this lesson by presenting a Prezi on the textile industry in Georgia during the pre Civil War period. This presentation should explain the significance of the textile industry as well as the impact of the invention of the cotton gin. The instructor should emphasize the relative period’s traditional process in creating fabric using mechanical weaving looms. The capacity of these mills, including the entire process of starting with raw cotton, to producing completed fabric should be described. The instructor should also explain that the loom in which the students will work with is very similar (yet rudimentary) compared to the looms that were being used in Georgia mills during the pre-Civil War period.

2. Once the instructor has finished explaining the historical information, the video that describes the basics of using a cardboard loom should be shown to students. This video
will describe how to create a loom. These looms are created using a 10” by 14” piece of cardboard with one half inch slits cut every one cm in the top (ten inch side) and the bottom. The weaving process is done by tying a knot in the end of a long (about five yards) piece of yarn. The knot should be pushed down into the first slit on one side of the cardboard and then wrapped down the length of the cardboard and pushed into the first slit on the other side. Next, the loose yarn will be moved one slit over (on the same side it is currently wedged in) by wrapping the strand around the backside of the adjacent slit and pushing through the slit. The loose yarn will be pulled down the length of the cardboard where the previous steps will be repeated until the yarn has reached the other end. Once the yarn has reached the other side, a new five yard piece should be obtained. This new piece of yarn will be woven into the loom beginning by going over the first string then under the next and repeating until the yarn reaches the other side; this piece of yarn should be pushed to the bottom of the loom. Once one piece has reached the other side, the long end of the strand should be threaded through the same way but starting by going under the first string and over the second, again, repeating until the other side. This second strand should be gently pulled all the way through the loom. This procedure should be followed to fill up the loom, beginning with the opposite direction (over first will be the third starting direction).

3. Next the assignment parameters should be described: students will be expected to incorporate at least four different colors, which each individually represent a family member. In this assignment description, the instructor should explain that following the studio project students will be expected to write an explanation for each color choice as it relates to their family.
4. Next the instructor should allow students the remainder of class time to create their looms.

*Day 2*

5. The instructor should begin the second class period by handing out the student created looms and prompting students to get to work on their fabric weaves.

*Day 3*

6. Studio time will continue on the third day, the instructor should provide assistance to students.

7. The instructor should prompt students to write the statement about their color choices once they have completed the weaving portion.

**Materials and Materials Management:**

yarn
ruler
rectangular piece of cardboard (10"x14")
marker
scissors

Table sets with rulers, cardboard, markers, and scissors will be prepared and placed at each table. Yarn will be available at the supply tables for students to obtain.

**Student Procedures:**

*Day 1*

1. The student will begin this lesson by remaining attentive during the Prezi on the history and economic impact of the textile mills in Georgia, specifically during the pre-
Civil War period. Students should also listen for information on the processes that took place in these mills.

2. Next the student should watch the video explaining how to weave a piece of fabric using yarn and a cardboard loom; if they feel it necessary the student should take notes. The assignment parameters will be given next.

3. The student should then begin brainstorming about various colors that they might feel represent their family members.

4. Once the colors have been decided upon, students will begin weaving their piece of fabric, going slowly and steadily to ensure a high level of craftsmanship. Should the student require any additional assistance, they should not hesitate to ask the instructor.

**Closure/Review:**

This lesson will conclude with students writing a short paragraph that explains their color choices and how they relate to their family members.

**Assessment Questions:**

How well did the student craft a three-colored (or more) piece of hand woven fabric using the cardboard loom method?

Did the student effectively communicate, through a written explanation, the significance of the colors they chose to represent their family members?
## Assessment Instrument:

<table>
<thead>
<tr>
<th>Assessment Level</th>
<th>Size and Craft</th>
<th>Colors</th>
<th>Written Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Student meets full size requirements and exhibits an exemplary level of craftsmanship. Rows appear mostly even and yarn is pulled tight.</td>
<td>Three colors are included in the artwork. Colors appear balanced.</td>
<td>Written portion is clear, eloquent. The relationship between the three colors and the family members they represent is detailed in the writing.</td>
</tr>
<tr>
<td>B</td>
<td>Student work meets full size requirements and exhibits an above average level of craftsmanship. Rows appear mostly even and yarn is pulled tight.</td>
<td>Three colors are included in the artwork. Colors are not well balanced.</td>
<td>Written portion is somewhat clear, and eloquent. The relationship between the three colors and the family members they represent is somewhat detailed in the writing.</td>
</tr>
<tr>
<td>C</td>
<td>Student’s work is just short of the size requirements and exhibits an average level of craftsmanship. Rows mostly appear even and yarn is inconsistently tight.</td>
<td>Two colors are included in the artwork; colors are balanced.</td>
<td>Written portion is somewhat clear, and eloquent. The relationship between only two colors and the family members they represent is included in the writing.</td>
</tr>
<tr>
<td>D</td>
<td>Student’s work is substantially short of the size requirements and exhibits a below average level of craftsmanship. Rows are not even and yarn is inconsistently tight.</td>
<td>Two colors are included in the artwork; colors are unbalanced.</td>
<td>Written portion is poorly done. The relationship between only one color and the family members it represents is included in the writing.</td>
</tr>
<tr>
<td>F</td>
<td>Student completed little to no weaving, craftsmanship is poor.</td>
<td>Student utilizes only one color. Project is incomplete.</td>
<td>Student did not submit writing assignment.</td>
</tr>
</tbody>
</table>
EXTENSION/ Differentiation or Adaptation:

Gifted students will be expected to incorporate more advanced weaving techniques. These students should be shown additional tutorial videos explaining how to do different techniques, or how to create geometric designs.

Students with physical disabilities will be provided a peer assistant to aid in the studio production portion of this lesson. These students will be provided adaptive tools, to help complete the weave and will be expected to complete a smaller 6”x4” piece.

Students with behavioral disabilities will be allowed to take intermittent breaks; additional completion time will be allotted to these students as well.
4.2.2  Unit 2, Lesson 2: Critique Poems and Narrative Silhouettes

GPS Standards or District:

VAHSVAAR.2 Critiques artwork of others and in group settings.

VAHSVAPR.1 Uses formal qualities of art (elements and principles) to make unified composition and communicate meaning.

ELACC8W2 Text Types and Purposes: Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Lesson Themes:

Art of Kara Walker, art criticism, poetry, cinquains and haikus

Objectives:

The student will write a poem that utilizes appropriate language and vocabulary as a response to a written group art criticism of the work of Kara Walker.

The student will create a three dimensional, well-crafted, narrative cardboard silhouette shadow boxes that incorporates at least four distinct figures.

Sample:

Resources:

https://img1.etsystatic.com/000/0/5750388/il_570xN.221759101.jpg

See section 4.2.2.1 and 4.1.1.3 for worksheet.
**Introduction/Motivation:**

In the Visual Verbal Journals, students will begin the day’s activities by writing a haiku about their week thus far. A reminder of the structure of a haiku will be written on the board. The class will have just 5 minutes to write their haikus, as this is a simple warm up exercise. After the allotted time has expired, these haikus will be shared with the class on a voluntary basis.

**Content Paper or PowerPoint:**

https://prezi.com/keawv9y1akgh/kara-walker-narrative-in-art/

**Instructor’s Procedures:**

*Day 1*

1. This lesson will begin with a quick visual verbal journal activity. This activity will ask students to write a haiku about their week thus far. Since this activity will require students to recall how a haiku is structured, an outline of the structure should be either projected or written on the board, this will be crucial for the primary activity as well.

2. After this quick activity, a presentation on narrative art with emphasis on Kara Walker should be given. This presentation should also include an outline of Feldman’s Model of Art Criticism.

3. Kara Walker’s *Confectionary* (2014), should be displayed for a class-wide, oral criticism using Feldman’s model.

4. At the end of this presentation four artworks by Kara Walker should be projected. The instructor should break students up into groups of three. Each group should be assigned one of the Kara Walker’s images. (If possible, have a print of each image
available to each group so that they can look closer at the work.) The instructor should
direct the small groups to delegate one member to write down the group’s comprehensive
criticism. The instructor should emphasize the use of Feldman’s model of art criticism (a
handout with this model should be provided).
5. The teacher should instruct students to extract key words or phrases from their
criticism of one of Kara Walker’s narrative images and proceed to write a haiku based on
these words.

Day 2

6. During the following class day, the instructor will give a demonstration on how to
create their narrative silhouette project, inspired by the work of Kara Walker. The
instructor will describe how to create these narrative shadow boxes: The instructor will
begin the demo by drawing silhouette figures (or objects) onto cardboard. The instructor
will include an additional “tab” (small square piece) on the figures, either attached to the
top, bottom or side of the figure; this location will be determined by the placement of the
figure within the box. The instructor should direct students in safely cutting out their
silhouette figures. Next, the instructor should demonstrate how to create the open-ended
box where the figures will be placed. Box construction can be completed by cutting out
four 5x7 pieces of cardboard and one 7x7 piece, then hot gluing the 5x7 pieces into a
square and gluing the back (7x7 piece) onto the square. The instructor should then direct
students to neatly paint their box and the tabs of the figures white and the many part of
the figures black. Once all pieces have dried, the instructor should demonstrate how to
.glue the figures into the box.
7. Upon completion of this demonstration, the instructor should allow students studio
time to cut out all of their cardboard.

*Day 3*

8. The instructor will begin the third day by reminding students the next steps in the
project: painting and assembly.

9. At the end of this final studio day, the instructor should provide parameters (a 5
sentence artist statement) for this lesson’s “ticket out the door” activity.

**Materials and Materials Management:**

Visual Verbal Journals

Pencils

Markers

Rulers

Xacto knives

cutting mats

Students will obtain their journals from the supply table at the beginning of class as they
take their seats. Cutting mats will be placed at the students’ workspaces. Once the
students have been broken up into small groups, strips of cardboard will be passed out.

Caddies will be on tables and stocked with markers, rulers, and Xacto knives prior to the
start of class.

At the close of this lesson, students will need to return all the items to their caddies; either
the instructor or student mentor will pick up the caddies. Sculptures will be stored by
students, in a designated area. Visual Verbal Journals will be returned to the supply table
as the students exit the classroom.
**Student Procedures:**

1. The student will begin this lesson by writing a short haiku about their day. Should the student need to reference the structure of a haiku there will be an example projected on the board.

2. Next, the student should be attentive to the presentation about narrative art.

3. The student should participate in a class wide activity that requires them to critique a Kara Walker art piece. Students should answer questions such as: What is Kara Walker’s narrative about? What features of the silhouettes give us clues about the various figures? What items included inform the viewer?

4. Once the class activity is complete, the student should listen for instructions on their next assignment. This assignment will require the students to participate in a small group in order to critique a given Kara Walker image. Groups will then create a haiku utilizing keywords or phrases which they brainstormed as they criticized the artwork.

5. After each group has finished their haiku they will send a group representative to present their poem to the class.

6. The student should listen to instructions for the studio portion of this lesson. The student will be expected to think of a story that they can depict through three dimensional cardboard silhouettes shadow boxes.

7. The student will then create a series of 4 small cardboard silhouettes that work together to tell a story.

8. The student will then construct a box that will house their silhouette figures.

9. Once the box and figures are complete, the student should paint the box and figure tabs white and the figures’ bodies black.
10. After the paint has dried, the student will affix the figures into the shadow box.

11. Upon completion of this studio project, students will be expected to write a 5-sentence artist statement as their “ticket out the door.”

**Closure/Review:**

Once the studio assignment is complete, the closure for this lesson will require students to write a 5-sentence artist statement about their cardboard silhouette.

**Assessment Questions:**

Was the student successful in writing a poem that utilizes appropriate language and vocabulary as a response to a written group art criticism of the work of Kara Walker?

How well did the student create a three dimensional, well-crafted, narrative cardboard silhouette shadow box that incorporates at least four distinct figures?

**Assessment Instrument:**

<table>
<thead>
<tr>
<th></th>
<th><strong>Group Activity Participation</strong></th>
<th><strong>Craftsmanship</strong></th>
<th><strong>Figure Requirement</strong></th>
<th><strong>Narrative</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Student offered numerous insights and productive criticisms.</td>
<td>Student exhibits a high level of craftsmanship. All cutting is neat, there are no jagged edges.</td>
<td>Four figures are present.</td>
<td>The narrative is interesting and easily discernible in the artwork.</td>
</tr>
<tr>
<td>B</td>
<td>Student offered some insights and productive criticisms.</td>
<td>Student exhibits an adequate level of craftsmanship. Cutting is mostly neat, there are seldom jagged edges.</td>
<td>Three figures are present.</td>
<td>The narrative is interesting and somewhat easily discernible in the artwork.</td>
</tr>
<tr>
<td></td>
<td>Group Activity Participation</td>
<td>Craftsmanship</td>
<td>Figure Requirement</td>
<td>Narrative</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------</td>
<td>---------------</td>
<td>--------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>C</td>
<td>Student offered few insights and productive criticisms.</td>
<td>Student exhibits a sub par level of craftsmanship. Cutting is only somewhat neat, jagged edges are on most pieces.</td>
<td>Two figures are present.</td>
<td>The narrative is mildly interesting but not easily discernible in the artwork.</td>
</tr>
<tr>
<td>D</td>
<td>Student was disengaged, spoke rarely.</td>
<td>Student exhibits poor craftsmanship. Cutting is poorly executed, jagged edges are on all pieces.</td>
<td>One figure is present.</td>
<td>The narrative is not interesting and not easily discernible in the artwork.</td>
</tr>
<tr>
<td>F</td>
<td>Student did not participate.</td>
<td>Student did not complete assignment.</td>
<td>Student did not create any figures.</td>
<td>There is no narrative evident in the work.</td>
</tr>
</tbody>
</table>

**EXTENSION/ Differentiation or Adaptation:**

Gifted students will be challenged with regard to not only their poetry but their cardboard silhouettes. Gifted students should create a cinquain, rather than a haiku. If possible, gifted students should be grouped together to socially develop their poetry. These learners will be expected to create more advanced, well-developed art that employs narrative. Five figures will be the minimum for these students.

A student with physical disabilities, including limited hand mobility, will be allowed to complete this project using adapted scissors and cardstock. A peer aid will help this student build a shadow box. This student will also be given additional time to complete the illustrative assignment.

A student with emotional or behavioral disabilities will be given additional time to complete the studio portion of this assignment. This student will be assigned to a group of
peers who are mature and will be assistive in ensuring their group’s success both as a whole and individually. This student will be checked upon frequently and will also be allowed short breaks during studio time.
4.2.2.1 Feldman’s Model of Art Criticism Outline

Step 1: Description
Describe what you see – the basics. Use details at level where you could help someone visualize the work without actually seeing the work. Do not make judgments or provide opinions.

Step 2: Analysis
Use the Principles of Design to describe the aesthetic purpose of the Elements of Art.

Step 3: Interpretation
What do you believe were the intentions of the artist?
What message is he/she trying to send?
Is there a mood or feeling that the art conveys?
Use the Description and Analysis portion of your criticism in order to support your opinions.

Step 4: Judgment
Do you like the artwork?
Support your decision by citing the other sections of your criticism.
4.2.3 Unit 2, Lesson 3: Kinetic Sculptures and Gravity/Mass

GPS Standards or District:

VA8PR.3 Produces an array of two-dimensional and three-dimensional artistic processes and techniques using a variety of media and technology.

Uses technology to produce original works of art (e.g., digital photo montage on a personally or socially compelling theme).

VA8PR.1 Engages in art making process with care and craftsmanship.

Explores the properties of art materials and various techniques/processes in preparation for art making.

S8P3. Students will investigate relationship between force, mass, and the motion of objects.

Demonstrate the effect of balanced and unbalanced forces on an object in terms of gravity, inertia, and friction.

Lesson Theme:

kinetic and mobile sculpture, gravity

Objectives:

The student will create a well-balanced mobile sculpture with at least 4 hanging elements created and assembled with a high level of craftsmanship.

The student will use digital technology to design and 3D print two of the mobile’s hanging elements.

The student will create two well-crafted, painted, three-dimensional cardboard pieces to be attached to the mobile.

Sample:
**Resources:**

http://www.sketchup.com/learn/videos/58

http://imageshack.com/f/442/42303676.jpg

http://www.kinderart.com/sculpture/foamwiremobile1lg.jpg

See section 4.2.3.1 and 4.1.1.3 for worksheets.

**Introduction/Motivation:**

This lesson will begin with a Prezi on Alexander Calder and how his work exhibits the scientific properties of mass and gravity. This presentation will incorporate basic explanations of these science concepts. This presentation will conclude with a video tutorial on the SketchUp program.

**Content Paper or PowerPoint:**


**Instructor’s Procedures:**

*Day 1*

1. The instructor will begin this lesson by presenting a Prezi exhibiting the artwork of Alexander Calder and how it pertains to science concepts. The instructor should explain how mass is impacted by gravity and further elucidate the connection to mobiles. The
instructor should conclude the Prezi with examples and expectations of the studio
assignment coupled with a video tutorial on using the 3D design software, SketchUp.

2. Once the video has concluded, the instructor should hand out reference cards (see
section 4.4.6) so students may use them as they work on computers to create their 3-D
objects. The instructor should provide individualized assistance to students who have
questions during this work time. The work completed in SketchUp will be a digital 3D
“sketch.”

3. After students have finished their 3D items, the instructor should assist them with
printing the objects. **If a 3D printer is not an available resource, the students may use
their SketchUp drawings as a sketch and create their 3D objects with cardboard.

4. As students begin to finish the computer work, the instructor should demonstrate to the
class how the wire structure of the mobiles should look. The instructor should show
students how to unbend and cut the coat hanger into two pieces; there should be a 15”
and 10” piece.

5. The students must then be shown how to bend a loop into the center of each piece.

6. Next, the instructor should demonstrate how to connect the two coat hanger pieces
using the smaller wire; the smaller piece should hang below the larger piece.

7. The instructor should then demonstrate how to add the 3D printed and cardboard
elements. The instructor should explain to students that they must make two cardboard,
3D shapes using the provided glue, paint, and scissors, which weigh similarly to the 3D
printed objects. As the instructor shows the students how to attach these objects, there
should be a discussion about how mass and gravity are at play in this art making process.

8. After this demonstration, the instructor should allow students the remainder of the first
class day to complete their digital 3D designs in SketchUp. If enough time remains, the instructor should aid students in printing their 3D pieces.

Day 2

9. The second day should begin by finishing 3D printing.
10. As the objects are being printed, the instructor should direct the class on how to create the cardboard shapes/objects for their mobiles.

Day 3

11. The instructor should begin day three by reminding students of the remaining steps left in their mobile creations: making wire hanging pieces and assembly.
12. The instructor should aid students on an individual basis as this studio time wraps up.
13. The instructor should conclude this lesson by collecting and displaying the student art works as well as prompting students to write a “ticket out the door” stating the relationship between mass and gravity and how it is at play in their sculptures.

Materials and Materials Management:

- computers
- 3D Printer
- wire coat hangers and smaller gauged wire
- wire cutters
- needle nose pliers
- cardboard
- glue
- scissors
- paint
Students will use computers to design and print two small 3D buildings. The instructor will facilitate the printing portion of this activity. Table sets that include wire cutters, needle nose pliers, coat hangers, glue, and scissors should be prepared and placed at each table. Cardboard and paint will be available at the supply table.

**Student Procedures:**

*Day 1*

1. The student will begin this lesson by following along with the Prezi given by the instructor.

2. The student will then pay close attention to the video tutorial for SketchUp.

3. Next, the instructor will provide information on the assignment parameters; the student should understand that they are expected to create a four element mobile that demonstrates an understanding of mass and gravity's relationship (as discussed in the Prezi) as well as a high level of craftsmanship.

4. Next the student should begin designing their 3D objects on the computer using the SketchUp program. If enough time remains, students may begin to print their objects.

*Day 2*

5. If they did not get to in the previous class, the student should begin the day by printing their object with the assistance of the instructor.

6. The student should sketch at least two abstract geometric forms and then begin creating them using cardboard. The student should cut the cardboard pieces with scissors and then begin to assemble it into abstract/geometric pieces by stacking, fitting together with slits, or otherwise connecting the pieces together with hot glue. The student may
create boxes or other three dimensional shapes as a base for these abstract cardboard pieces. These cardboard creations should be finished with paint.

Day 3

7. At the beginning of this class day, the student should listen for reminder directions on how to create their wire pieces and assemble their mobile.

8. Next the student should create the wire pieces and begin assembling their sculptures. The student should conclude this lesson by submitting their artwork to the instructor and writing a “ticket out the door” that states the relationship between mass and gravity in the artwork that they created.

Closure/Review:

This lesson will conclude with a ticket out the door activity that requires students to describe the relationship between mass and gravity in the artworks that they created.

Assessment Questions:

Did the student create a well-balanced mobile sculpture with at least 4 hanging elements created and assembled with a high level of craftsmanship?

Did the student successfully use digital technology to design and 3D print two of the mobile’s hanging elements?

How well did the student create two, painted, three-dimensional cardboard pieces?
**Assessment Instrument:**

<table>
<thead>
<tr>
<th></th>
<th>Objects</th>
<th>Craftsmanship</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>At least four objects were created and incorporated into a well-balanced mobile.</td>
<td>The mobile exhibits a high degree of craftsmanship. The created objects are cut and glued precisely and neatly.</td>
</tr>
<tr>
<td>B</td>
<td>Three objects were created and incorporated into a well-balanced mobile.</td>
<td>The mobile exhibits a good degree of craftsmanship. The created objects are cut and glued somewhat precisely and neatly.</td>
</tr>
<tr>
<td>C</td>
<td>Two objects were created and incorporated into a somewhat well-balanced mobile.</td>
<td>The mobile exhibits a low degree of craftsmanship. The created objects are cut and glued in a messy manner.</td>
</tr>
<tr>
<td>D</td>
<td>One object was created and incorporated into an unbalanced mobile.</td>
<td>The mobile exhibits a poor degree of craftsmanship. The created objects are cut and glued in a rushed and haphazard manner.</td>
</tr>
<tr>
<td>F</td>
<td>The student did not create any objects for the mobile.</td>
<td>Student did not exhibit any concern for craftsmanship. The work is incomplete.</td>
</tr>
</tbody>
</table>

**EXTENSION/ Differentiation or Adaptation:**

Gifted students will be challenged to create objects that are unbalanced and then re-balance them using varying wire lengths. This student will also be expected to create additional hanging elements to create a more complex mobile.

Students with physical disabilities will be provided a peer assistant to aid the student in assembling the wire and cardboard portions of this activity; these students will also be allowed additional time to complete the studio activity.

Students with behavioral disabilities will be allowed to take short breaks during the studio time. This student will also be provided a peer assistance to help them stay focused.
on their task at hand. The instructor will frequently check on the student while also allowing them additional time to complete the assignment.
4.2.4 Unit 2, Lesson 4: Balance and Symmetry Paper Sculptures

GPS Standards or District:

VA8PR.1 Engages in art making process with care and craftsmanship.

VA8PR.3 Produces an array of two-dimensional and three-dimensional artistic processes and techniques using a variety of media and technology.

Develops three-dimensional artworks from materials such as clay, papier-mache, plaster, wood, wire, found objects and/or combinations of materials.

VA8AR.1 Critiques personal artworks as well as artwork of others using visual and verbal approaches.

MCC8.G.1 Verify experimentally the properties of rotations, reflections, and translation

Lesson Theme:

Reflections, translations, and rotations

Objectives:

The student will complete a 12" x 12" paper bas-relief sculpture that exhibits a high-level of craftsmanship, 4 geometric shapes, in a radial composition that reflects, rotates, or translates the same shape/pattern at least 4 times.

The student will complete a written statement describing their artwork using two art and one math vocabulary terms.

Sample:
Resources:
See section 4.1.1.3 for worksheet.

Introduction/Motivation:
This lesson will begin with a review presentation on reflections, translations, and rotations in art. This presentation will continue with new content on artists who transform paper, a traditionally 2D medium, into 3D bas-relief sculptures.

Content Paper or PowerPoint:
https://prezi.com/iotz0aht1gcw/ radial-balance-and-paper-sculpture/

Instructor’s Procedures:

Day 1
1. The instructor will begin this lesson by challenging students to recall information from the 2D design lesson that required them to create compositions using reflections, translations, and rotations.
2. Next the instructor will give a presentation, which includes examples of symmetrical and radially balanced artwork. The instructor should explain that creating radially balanced artwork often requires the artist to use the reflection technique. This Prezi will further incorporate information on artists who use paper to create 3D sculptures.
3. The instructor should outline the assignment parameters: students will be expected to create well-crafted, radially balanced artworks that incorporate at least four geometric shapes using paper and glue only; the student should demonstrate their understanding of math transformations by incorporating at least 4 transformation moves of the same shape. The teacher should further explain that the student must incorporate four math
transformations

4. The instructor will then demonstrate the steps in creating the project. The first step in the demonstration will be to take one piece of 12”x12” sheet of paper and fold it into quarters. The instructor will then draw four shapes onto one side of the folded paper using a sharpie marker, encouraging students to place at least one shape that sits over the edge of the paper. Next, the instructor will exhibit how to transfer the design to the subsequent three quadrants on the 12”x12” piece of paper. During this process the instructor should emphasize how this is essentially the reflection method. The next step will be to lightly trace (using a pencil) the finished radial design onto a new sheet of paper. The sculptural construction will take place next. The instructor should show students how to dip their paper strips in glue and place them onto their design. The instructor should emphasize patience when holding the paper in place while the glue dries. To conclude this demonstration a completed sample should be exhibited.

5. Studio time will immediately follow the demonstration; the instructor should provide assistance to students who need additional help or clarification.

Day 2

6. The second day of this project will be studio time for students; the instructor should provide individual assistance to students who require additional help.

7. As students begin to complete their studio assignment, the instructor will direct students to complete a “ticket out the door” that requires them to describe their design using two art and one math vocabulary terms.

Materials and Materials Management:

12”x12” paper
The instructor will cut the 12”x12” paper as well as the 1” paper strips before the beginning of class. Paper will be placed on the supply table for students to obtain. Glue and scissors will be divided into table sets and placed at each table.

**Student Procedures:**

1. The student will begin this lesson by participating in a discussion that requires them to recall information from a previous lesson about radial and balanced design.

2. Next the student should examine the paper sculptures that the instructor projects and begin to think about the transformation of a 2D medium into a 3D relief art piece.

3. The student should then remain attentive as the instructor demonstrates how to create a radially balanced paper sculpture. The students should take notes on this process for clarification during the lab portion of this lesson.

4. Once the instructional time is completed the student must obtain their paper materials and begin drawing their designs.

5. Next the student should begin lightly tracing their design onto a new sheet of paper using a pencil.

6. The student should then begin carefully adding the sculptural elements by dipping paper strips into glue and placing it over the pencil lines (following the line). The student should remain patient as the glue dries and hold the paper strip in place until it stands up/doesn’t move, this will be important to satisfy the craftsmanship requirements. The student should continue this process until the end of class.
Day 2

7. The student should spend this class period completing their relief sculptures by ensuring all the lines have been covered with perpendicular pieces of paper strips.

8. The student should wrap up this lesson by completing a “ticket out the door” that describes their design using two art and one math vocabulary terms.

Closure/Review:

This lesson will conclude with a “ticket out the door” activity where students will be asked to describe their radial paper sculptures using at least two art and one math vocabulary terms.

Assessment Questions:

How well did the student complete a 12” x 12” paper bas-relief sculpture that includes 4 geometric shapes, in a radial composition that reflects, rotates, or translates the same shape/pattern at least 4 times?

Did the student complete a written statement describing their artwork correctly using two art and one math vocabulary terms?

Assessment Instrument:

<table>
<thead>
<tr>
<th>Shape and Transformation Requirement</th>
<th>Craftsmanship</th>
<th>Ticket out the Door</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Student exhibited exemplary craftsmanship. All paper strips are standing upright, there is no excess glue, and the paper is clean.</td>
<td>All three vocabulary words were used and in the correct manner.</td>
</tr>
<tr>
<td></td>
<td>Shape and Transformation Requirement</td>
<td>Craftsmanship</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>B</td>
<td>Three shapes were incorporated, at least one shape/pattern was mathematically transformed 3 times.</td>
<td>Student exhibited good craftsmanship. Most paper strips are standing upright, there is little excess glue, and the paper is clean.</td>
</tr>
<tr>
<td>C</td>
<td>Two shapes were incorporated, at least one shape/pattern was mathematically transformed 2 times.</td>
<td>Student exhibited acceptable craftsmanship. At least half the paper strips are standing upright, there is a moderate amount of excess glue, and the paper is somewhat clean.</td>
</tr>
<tr>
<td>D</td>
<td>One shape was incorporated, at least one shape/pattern was mathematically transformed 1 time.</td>
<td>Student exhibited poor craftsmanship. Few paper strips are standing upright, there is a lot of excess glue, and the paper appears unclean.</td>
</tr>
<tr>
<td>F</td>
<td>Student did not include any shapes.</td>
<td>Student exhibited no consideration for craftsmanship. Project looks rushed and thrown together.</td>
</tr>
</tbody>
</table>

**EXTENSION/ Differentiation or Adaptation:**

Gifted students will be challenged to create a more complex design. More than four shapes should be incorporated into this design and the elements should all connect using various techniques.

Students with physical disabilities will be given additional time to complete this assignment as well as a peer assistant to aid in the gluing process.
Students with behavioral disabilities will not be allowed occasional breaks and will also be assigned a peer assistant to help them stay focused on their work during studio time. This student will also be given additional time to complete the assignment.
4.3 Implementing Unit 3: Ceramics

Unit three’s lessons are based around ceramics studio projects. As this is the final unit within this interdisciplinary curriculum, more of the content will overlap; this will continue to be seen as further review/reiteration of some interdisciplinary topics. The lessons in unit three require the middle school art educator to be familiar with other discipline topics: chemical changes (see unit one, lesson two), Native American functional pottery, volume calculations, and narrative/story-telling (see unit two, lesson two).

Lesson one and four of this final unit include interdisciplinary topics that have been previously covered in the first two units. A review of material should be completed by the instructor when implementing this lesson. As with all other lessons, these two should incorporate repeated, explicit statements connecting the academic disciplines to the art content. For lesson one, this statement of connection can be made throughout the presentation and studio project process. As the instructor describes the drying stages in the presentation and when these drying phases actually occur in the studio project, the science connection should be pointed out. As for lesson four, emphasizing the connection between telling stories and art making should be at the forefront of the instructional time; this connection should also be a major component of individualized instructional discussions during studio time.

The second lesson in this unit requires the instructor to be knowledgeable of the pinch building method in ceramics as well as information pertaining to the Cherokee and Creek tribes’ use of functional pottery. The links listed under the “Resources” section of this lesson provide information on the social studies portion. The Cherokee Heritage
Center webpage offers a comprehensive description of pottery’s role within early Cherokee tribes. Since this lesson is concerned with the distinction between functional and decorative art, the effective interdisciplinary art educator should describe this dichotomy as being present within the pottery of these Georgian tribes; this connection should be explicitly stated.

A new ceramics building method and a new math concept will be explored in the third lesson of unit three. Understanding how to use a mathematical formula to determine the volume of a cylinder is the only math related information included in this lesson. By plugging in the measured distances of a cylindrical vessel, using the formula: 

\[ V = \pi r^2 h, \]

where \( r \) = radius and \( h \) = height, the volume may be easily calculated. A major point of this lesson is to directly connect the use of math to being a working artist. The effective interdisciplinary art educator should be able explain why a ceramicist might need to measure the volume of various ceramic creations. Examples to discuss might include: cups or bowls that were commissioned to a specific size, being able to keep consistency with the mostly standardized tableware industry.
4.3.1 Unit 3, Lesson 1: Chemical Changes in Clay and Glazes

GPS Standards or District:

VA8PR.3 Produces an array of two-dimensional and three-dimensional artistic processes and techniques using a variety of media and technology.

Develops three-dimensional artworks from materials such as clay, papier-mache, plaster, wood, wire, found objects and/or combinations of materials.

VA8PR.1 Engages in art making process with care and craftsmanship.

S8P2. Students will be familiar with the forms and transformations of energy.

Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation of precipitate, and change in color).

Lesson Theme:
Understanding how energy transforms clay, foundations of ceramics, glaze

Objectives:

The student will create two well-crafted, glazed, pendants that have carved surface embellishments.

The student will exhibit an understanding of the basics of ceramics, i.e. dryness/firing stages, wedging, building methods by completing a worksheet that requires them to describe these methods.

Sample:
Resources:


https://www.youtube.com/watch?v=U2Z6zcxTaTs

See section 4.4.7 for worksheet.

Introduction/Motivation:

This lesson will begin with a Prezi that introduces basic terms and tools in ceramics. Students will be given a “note taker” worksheet to guide them through the Prezi as well as the demonstration to follow.

Content Paper or PowerPoint:

https://prezi.com/573aayatkIwu/ceramics-the-basics/

Instructor’s Procedures:

Day 1

1. During the first lesson of the ceramics unit, the instructor will infuse science into studio production. To make this an easier infusion, the instructor should watch the YouTube video listed under resources for information linking ceramics to science.

2. The instructor should begin this lesson by handing out a worksheet for students to complete during the presentation about the basics of ceramic studies while also emphasizing the chemical changes that clay undergoes during the firing process. The instructor should outline the different stages of clay: leather hard, green ware, bisque ware, and glaze ware. Other foundations of ceramics should be discussed in this presentation, specifically: basic information about working with clay and wedging, types of clay, and tools.
3. Once the presentation has concluded, a demonstration on how to work with clay should be given. The instructor should demonstrate how to wedge, roll out, and cut clay using a fettling knife.

4. The instructor should have a bisque fired tile (made preemptively) so that they can also demonstrate how to apply glaze. The instructor should also show an example of glazes after it has been fired so students may see how the glaze changes once it is fired.

5. Upon completion of the demo, the instructor should describe the day’s studio expectations: students will roll out a small piece of clay and cut out two, pendant sized pieces. Students should carve simple designs into the surface of their pendants, as well as cut a small 2mm hole near the edge so that a chord can be threaded through.

6. Next, the instructor should allow students to work on their pendants for the remainder of the class.

7. Before students leave, the instructor should direct students to leave their pendants out in designated areas so that they may dry.

*The instructor should bisque fire the clay pendants once they have dried adequately, if there are enough days in between class meetings, the instruction for this lesson can continue. If the pendants cannot be fired and cooled in time for the next class meeting, the next lesson should be started.

_Day 2_

6. The instructor should begin day two of this lesson by prompting students to obtain their bisque ware pendants so that they may be glazed.

7. The instructor should allow students the remainder of the class period to glaze their pendants.
Materials and Materials Management:

clay
plastic covering
fettling knife
needle tool
rib
smoothing tool
loop tool
clean up tool
rolling pins
slab roller
glaze

The instructor will hand out clay in pre-divided balls as well as pieces of plastic for covering in progress clay. All clay tools will be distributed in table sets via baskets or containers. Glaze will be distributed in small cups.

Student Procedures:

Day 1

1. At the beginning of this lesson the students should remain attentive during the presentation and demonstration on working with clay. Students will utilize the provided “note taker” worksheet to learn about clay basics as well as the connection between ceramics and science. The student will submit the worksheet and listen for further instructions about their assignment.
2. The student will be given a small piece of clay. The students will begin by wedging their clay, and will proceed to roll out a slab and cut out two small shapes.

3. Students will then be instructed to use their tools to carve out or draw a surface embellishment on their pendants.

Day 2

4. When the students return to the next class, the pendants will be bisque fired and ready to be glazed. Students should apply different glazes on their pendants while avoiding overlapping.

5. Students will finish this lesson with a short quiz on the art and science information covered throughout the lesson. Students will also be provided a leather cord to add to their pendants so they can wear them as necklaces.

Closure/Review:

This lesson will conclude with a “line up at the door” review. Students will be asked to questions such as:

What is the difference between a physical change and a chemical change?

Name two stages of dryness in ceramics.

When do we apply glaze?

What is a rib used for?

Assessment Questions:

How well did the student create two glazed pendants that have carved surface embellishments?

Did the student exhibit an accurate understanding of foundational ceramics concepts by correctly completing the worksheet?
**Assessment Instrument:**

<table>
<thead>
<tr>
<th></th>
<th>Pendant Requirements</th>
<th>Craftsmanship</th>
<th>Glaze</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Two pendants are complete with surface embellishments and glaze.</td>
<td>Clay is handled nicely, surface embellishments are neat and the clay is smooth.</td>
<td>Glaze was clearly applied carefully and neatly. There appears to be no overlapping.</td>
</tr>
<tr>
<td>B</td>
<td>Two pendants are submitted, one is complete with surface embellishment and glaze, the other is not.</td>
<td>Clay surface embellishments are mostly neat and the clay is somewhat smooth.</td>
<td>Glaze was clearly applied carefully. Execution is mostly neat. There appears to be very slight overlapping.</td>
</tr>
<tr>
<td>C</td>
<td>Student created only one completed pendant.</td>
<td>Clay surface embellishments are apparent but not very neat and the clay is somewhat rough.</td>
<td>Glaze was applied somewhat carefully. Execution is partially neat. There appears to be numerous areas of overlapping.</td>
</tr>
<tr>
<td>D</td>
<td>Student created only one, partially completed pendant.</td>
<td>Clay surface embellishments are hardly apparent and not neat, the clay is rough.</td>
<td>Glaze was not applied carefully. Execution is not neat. There appears to be numerous areas of overlapping.</td>
</tr>
<tr>
<td>F</td>
<td>Student did not submit any work.</td>
<td>Clay is cracking, apparently handled poorly. Surface is rough and handled with little consideration.</td>
<td>Student did not use glaze.</td>
</tr>
</tbody>
</table>

**EXTENSION/ Differentiation or Adaptation:**

Gifted students will be challenged to create more detail in their pendants, using carving methods and glazing.

Students with physical disabilities should be provided adapted tools for cutting and carving their clay; additional time to complete the project should also be given.
Students with physical disabilities will be assigned a peer mentor to assist them in staying focused on the studio task.
4.3.1.1 Lesson 3.1 Worksheet

Ceramic Worksheet: General Information
Name__________________________

The three main types of pottery are:

1. Greenware____________________________________________________________
_________________________________________________________________
2. Bisqueware___________________________________________________________
__________________________________________________________________
3. Glazeware____________________________________________________________
__________________________________________________________________

Clay Building Methods: There are five methods of working with clay

1. ______________________ 2.______________________
3.______________________  4. ______________________
5.______________________

Stages of Clay

1. Plastic:______________________________________________________________
2. Leather hard:_________________________________________________________
3. Bone dry:____________________________________________________________

Stages of Ceramic Ware:

1. Greenware:__________________________________________________________
2. Bisqueware:__________________________________________________________
3. Glazeware:__________________________________________________________

Draw the Tools:

Clean-up tool  __________________________________________________________________
Rib  __________________________________________________________________

Smoothing tool  __________________________________________________________________
Needle tool  __________________________________________________________________

Fettling knife  __________________________________________________________________
Loop tool  __________________________________________________________________
4.3.2  Unit 3, Lesson 2: Pinch Pots and Native Georgians

GPS Standards or District:

VA8PR.1 Engages in art making process with care and craftsmanship.

VA8PR.3 Produces an array of two-dimensional and three-dimensional artistic processes and techniques using a variety of media and technology.

Develops three-dimensional artworks from materials such as clay, papier-mache, plaster, wood, wire, found objects and/or combinations of materials.

SS8H1 The student will evaluate the development of Native American cultures and the impact of European exploration and settlement on the Native American cultures in Georgia. Describes the evolution of Native American cultures (Paleo, Archaic, Woodland, and Mississippian) prior to European contact.

Lesson Theme:

pinch method, Georgia history, Creek and Cherokee tribes

Objectives:

The student will create a well-crafted, and decorated (through carving) pinch pot with a coil base that is designed with a specific and clear function.

The student will write a well-crafted description, using proper grammar and syntax, of their vessel, giving details about the decorative aspects and the functional aspects.

The student will demonstrate understanding of the distinction between functional and decorative art by writing a short description of the differences.
Sample:

Resources:


See section 4.1.1.3 for worksheet.

Introduction/Motivation:

This lesson will begin with a presentation on the distinction between functional and decorative art; students will participate in a class wide discussion on this topic.

Content Paper or PowerPoint:


Instructor’s Procedures:

Day 1

1. The instructor should prepare materials before the start of this lesson. Clay should be separated into small sections (approx. 3”x3” cubes of clay) in order to distribute to students more efficiently. Additionally, clay tools and plastic coverings should be separated into table sets and distributed to each table in a small container or caddy prior to the start of each class.
2. At the beginning of this lesson the instructor should ask students to recall information from the previous ceramics lesson. The instructor should ensure that students understand the basics of working with clay, specifically, how overworking clay can dry it out quicker.

3. Following this quick review, the instructor will give a presentation distinguishing the difference between functional and decorative art. This presentation should describe how Native American pottery, even that which is specifically connected to Georgian tribes, has evidence of both functional and decorative uses. The importance of the Native Americans in the context of Georgia history should be described in this presentation as well.

4. To follow up this presentation, the instructor should lead a class wide discussion on various artworks and whether they should be considered functional or decorative or both.

5. After this discussion the instructor should distribute clay and encourage students to not touch the clay until the demonstration begins. In this demo, the instructor should verbally describe the process but also provide written steps as well as physically demonstrate how to create a pinch pot. These steps are: a. Roll and shape clay into a nice round ball, b. push thumb 1 ½” into the center of the ball, c. begin pinching the clay while the thumb is still inserted into the ball, the pinching should occur near the bottom of the hole and should only be done as the other hand rotates the ball, d. to finish the main part of the pot, a whole hand pinch may be used to even out the sides of the pinched vessel, f. The final step is to roll a coil of clay out, form it into a circle no larger than the base of the pot, and then attach it to the bottom by scoring and smearing. Both a teacher sample and student samples (if available) should be shown.
6. Following this demonstration the students will be allowed studio time to complete their pinch pots; during this time, the instructor should walk around to assist students individually should they have any questions or problems with the process.

7. Once the students have finished their pinch pots the instructor should remind the class to inscribe their names and last initial on the bottom on their piece using a stick tool. The instructor will then need to bisque fire the students’ artwork once they reach the greenware stage.

*The instructor should bisque fire the pinch pots once they have dried adequately, if there are enough days in between class meetings, the instruction for this lesson can continue. If the pots cannot be fired and cooled in time for the next class meeting, the next lesson in this unit should be started.

Day 2

8. To proceed with this lesson, the instructor will show students how to dip glaze their artwork. The instructor will then give further directions on the completion of this assignment: students will be expected to write a short paragraph describing how their clay piece might be used.

9. A “ticket out the door” activity will be presented next: students should complete a short description of the difference between decorative and functional art.

*After class, same day:

10. The instructor must glaze fire the students’ vessels.

Day 3

11. To close this lesson, the instructor should facilitate a large group critique.
Materials and Materials Management:

clay
plastic covering
needle tool
serrated rib
glaze

The instructor will hand out clay in pre-divided balls as well as pieces of plastic for covering in-progress clay. All clay tools will be distributed in table sets via baskets or containers. Students will glaze their pots individually by dipping them into a large container of clear glaze located at the supply table.

Student Procedures:

Day 1

1. Students will begin this lesson by listening to a presentation on functional versus decorative art. This presentation will also cover Native American pottery, specifically from tribes native to the state of Georgia.

2. Next the class will participate in a large group discussion on how these clay items may have been used by the native Georgian tribes; the distinction between functional and decorative art should also be discussed.

3. Next, the student should remain attentive during the demonstration on how to make a basic pinch pot. Students will then be given clay and instructions to create their own “functional” pinch pots, they will be required to make these vessels with a specific purpose in mind.

Day 2
4. Once the students have completed the building process and the instructor has bisque fired the pieces, the students will be expected to dip glaze their work. The student will wrap up this lesson by writing a paragraph explaining the intended use for the piece that they created.

5. The student will complete a “ticket out the door activity” that requires them to describe the difference between functional and decorative art.

*Day 3*

6. The student will participate in a large group critique of the vessels.

**Closure/Review:**

To close this lesson, students will be expected to write a short paragraph explaining the intended use for the piece that they created. The student will also be expected to write a “ticket out the door” defining the difference between functional and decorative art.

**Assessment Questions:**

How well did the student create a decorated (through carving) pinch pot with a coil base that is designed with a specific and clear function?

Did the student write a well-crafted description of their vessel, using proper grammar and syntax, giving details about the decorative aspects and the functional aspects?

Did the student demonstrate an understanding of the distinction between functional and decorative art by writing a short description of the differences?
### Assessment Instrument:

<table>
<thead>
<tr>
<th></th>
<th><strong>Craftsmanship</strong></th>
<th><strong>Purpose</strong></th>
<th><strong>Written Assignment</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Student exhibits exemplary craftsmanship. Vessel is sturdy, walls are even, clay is smooth/not cracking.</td>
<td>The purpose of the vessel is clear aesthetically and in writing. Student has designed the structure and added surface embellishments to visually define the purpose.</td>
<td>Writing exhibits exemplary grammar/syntax, includes numerous details about the function of the vessel.</td>
</tr>
<tr>
<td>B</td>
<td>Student exhibits good craftsmanship. Vessel is sturdy, walls are even, clay is somewhat smooth/not cracking.</td>
<td>The purpose of the vessel is somewhat clear aesthetically and in writing. Student has designed the structure or added surface embellishments to visually define the purpose.</td>
<td>Writing exhibits good grammar/syntax, includes a few details about the function of the vessel.</td>
</tr>
<tr>
<td>C</td>
<td>Student exhibits acceptable craftsmanship. Vessel is mostly stable, walls are somewhat even, clay is slightly smooth/some cracking is apparent.</td>
<td>The purpose of the vessel is vaguely apparent aesthetically and in writing. Student has somewhat designed the structure to visually define the purpose.</td>
<td>Writing exhibits acceptable grammar/syntax, includes only a couple of details about the function of the vessel.</td>
</tr>
<tr>
<td>D</td>
<td>Student exhibits poor craftsmanship. Vessel is not sturdy, walls are uneven, clay is cracking and rough.</td>
<td>The purpose of the vessel is unclear both aesthetically and in writing. Student has done little to design the structure in a manner that visually defines it’s purpose.</td>
<td>Writing exhibits poor grammar/syntax, includes only one detail about the function of the vessel.</td>
</tr>
<tr>
<td>F</td>
<td>Student exhibits no consideration for craftsmanship.</td>
<td>Student did not exhibit any intention for the function of the vessel.</td>
<td>Student did not submit the writing portion of this lesson.</td>
</tr>
</tbody>
</table>

### EXTENSION/ Differentiation or Adaptation:

Gifted students will be challenged to form their jars in a more complex shape.

Students with physical disabilities will be assigned a peer mentor to aid this student in the studio portion; extra time to complete this assignment should also be given.
Students with behavioral disabilities will be allowed to take occasional short breaks from working during the studio activity; these students will also be assigned a peer mentor to aid them in completing the assignment.
4.3.3  Unit 3, Lesson 3: Selling Art and Calculating Volumes

GPS Standards or District:

VA8PR.1 Engages in art making process with care and craftsmanship.

VA8PR.3 Produces an array of two-dimensional and three-dimensional artistic processes and techniques using a variety of media and technology.

Develops three-dimensional artworks from materials such as clay, papier-mache, plaster, wood, wire, found objects and/or combinations of materials.

MCC8.G.9 Knows the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Lesson Themes:

Slab building

Slipping and scoring

Surface textures in clay

Calculating volumes

Art as a consumer product

Objectives:

The student will create a well-crafted cylindrical vessel that is at least 14 inches tall, with a bottom and a lid that incorporates three different surface textures.

The student will exhibit understanding of calculating volumes by correctly completing a short worksheet.

The student will complete a “ticket out the door activity” where they measure and calculate the volume of their created vessel.
Sample:

![Sample Image](http://4.bp.blogspot.com/-jGexvWpYZrQ/TcQQdHxIZbI/AAAAAAAOo/UtYV8k8MaS4/s1600/Patterned+Pencil+Holder.jpg)

Resources:

http://4.bp.blogspot.com/-
jGexvWpYZrQ/TcQQdHxIZbI/AAAAAAAOo/UtYV8k8MaS4/s1600/Patterned+Pencil+Holder.jpg

http://www.mathworksheets4kids.com/volume/cylinder-large.png

See section 4.3.3.1 and 4.1.1.3 for worksheets.

Introduction/Motivation:

This lesson will begin with a presentation that discusses functional art, as well as art as a consumer product. This Prezi will include images of ceramic artwork that is made with the intention to be sold.

Content Paper or PowerPoint:

https://prezi.com/ngslji6qk8c/slab-building/

Instructor’s Procedures:

Day 1

1. Before this lesson begins the instructor should have clay and tools readily available to work with during the demonstration.
2. The instructor will begin the lesson by presenting a Prezi that discusses art as a consumer product as well as art that is functional. This presentation will conclude with information on how volume calculation is important when making ceramic vessels.

3. The instructor should give students the accompanying short worksheet that requires them to calculate the volume of cylindrical vessels.

4. When students have completed this worksheet, the instructor will proceed with a demonstration on how to create slab built vessels. The instructor should exhibit: a. how to wedge and roll out the clay, b. cut the clay to the proper size (one 10"x14" pieces and two 6"x6" pieces) c. cut all the edges of the larger piece of clay at 45 degree angles, c. score and connect the long edges, forming the slab into a cylinder, d. trace the cylinder into both smaller pieces of clay e. cut out the pieces using the same 45 degree angle, f. attach one circle to the bottom (with the cut side facing inward) by scoring and smearing the clay g. add a small knob to the top (other circle) and ensure the lid fits into the vessel.

5. Various surface texture techniques should be demonstrated next.

6. The instructor should then outline the assignment parameters: create a well-crafted cylindrical vessel that is at least 14 inches tall, with a bottom and a lid that incorporates three different surface textures.

7. Studio time will follow this demonstration; the instructor should be readily available to students should they need assistance with any of the processes for this project.

_Day 2_

8. The second day of this project will be studio time for the class, the instructor should provide individualized instruction to students.
*The instructor should bisque fire the slab vessels once they have dried adequately, if there are enough days in between class meetings, the instruction for this lesson can continue. If the vessels cannot be fired and cooled in time for the next class meeting, the next lesson in this unit should be started.

*Day 3*

9. Once the students’ vessels have been fired, the instructor should demonstrate how to brush on glazes, emphasizing multiple coats.

10. The remainder of this class day will be studio time, where the instructor should, again, provide students with individualized instruction.

*Day 4*

11. Upon completion of this project, when the work has been glaze fired, students will participate in small group critiques.

12. The “ticket out the door” for this assignment’s conclusion will be to calculate the volume of the created vessel.

**Materials and Materials Management:**

- clay
- plastic covering
- fettling knife
- needle tool
- rib
- smoothing tool
- loop tool
- clean up tool
The instructor will hand out clay in pre-divided balls as well as pieces of plastic for covering in progress clay. All clay tools will be distributed in table sets via baskets or containers. Texture mats and fabric will be available at supply tables for students to choose from. Students should be encouraged to return the surface texture applicators when they are finished so that other students may make use of them. Glaze will be distributed by the instructor in small cups.

**Student Procedures:**

*Day 1*

1. The student will begin this lesson by being attentive throughout the presentation on slab building, art as a consumer product, as well as measuring vessel volumes.
2. The student should then complete the short volume worksheet.
3. Next the student should take notes during the demonstration on crating slab built vessels. The important aspects of this process worth noting would be the rolling out of the clay, bevel cutting, slipping and scoring, as well as surface texture techniques.
4. Once the demonstration is completed and the instructor has outlined the project parameters the student should begin working on their cylindrical vessels.

*Day 2:*

5. The student will commit this class period to refining their slab built vessels.

*Day 3*
6. The student should begin the third day of this lesson by watching the demonstration on glazing with brushes.

7. The student should spend the remainder of this class carefully glazing their vessels.

8. As a conclusion to this project the students must turn in a “ticket out the door” that has the calculated volume of the vessel in which they created.

Day 4

9. The student should participate in a large group critique.

Closure/Review:

To wrap up this lesson students will complete a “ticket out the door” by measuring their vessel and calculating its total volume.

Assessment Questions:

How well did the student create a cylindrical vessel that is at least 14 inches tall, with a bottom and lid that exhibits three surface textures?

Did the student exhibit understanding of calculating volumes by correctly completing the given worksheet?

Did the student correctly measure and calculate the volume of their created vessel?

Assessment Instrument:

<table>
<thead>
<tr>
<th></th>
<th>Craftsmanship</th>
<th>Surface Textures</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Student exhibits exemplary craftsmanship. Vessel is sturdy, walls are even,</td>
<td>The student seamlessly incorporates three surface texture techniques onto</td>
</tr>
<tr>
<td></td>
<td>seams are not apparent.</td>
<td>their vessel.</td>
</tr>
<tr>
<td>B</td>
<td>Student exhibits good craftsmanship. Vessel is sturdy, walls are somewhat</td>
<td>The student incorporates three surface texture techniques onto their vessel but</td>
</tr>
<tr>
<td></td>
<td>even, seams are mostly not apparent.</td>
<td>the application is not “seamless” or fully integrated.</td>
</tr>
<tr>
<td></td>
<td><strong>Craftsmanship</strong></td>
<td><strong>Surface Textures</strong></td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>C</td>
<td>Student exhibits average craftsmanship. Vessel is slightly sturdy, walls are somewhat uneven, seams are somewhat apparent.</td>
<td>The student incorporates only two surface texture techniques onto their vessel.</td>
</tr>
<tr>
<td>D</td>
<td>Student exhibits poor craftsmanship. Vessel is not sturdy, walls are all uneven, seams are apparent.</td>
<td>The student incorporates only one surface texture technique onto their vessel.</td>
</tr>
<tr>
<td>F</td>
<td>Student exhibits no consideration for craftsmanship.</td>
<td>Student incorporated no surface textures onto their vessel.</td>
</tr>
</tbody>
</table>

**EXTENSION/ Differentiation or Adaptation:**

Gifted students should be challenged to make larger vessels with intricate surface designs. The students will be expected to exhibit a high-level of craftsmanship. These students should also exhibit exemplary understanding of the math content in this lesson.

Students with physical disabilities will be provided adaptive tools and additional time to complete the assignments in this lesson.

Students with behavioral disabilities will be allowed additional time and be assigned a peer mentor to help them complete the assignments for this lesson.
4.3.3.1 Lesson 3.3 Worksheet

Find the exact volume of each cylinder.

1)

[Diagram of a cylinder with dimensions 11 m and 6 m]

Volume =

2)

[Diagram of a cylinder with dimensions 13 m and 6 m]

Volume =

3)

[Diagram of a cylinder with dimensions 9 cm and 10 cm]

Volume =

Find the exact volume of each cylinder.

1)

[Diagram of a cylinder with dimensions 11 m and 6 m]

Volume =

2)

[Diagram of a cylinder with dimensions 13 m and 6 m]

Volume =

3)

[Diagram of a cylinder with dimensions 9 cm and 10 cm]

Volume =

Find the exact volume of each cylinder.

1)

[Diagram of a cylinder with dimensions 11 m and 6 m]

Volume =

2)

[Diagram of a cylinder with dimensions 13 m and 6 m]

Volume =

3)

[Diagram of a cylinder with dimensions 9 cm and 10 cm]

Volume =
4.3.4 Unit 3, Lesson 4: Story Totems

GPS Standards or District:

VA8CU.2 Investigates and discovers personal relationship to community, culture, and world through making and studying art.

VA8PR.1 Engages in art making process with care and craftsmanship.

VA8PR.3 Produces an array of two-dimensional and three-dimensional artistic processes and techniques using a variety of media and technology.

Develops three-dimensional artworks from materials such as clay, papier-mache, plaster, wood, wire, found objects and/or combinations of materials

ELACC8W2 Text Types and Purposes: Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Lesson Theme:
ceramics, narratives, totem poles

Objectives:
The student will write a descriptive three-paragraph short story, with a beginning, middle and end describing a journey they have taken in life.

The students will create a well crafted five-element totem correctly utilizing clay and glazes
Sample:

Resources:

https://s-media-cache-ak0.pinimg.com/236x/5d/90/1a/5d901a2846419b6ff8c7de6c563cfc2.jpg

Introduction/Motivation:

This lesson will begin with the reading of a short story. Students will then be prompted to write a short story.

Content Paper or PowerPoint:

https://prezi.com/781p0jcyccib/telling-a-story-through-art/

Instructor’s Procedures:

*Day 1*

1. The instructor will begin this lesson by reading the class the short story *The Bet* (see Resources). Next, the instructor will prompt students to spend 30 minutes writing a descriptive three paragraph, well-articulated short story that describes a “journey” they have taken in life.
2. Following this writing activity the instructor will give a short presentation on Native American totem poles and their derived meanings.

3. Next the instructor will give a demonstration on creating different surface textures, i.e.: using textures, various carving methods, stippling, etc. Slipping and scoring will be reviewed to conclude this demo.

4. The instructor will outline the parameters of their studio assignment: Students will be expected to create a five-element totem pole that reflects the story that they wrote.

5. Before they receive their clay, the instructor should prompt students to create five sketches of different scenes from their story.

6. Students should then be asked to derive a totem segment from each sketch.

Day 2

7. Next the students should begin sculpting these sections from the bottom to the top, attaching each section using slip and score methods. Each section should be formed and carved. After the clay has dried slightly (holding it’s shape but still somewhat wet), the student should slip and score the sections together.

8. Throughout the studio time the instructor should emphasize the connection between storytelling and art, and how narrative also plays an important part in their language arts classes.

9. The instructor should also provide aid to students individually based on their progress and abilities sculpting clay.

Day 3-4: Studio Days

10. The instructor should provide individualized assistance to students.
11. Following day 4, the instructor should bisque fire the artwork once they have dried adequately.

Day 5

12. The instructor should begin this day by reviewing basic information on glazing; multiple coats when using a brush, only one coat when dipping.

Day 6

13. To conclude this lesson, a large group critique should be facilitated.

Materials and Materials Management:

- clay
- plastic covering
- fettling knife
- needle tool
- rib
- smoothing tool
- loop tool
- clean up tool
- rolling pins
- slab roller
- glaze

The instructor will hand out clay in pre-divided balls as well as pieces of plastic for covering in progress clay. All clay tools will be distributed in table sets via baskets or containers. Glaze will be distributed in small cups.
Student Procedures:

1. The student should begin this lesson by listening to the short story, and when prompted by the instructor, write their own.

2. The student must then remain attentive to a presentation on current and historical artists that create their work as a response to some form of narrative. Native American totem poles will be emphasized in this presentation as well.

3. Following the presentation, the assignment parameters will be outlined and students will transition into studio time.

4. To begin this project, the student will derive five scenes from their short story and quickly sketch the scenes.

5. The students should procure one element from each scene to sculpt from clay into a totem segment.

Day 2-4

6. The students will then begin to create their five element, collaged, three-dimensional ceramic piece that reflects the student’s written narrative.

Day 5

7. Once the student has finished the sculpting process, they may use glaze and acrylic paint to finish their piece.

Day 6

8. The students should finish this lesson by participating in a large group critique.

Closure/Review:

This lesson will conclude with a large group critique, which follows the guidelines of Feldman’s Model of Art criticism.
**Assessment Questions:**

How well did the student write a descriptive three-paragraph short story, with a beginning, middle and end?

How well did the student create a five-element totem that correctly utilizes clay and glazes?

**Assessment Instrument:**

<table>
<thead>
<tr>
<th></th>
<th>Number of Elements</th>
<th>Craftsmanship</th>
<th>Narrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Five elements are incorporated into the totem.</td>
<td>Student exhibits an exemplary level of craftsmanship. Clay surface is smooth with no apparent cracks. Glaze is applied neatly.</td>
<td>Narrative is clear, there is a distinct relationship between the five elements.</td>
</tr>
<tr>
<td>B</td>
<td>Four elements are incorporated into the totem.</td>
<td>Student exhibits an good level of craftsmanship. Clay surface is mostly smooth with one or two apparent cracks. Glaze is applied neatly</td>
<td>Narrative is somewhat clear, there is a slightly distinct relationship between the five elements.</td>
</tr>
<tr>
<td>C</td>
<td>Three elements are incorporated into the totem.</td>
<td>Student exhibits an average level of craftsmanship. Clay surface is somewhat smooth with numerous cracks. Glaze is applied somewhat neatly.</td>
<td>Narrative is somewhat vague, there is a relationship between the five elements but it is somewhat disjointed.</td>
</tr>
<tr>
<td>D</td>
<td>Two elements are incorporated into the totem.</td>
<td>Student exhibits a poor level of craftsmanship. Clay surface is rough with major cracks. Glaze is applied haphazardly.</td>
<td>Narrative is vague, there is a relationship between the five elements but it is completely disjointed.</td>
</tr>
<tr>
<td>F</td>
<td>One element is created for the totem.</td>
<td>Student exhibited no consideration for craftsmanship.</td>
<td>Narrative is indiscernible.</td>
</tr>
</tbody>
</table>
EXTENSION/ Differentiation or Adaptation:

Gifted students will be challenged to make their totems more detailed. These students should also be encouraged to add more totem elements to create a more complete narrative. Craftsmanship and execution should be exemplary for these students.

Students with physical disabilities will be provided adapted ceramics tools to use in sculpting their clay. These students will also be provided additional time to complete this assignment and will only be required to create a three element totem.

Students with behavioral disabilities will be allowed to take short breaks from working with the clay. These students will be assigned a peer mentor to help them remain on task throughout the studio portion; additional time should also be given.
5 REFLECTION

5.1 Reflection

I developed this curriculum based on the effectiveness of information extracted from research that utilizes interdisciplinary inclusions effectively. I strongly believe that any well-rounded art educator should be able to easily incorporate this curriculum into their classrooms if they follow the implementation guides and lesson plans. I also feel that any effective educator should be willing to push themselves to be the best teacher they can be—even if that means becoming familiar with a little bit of outside content. I also argue that learning interdisciplinary subject matter can truly enhance the educator’s ability to draw real life connections to art lessons.

To succinctly describe how I developed these lessons and specifically discern how an art educator might approach implementation I have broken down implementation into five simple steps.

1) To begin, determine how your school or district has designed the art curriculum, keeping performance standards in mind. In my experience, most middle school art curricula is based around studio units. I broke my curriculum into units based on studio content; 2D Design, 3D Design, and Ceramics.

2) Next, I examined the performance standards in the academic content areas. I generally drew from standards with which I had prior knowledge of the associated content.

3) Upon examining the academic standards, the art educator should put into practice their own higher order thinking. Determining the most visually oriented standards would be the next step. I chose mathematical transformations, as this content area is based in seeing the visual change of a figure on a graph.
4) Next, an effective art educator will determine which visual academic standards fit within the studio units. In thinking about this idea, I asked myself (specifically with science content in mind, for example): how does science fit into art? Can chemical and physical changes occur in art? By asking these questions, I determined how these changes might be at play in specific art forms and further developed lessons based on what I already knew and through short research.

5) To conclude I added the additional Discipline Based Art Education content that was not already a part of the primarily studio based art lessons. I attempted to keep the number of art history, criticism, and aesthetics inclusions balanced so that each discipline was addressed and included equally.

By following this simple strategy, I feel that an art educator should be able to access the information necessary to seamlessly implement an interdisciplinary, discipline based art curriculum.

If an art teacher is hesitant to commit fully to an entire curriculum that is infused with non-art content, I implore those non-believers to try at least one interdisciplinary lesson. I argue this because it is now easier and more important than ever for educators to be able connect content to the real world—an interdisciplinary approach can give not only the student insight into this idea, but provides the educator a base to facilitate that discussion. I feel that Dobbs (1998) succinctly describes how important an interdisciplinary education can be:

Disciplinary integration in art is educationally desirable not only because it represents the actual ways in which artists and arts-related professionals experience art, but because it is an effective way to underscore and reinforce what
is important (p. 119).

5.2 **Implementing at the High School Level**

As a pre-service educator, I initially set out to write this thesis as a resource that I could utilize in my own classroom. During this writing process I was hired at a high school and now I have a personal interest in adapting these lessons to suit the needs of high school students. I intend to put into practice, review, and re-write these lessons based on the needs of these grade levels. This implementation will be more difficult for a number of reasons. Taylor, Carpenter, Ballengee-Morris, and Sessions (2006) elaborate on that notion:

Students in high school art classes range in grade and interest level and therefore rarely share classes or teachers in other disciplines. High school art classes are typically product and media-driven due to the demand for exhibition, competitions, art school and advanced placement portfolio construction, budget limitations, and advocacy issues (p. 7).

Though these obstacles are troublesome, art teachers can find solace in the fact that a discipline based art education, as exhibited in this curriculum, is comprehensive in nature and therefore infusion will be more easily facilitated. To support this claim, Taylor et al. (2006) “contend that teaching and learning visual arts is fundamentally interdisciplinary and integrated. Therefore, much of what we do as high school art teachers is intricately connected to other realms of knowledge and experience” (p. 3).

The best method for implementing this curriculum at the high school level involves an understanding of how to choose the best, most applicable interdisciplinary information. The effective interdisciplinary high school art teacher should incorporate
information from other subjects that have most likely already been introduced to the majority of students. With this being said, adaptation should be done so with the lowest level in mind. Essentially ninth grade curriculum would be the ideal level for adaptation in order to make the greatest impact and best likelihood for success. Students who are in ninth grade will be able to have information that is fresh in their mind reiterated in the art room; upperclassmen should be cognitively strong enough to understand and apply the discipline connection to not only what they learned in ninth grade but to what they are presently learning. By placing emphasis on general academic ninth grade standards, there will be a greater chance that the student can apply the academic content to their present or past classes.

Drawing connections between disciplines, and more importantly, to the world beyond the classroom, should be another primary concern for implementing an interdisciplinary curriculum into the high school art classroom. Students at this level are more likely to see and independently draw these connections therefore the strength of such a curricula within this setting could potentially be exacerbated. The inclusion of connections to other academic disciplines also provides a better model for the way real life actually is—well connected. High school students are incredibly close to beginning their adult lives and this type of learning will be more indicative of the way the world truly works and provide a good method for connecting ideas and concepts across sometimes polarizing oppositions.
REFERENCES


Rhode Island School of Design. STEM to STEAM. Retrieved January 2, 2015 from http://www.risd.edu/about/stem_to_steam/


