

ART AND SCIENCE: HOW DO THEY RELATE, VISUALLY SPEAKING?

By

AMELIA KENNISON

A CAPSTONE PROJECT PRESENTED TO THE COLLEGE OF FINE ARTS OF THE  
UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR  
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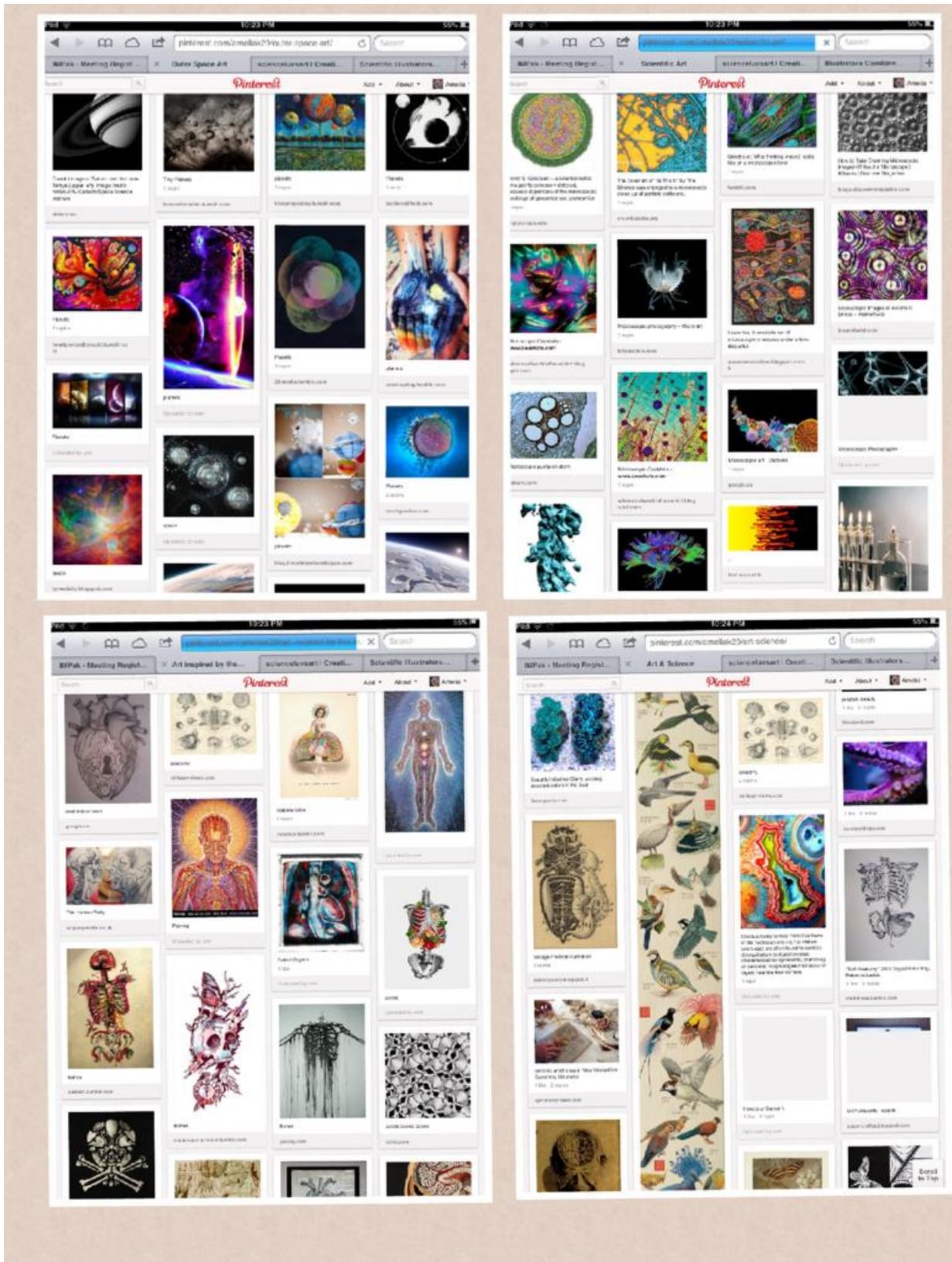


Figure 1: Screenshot from Pinterest Boards, [www.pinterest.com/ameliak29/](http://www.pinterest.com/ameliak29/) 2013

ABSTRACT OF CAPSTONE PROJECT PRESENTED TO THE COLLEGE OF FINE ARTS  
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Amelia Kennison

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Chair: Elizabeth Delacruz

Committee Member: Jodi Kushins

Major: Art Education

**Abstract**

As we go about our normal daily activities we are surrounded by the beauty of nature. This aspect of our everyday life inspires artists and art making everywhere. The main purpose for this capstone research project is to explore the mysteries and beauty that nature and science has to offer the art world. I am interested in how art and science can be blended in a high school art program. At the start of my research I created two resource archives and a working blog to house information from articles to images. Based on these archives and my blog,

[www.scienceluvsart.blogspot.com](http://www.scienceluvsart.blogspot.com), I then created a curriculum resource in the form of a website that brings science into the art room, [www.ameliakenniso6.wix.com/scienceluvsart](http://www.ameliakenniso6.wix.com/scienceluvsart). I collected articles and writings about science and science education in a bookmarking site called Scoop-it, [www.scoop.it/u/amelia-kennison](http://www.scoop.it/u/amelia-kennison). I also collected images and developed some Pinterest boards that helped me archive and organize images that are influenced by science concepts, [www.pinterest.com/ameliak29/art-science/](http://www.pinterest.com/ameliak29/art-science/). These visual images inspired lesson ideas for projects to use in art and science lessons. My pin boards are organized under the following titles: outer space art, scientific art, art inspired by the human body, art inspired by botany, and my largest board is Art and Science. The research blog was a great source for me to compile information and focus on organization, idea development, and application to art education curriculum development. My research blog reflects my thoughts about useful facts, resources, cool images, and my ideas for interdisciplinary lesson plans. My website brought all of this together into an organized curricular resource with lesson ideas, materials, and links to relevant sites. Having these online tools, my blog, Scoop-it, Pinterest boards, and website easily available helped me build content for my curriculum research and at the same time become a possible resource for other art educators.

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## Introduction

My interest in researching this topic began when I first started my undergraduate studies in 1996 at McNeese State University in Lake Charles, Louisiana. I was majoring in biology but always found my first love in Art. Eventually, I began taking Art courses and ending up majoring in both disciplines. With this research study I planned to uncover the love and importance that art has within the science discipline. I produced a working blog, [www.scienceluvart.blogspot.com](http://www.scienceluvart.blogspot.com) to organize my research findings. I also utilized Scoop-it, [www.scoop.it/u/amelia-kennison](http://www.scoop.it/u/amelia-kennison) and Pinterest, [www.pinterest.com/ameliak29](http://www.pinterest.com/ameliak29) to help me organize and store resources for art lesson ideas that include art and science concepts collectively. I brought all of this information together into a curriculum website; [www.akenniso6.wix.com/scienceluvart](http://www.akenniso6.wix.com/scienceluvart) that houses lesson ideas, resources, and links to relevant material.

## Statement of the Problem

Art and science concepts can relate to one another in several ways. Both include investigating ideas to uncover how to transform something into something else. With the use of a variety of subjects and how these topics can intertwine with each other gives art educators a way to utilize an interdisciplinary teaching approach. Both of these disciplines include using your critical thinking skills and applying the learned knowledge of certain skills through the use of the inquiry process. Some inquiry based activities that can be used within the arts and sciences include color mixing, plant chromatography, light-induced decomposition, and shading. Studying art involves making observations through sketches and data collecting using a journal or a sketchbook. A scientist also utilizes the use of journals as a tool for data entry, daily reflections, and analytical thinking. Both art and science builds learners observation skills and help develop creativity. Creativity is a characteristic of both scientists and artists. This

characteristic aids in a student's conceptual thinking process and self realization. Being able to connect and understand both disciplines can also lead to a career that includes a little of both. These careers can range from medical illustration to scientific imaging which is more of a technology driven career. Overall several ideas were explored to distinguish the importance of visual arts and how images affect the understanding of science concepts.

### **Purpose or Goals of the Study**

In this capstone project, I investigated several ideas and topics that could be valuable to the arts and science discipline collectively. Within this research one of my main goals were to utilize science concepts specifically at the high school level and concepts that can be applied to the making of visual artworks. As a high school fine arts educator, having the opportunity to bridge these two disciplines can enhance my students' classroom experience and overall knowledge in both subjects. Adding art and visual imagery to the kinds of concepts that are discussed in my students' science classes will both add interest and a new twist to the normal or ordinary way of learning this information. I am interested in including science topics such as anatomy, biology, geology, entomology, and zoology and how these might apply artistic processes. This approach will also aid in increasing the students' interest in more than one subject area.

### **Research Questions**

Some research questions I explored within this study included finding out the actual creative connection between art and science. The first research question focuses on finding connections, *how can art and science relate thematically?* The next research question is mainly about the visual imagery, *how can visual arts use visual images from science and vice versa?*

The last research question is, *why is incorporating science concepts and inquiry processes of value to the learner in an art class?* All of these questions are really about the importance of visualization and creativity in the search for knowledge and meaning.

### **Rationale and Significance of the Study**

Science is a formal search for knowledge. Within the science discipline scientists and researchers explore and observe different parts of how the world is made up. Science courses explore the simplest to the smallest parts of particles that make up the worlds existence. Branches of science that rely on a majority of visual imagery include but are not limited to anatomy, biology, botany, and zoology. Science is defined by several sources as an intellectual activity carried by humans that are designed to discover information about the natural world. According to Webster's dictionary, science is knowledge attained through the study of acquiring knowledge.

Art is a tool that is used to explain several ideas and concepts through visual imagery. It is defined as the expression or application of human creative skill and imagination, typically in a visual form such as drawing, painting, sculpture, and digital media. Art is found in nature, in the human make up, and throughout the universe of the unknown. According to the Britannica online, art is defined as the use of skill and imagination in the creation of aesthetic objects, environments or experiences that can be shared with others. Art has a variety of disciplines under its exploration umbrella. These art subjects include drawing, ceramics, printmaking, painting, sculpture, photography, and computer aided graphics. Advanced learning can take place because of the hands on approaches and the processes of what art making entails.

Incorporating both art and science knowledge together can enhance the entire learning experience of the pupil. As the educator you are positively preparing the student for a successful overview of knowledge that can be utilized throughout their entire life. Science is great part of knowing oneself and life around you. Art helps you visualize and understand these things in our existence. As an example, scientific images of human cells and brain scans are images found in artwork that brings a new look at what art is.

### **Assumptions**

Within this research study my goal is not to teach all the concepts of science and I am not expecting for my students to leave this course with a total complete understanding of every high school science objective. This research study will not cover all science concepts and is not going to be geared to teaching all the science state objectives that are required for a high school student. This study mainly focused on certain science concepts that will enhance the beauty of creating art.

### **Definition of Terms**

Three main terms that will be investigated throughout this research project are *scientific visualization, interdisciplinary curriculum, and the big idea curriculum approach*. *Scientific visualization* is an interdisciplinary branch of science that is primarily focused on visual imagery. Much of the images created are emphasized on realistic renderings of various science related topics. *Scientific visualization* can be dependent on computer generated images with the use of animation or computer stimulated programs. Scientific visualization is known as a branch of science that is involved with an interdisciplinary approach. The main concerns with this key term focuses on three dimensional visuals of science concepts. NASA relies on scientific visualization

to explore and understand earth and space science. Some of the most interesting images are found within this form of science. Scientific visualization is a form 21<sup>st</sup> century art that utilizes technology and computer graphics. Online sources such as <http://www.wired.com/wiredscience/> have images that are stimulating enough to use as motivators in lessons for art and science.

*Interdisciplinary curriculum* is a structured study of a topic or concept. Within this curriculum information is gathered and a comparison of concepts from multiple disciplines is combined to distinguish how each subject relates to one another. Combining subject matter from more than one discipline that the students are learning can allow the student to make connections between several subjects and make the learning process more meaningful and engaging. Integrating the arts within science or any other discipline improves student achievement and allows the student to think on a higher level when solving problems. A “*big idea*” *curriculum approach* places the most important thematic content and essential understandings sought in a lesson at the forefront. Applying the *big idea curriculum approach* to this research project allows the teacher to plan lessons that identify the desired results in the very beginning.

I believe planning lessons in this matter also provides the learner with a meaningful curriculum that is relevant to the learner. Several outcomes result from making these connections between art and science. Learners will be able to apply these learned skills and processes from one discipline to another to create a product that is visually relevant to their learning experience.

## Literature Review

### Looking at Art and Science

The focus of my review of the literature is concerned with how the two disciplines of art and science benefit from one another. There are many similarities in the fields of art and science, as they share common interests about the world and their relationships can be observed throughout the history of each discipline. These two subjects find common ground through similar inquiry approaches involving creativity, exploration, research, and visualization. Both disciplines utilize investigation strategies by using ideas or theories to communicate to their perspective audiences. They use a variety of materials to find creative and/or interesting solutions. Science concepts incorporate a wide range of interesting images that can be a great sense of inspiration for artistic creations. Artists also cross over into science. For example, Leonardo DaVinci is known for both his scientific investigations and his renowned paintings. DaVinci shows us the power of these two disciplines combined. This includes the combining of ideas, theories, and hypotheses that are tested in some way, and where the mind and hand of the artist/scientist come together either in a lab or art studio (Hughesdon, 1918). Ariane Koek, one of the leaders of the world's largest particle physics laboratories stated that art is a communicator of science to the outside world. Both art and science require critical thinking skills and the application of these skills through the inquiry process or investigation. Numerous scholars have identified several common interests' from artists and scientists whose ideas have meshed together. Eliane Strosberg has claimed that the common interests of these two disciplines are intrigued by theory (Strosberg, 2001). Strosberg is the author of *Art and Science*. She has worked at Boston Museum of Fine Arts in a research laboratory and is also known for research on Jews and figurative painting. John Maeda explains why science uses art as a priority for conveying

aspects of human life (Maeda, 2010). Maeda is a Japanese-American graphic designer, computer scientist, and author. He believes that art is a main source of expressing science ideas in a realistic way.

### **How Scientists and Artists Experiment and Investigate**

Art and science are two interesting subjects that can be connected to years of historical findings. Some may feel that one is more beneficial, but the fact is that combined, these two disciplines have the potential to foster an important aspect of creative innovation. Artists and scientists approach creativity, exploration, and research in different ways and from different perspectives. However, when they work together they open a new way of seeing, experiencing, and the interpreting the world around us (Lehrer, 2008). Lehrer expresses the importance of finding the connection of these two subjects and identifies several projects that prove the benefits of this merger. In science, you have to be open to interpretation of results and look for the next steps. In art you similarly use interpretation to identify what the artist is trying to say (Pain, 2009).

Having a common drive to creatively explore a concept or problem visually is another thing these artists and scientists have in common. Scholars such as Ariane Koek dedicate her research to studies on the power of imagination and self-expression to generate change and innovation. She observes that art is used as a communicator of all subjects especially within science (Koek, 2011). Risk taking and exploration are two approaches you have to be willing to undertake when working with both art and science. Scholars such as Professor Stephen Wilson, claims that the most dynamic works of art not being produced in the art studio, but in ascience

laboratory where artists explore cultural and social questions that are connected to cutting edge research (Wilson, 2010).

Stem biologist and artist Ariel Altaba stated “never let yourself be paralyzed by the fear of risks, whatever your choice put into it as much passion as you can” (Pain, 2009, p.10). Risk taking and exploration are two approaches you have to be willing to undertake when working with both art and science. Scholars such as Professor Stephen Wilson, claims that the most dynamic works of art are not being produced in the art studio, but in a science laboratory where artists explore cultural and social questions that are connected to cutting edge research (Wilson, 2010).

### **The Art and Science Mix**

As this brief review recounts, scholars have described how and why pairing art and science subjects together can be of great benefit in stimulating the creativity and thinking processes of a learner. Art has found inspiration from a wide range of science topics which can include microbiology, the physical sciences, human biology, astronomy, and zoology just to identify a few. Combining subject matter, inquiry processes, and creative approaches from both art and science is ideal for an interdisciplinary approach in an art curriculum and such an approach is beneficial for the learner, educator, and everyone that comes in contact with this type of study. For example, using images from the microscope to create anything from beautiful and interesting abstract paintings to botanical studies of floras and species has the potential to foster new excitement and learning in the art classroom. Combining the complicated concepts of science with creative art making is an important approach for the 21<sup>st</sup> century classroom.

## **Interdisciplinary Art Education**

When incorporating an interdisciplinary curriculum approach in art education, the instructor must bring to focus that art is relevant to daily life and connections to other subjects. Making it a lesson planning goal to establish purpose and meaning to why the students are creating this work of art is an important requirement to developing a successful lesson. Within this approach the instructor should use key concepts, essential question inquiry, and collaborate with other core content teachers. Creating a good plan of action of combining a range of subject content expands the development of students' critical thinking skills. Within an interdisciplinary curriculum lesson, planning involves an extensive range of topics from other disciplines in the lessons. Learning activities feature connections between two or more disciplines usually introducing concepts that can relate to one another in some way. Students are able to generate new insights and establish meaningful connections when exposed to this type of learning environment. Elements that are considered essential for an interdisciplinary curriculum approach are creating learning experiences that promote meaningful connections, in depth information about the content, using accurate examples, required student involvement, and utilizing relevant assessments (Stewart & Walker, 2005). Incorporating visual art activities increases student motivation and allow the student to learn through hands on experiences. Arts-fused learning increases student attention to details, improves test scores, and develops better retention of information. Most importantly the arts can enhance critical thinking which results in learning from doing. The Consortium of National Arts Education Association supports the use of an interdisciplinary curriculum that includes student-centered learning environments, increases student achievement, focus on learning standards, provides a balance among the subjects being

taught, encourages formative and summative assessments, and acknowledges diverse learning strategies (NAEA, 2002). The Consortium also requires art educators to work with content teachers, focus lessons on state art standards and other disciplines (NAEA, 2002). While planning an integrated curriculum the instructor should identify the big ideas, develop key concepts, and essential questions to expand the students overall outlook of the lesson (Walker, 1996). Curriculum mapping is another great tool with an integrated a curriculum. It involves a review of the subject content, skills, assessments, and essential questions. This tool provides a visual reference as well as an informative source for the topic being discussed. An interdisciplinary curriculum approach mainly breaks a topic down to parts and makes connections.

### **Methodology**

The best research method to conduct for this particular study is curriculum research and development. Curriculum research and development involves actively planning for the classroom environment in which a particular subject is taught. Curriculum research methods include identifying, examining, and utilizing relevant content (research reports, websites, studies, and images) from disciplines informing the subject area or area of curricular interest. In my study, curriculum development involved identifying findings, studies, and images from science that I believe can be integrated into art lessons, with consideration of the benefits intermixing content from these two subjects (art and science). Curriculum development involves utilization, application, and adaptation of curriculum research findings in the creation of curricular resources and possible units of study. I adapted a Backward Design approach developed by Wiggins and McTighe in 2005 (discussed below) in my curriculum development procedures.

## **Backward Design as a Starting Place for Curriculum Development**

As explained by Wiggins and McTighe, within a backward design curriculum model the instructor has three starting main goals (2005). The first goal is to identify the desired learning outcomes of the given lessons. In this instance the results are focused on establishing common connections between the two disciplines art and science that are visually inspiring towards art making. The second goal is to determine acceptable evidence through relevant assessments and provide useful examples. Identifying what the instructor will be looking for in the end result is beneficial for both teacher and student. Third goal is to plan learning activities and instruction strategies that create value to the information being taught. In this particular research involving two completely different subjects the instructor must apply concepts that are familiar and relevant to the learners' educational experience (McTighe & Wiggins, 2005). Incorporating learning activities that range from hands on activities to the use of technology can help capture the minds and attention of most students today. While establishing the priorities for the lessons, the instructor should identify the relevance, importance, and lasting understanding of the ideas being introduced to the student. Creating essential questions for each lesson helps students focus on the topics being discussed and allow the student to make connections (McTighe & Wiggins, 2005).

Application in the profession of art education of the Backward Design approach may be found in the book, *Rethinking Curriculum in Art Education* (Walker and Stewart, 2005). Here authors identify several strategies to enhance our lessons and think out the box My approach to the backward design model but utilizes the main concepts of this curriculum method, but does not follow the model exactly as stated. Inspired by Walker and Stewart, the curriculum chosen for my research study was based on the main points of the backward design, mainly focused on

started with the end result in mind (Wiggins, 1998). I also found inspiring source material and tried to focus my lessons to be both content specific and relevant and interesting to students.

### **Subject Areas of Focus and Intended Audience**

An area of focus in this research was art and science, with a focus on art education. The intended audience of the resulting curriculum resources and possible units of study are my own advance level high school art students that are made up of varying cultural backgrounds. Along with the difference in cultural backgrounds these students have different learning styles and are considered at different grade levels of learning. Other audiences include art educators and students who find my curriculum resources desirable.

### **Data Collection and Analysis Procedures**

Data collected included science research reports, studies, curricular resources from science education, scientific images, descriptions of scientific inquiry processes, and related material that seems adaptable to art education. Art education data to be collected include art education reports, studies, curricular resources, education, images, descriptions of art inquiry processes, and related material from the profession of art education that seems adaptable to inclusion of science ideas, visualizations, and inquiry processes in art education. All of this material is collected on online sources including websites, blog sites, social bookmarking sites, video sites, and online journal databases. These sites include Scoop-it, which was used primarily for research and writings, and Pinterest, which was used primarily for images and art or science projects. There will be some crossover between these two sites. I also maintained a blog that displays my ongoing inquiries, findings, and ideas about possible lessons. My working research blog is found at [www.scienceluvart.blogspot.com/](http://www.scienceluvart.blogspot.com/), my Pinterest image storing site is found at

[www.pinterest.com/ameiak29/](http://www.pinterest.com/ameiak29/), and my collect articles were archived on [www.scoop.it/u/amelia-kennison](http://www.scoop.it/u/amelia-kennison). All of these sites along with my lesson ideas are found on my website at <http://ameiakenniso6.wix.com/scienceluvart>.

I organized my ideas about the connections between art and science and possible art projects that incorporate scientific ideas, images, or inquiry processes (as they were forming) on my blog. I considered the beneficial information from each subject, art and science that allowed me to create a sense of connection for future student understanding of concepts coming from these two disciplines. For example, I considered how the steps of the scientific method can be used in art. First, you formulate a question and establish a hypothesis. Second, you collect and research data through experimentation. Lastly, you test the hypothesis then come up with a summarized conclusion of our results.

I also thought about how scientific visualization involves creativity, just as art making does. I compared scientific processes and image making to the art making process. For instance, I could start with a science concept then create a visual representation of that idea. As this discussion suggests, the process of data analysis involves identifying connections and applying concepts and procedures from each discipline (art and science) to the job of developing curricular resources for art education.

### **Limitations of the Study**

Science and art are arguably two different subjects but cross paths on many visual interests. Science has thousands of subjects that are quite fascinating and can be used for prompts in the art making process but not all science subjects can be covered or explored especially while also learning about art techniques and art history which is in vast abundance in itself. This

research project will not cover all science concepts and is not going to be geared to teaching the science state objectives that are required for a high school student. This study mainly focuses on certain science concepts that will enhance art education students' learning experiences. As the educator, my duty is not to overwhelm my students but to inform them of topics that can be crossed over and become clearly relevant to various aspects of their learning in art.

### **Findings**

Within this research project I established useful questions to help guide me in my direction of finding ideas. These questions involved topics dealing with the benefits of combining art and science within a high school advance art class curriculum. I also explored the importance of using visual imagery in both content areas. I then identified useful connections of both subjects to one another. I share my findings, lesson ideas, insights and recommendation in the following passages.

#### **The Benefits of Combining Art and Science**

I believe that combining these two subjects most importantly develops learners' creativity and critical thinking skills. Within the science courses, the learner utilizes creative ways that focus on the visual aspect of exploration to uncover the mysterious ideas of the science world. Both disciplines allow the learner to explore and discover an abundance of concepts using their hands. Teaching the arts allow the use of creative problem solving which results in improving scores in core content areas such as math and science. Implementing the interdisciplinary curriculum approach is a great way to provide knowledge about subjects, art and science.

*The Use of Visual Images.* Art is about creativity and beauty; and Science is about experiments and facts. Both rely on interpretation and the use of visuals. The use of visual

images allows the learner to fully grasp the concept in a way that might be hard to understand with just the use of words. Incorporating visuals is known to be an effective learning strategy in all aspects of learning. Visuals increase the understanding of certain concepts or ideas allowing the words to come to life. The use of visual images can also be a huge benefit for different types of learners within a diverse classroom environment.

*The Connection-Experimentation.* As educators, being able to bring a variety of ideas to the learning environment helps make their students become a well rounded learner. Even though at first thought when you think of art and science, you definitely think they are totally opposite but that is not the case at all. Twenty-first learning environments have become a playing ground of combination. Combining different ideas that are discussed throughout the years of the learner have established a better understanding of complicated concepts. Leonardo Da Vinci discovered the potential behind this idea way before its time but now the benefits are more than evident.

### **Creative Lesson Ideas**

Through the months of researching this interesting topic, I was able to find an unlimited amount of lesson ideas that covered a wide range of science concepts. Referring to some of the images I found on Pinterest, the images gave me great inspiration for lesson ideas for all grade levels. On my curriculum website, [www.ameliakenniso6.wix.com/scienceluvart](http://www.ameliakenniso6.wix.com/scienceluvart), I provided three high school art lessons referred to as learning explorations. Each lesson begins with a motivator or warm-up to get the students interested. When deciding on a motivator I wanted to keep it relatable and interesting to students, keeping in mind the main reason for the learning activity itself, what is engaging, and what creates a sense of curiosity. Thinking about big ideas, enduring understanding, and key questions helped me focus each lesson. Using images and

examples are a source of motivation for a majority of my art lessons. Utilizing online sources such as Pinterest, Google, and Flickr will allow my students to explore different topics with the click of the finger. I explore these online tools quite often when searching for lesson ideas. With my Pinterest boards in particular, [www.pinterest.com/ameliak.com](http://www.pinterest.com/ameliak.com), I was able to store and share inspiring images of a wide range of science topics that could be used to enhance the learning experiences of each exploration lesson. Along with my blog, I intend to use these Pinterest boards for motivation and curriculum delivery in the coming year as I implement the lessons developed in this research project.

The following sections share some of the curricular ideas that I have designed based on my research. These ideas will be the basis of the lessons that I plan to implement in the future with my high school students. The first learning exploration explores the science concepts that focus on chemical reactions, animals in their natural environment, and botanical themes. I provided three different science related themes that will allow me a range to select from. The medium to be used for this lesson is various papers to create a paper sculpture in two or three dimension. The second learning exploration explores microscopic images that inspire designs for a painting. The images that are formed from the microscope are rather intriguing. The last learning exploration I selected to share is exploring science concepts that are inspired from medical illustrations to create a piece of mixed media art. Mixed media choices for this lesson may include a range of found materials, recycled plastics, and actual food items.

*Exploring Themes in Art and Science.* The lesson objective for the first learning exploration is to explore science themes that deal with chemical reactions that could be seen under a microscope, animal's habitat, and botanical environments. Students can refer to my blog, [www.scienceluvart.blogspot.com/](http://www.scienceluvart.blogspot.com/), for useful images and examples throughout the lesson. I

provided three different themes to allow me to select from or to open doors for other possible science themes. The main goal of this lesson is for students to be inspired by examinations of nature that scientists conduct, and to then create a successful paper sculpture based on these kinds of images from science but illustrating their own (student-selected) concepts visually and creatively.

I looked at the state learning objectives of where I teach and identified the science objective that focuses on design and implementing investigative procedures which includes making observations, and asking well-defined questions ([www.tea.state.tx.us](http://www.tea.state.tx.us)). The art learning objectives states the student will express ideas through original artwork using a variety of media, in this case paper with appropriate skill integrating information from a variety of sources. Some vocabulary terms to discuss include nature, habitat, zoology, art nouveau, curvilinear, and landscape. The warm-up which is also known as the hook, intro, or discussion question would be an index card with a different idea of the chosen theme for each student. Each card will have a useful reference picture and brief summary of the idea. Several examples of paper sculpture will be provided and located in the classroom for the students to analyze or observe. The students will then create a rough illustration or sketch of the idea and explain their concept to their table mates. After the students successfully explain his or her idea to their classmate, they will have to explain their idea to the teacher. After the teacher approval, the student may proceed in creating their paper sculpture illustrating their given theme or idea. Reflections of the project will include a class critique and display. The assessment will be based mainly on if the student successfully illustrated the theme, was the paper sculpture neat and visually pleasing. Some ideas that can be included on an assessment rubric for these lessons are: skills and techniques; creation and

communication; connections; aesthetic and critical analysis; applications to life. Refer to [www.pinterest.com/amermaidsbauble/art-assessments/](http://www.pinterest.com/amermaidsbauble/art-assessments/) for a few ideas.

*Close Observation.* Within the second learning exploration discussed on my curriculum website, [www.ameliakenniso6.wix.com/scienceluvsart](http://www.ameliakenniso6.wix.com/scienceluvsart), the lesson objective is to explore designs created from microscopic images. The state learning objectives that will be the focus for this lesson states that the student will use critical thinking, scientific reasoning, and problem solving to make informed decisions. Some vocabulary terms that can be introduced are micrograph, microscopic, design, abstract, microbiology, accent color, and biomorphic shapes. The art objectives will focus on the student developing and organizing ideas from the environment, illustrating flexibility in solving problems, creating multiple solutions, and thinking imaginatively. The medium used will be paint. Each art table will have a microscope available and each student will have their own substance plate to look at under the microscope. The images will be used for inspiration to create a final painting. The student will need to create at least four different compositions then select the best to finalize. The assessment for this lesson includes comparing the original image to the final product and analyzing the painting technique used.

*Conveying Ideas Visually.* In the third learning exploration the students will explore science concepts that are associated with medical illustrations. The state learning objectives will allow the students to focus on the scientific process to investigate science concepts and is expected to design and implement investigative procedures. The art learning objectives will focus on solving visual problems and develop multiple solutions for designing ideas, clarifying presentations, and using design skills. The students will be able to use any type of alternative or form of mixed media combination they wish. Each art table will be supplied with several medical

images to choose from. Once the student selects one image, they will have to create at least three different compositions. Each composition will have to include the materials they would like to use, such as wood or recycled plastics. Vocabulary terms that can be discussed are medical illustration, anatomy, assemblage, mixed media, and texture. Students will present their final product to the class and explain their process. The assessment will be based on if the students' presentation was clear and understood by their peers; and the overall completion of the piece of art.

### **Insights**

From chemists to physicists, the appreciation of the visual arts is quite evident. The use of visual images through art can aid in understanding the overall concepts or processes of many subjects in science and opens up many doors of respect towards what the arts can do for any topic or subject. Artists that have a focus more towards abstract art are subconsciously creating visions of science even if the knowledge of certain concepts is not prior explored. After creating some curricular resources and creative projects ideas that focused on science ideas and the creation of visual imagery affects, I hope that these kinds of lessons shows how art is a major component when learning about different topics in the science discipline. Not only is art a major contributor to science it is beneficial to all subjects. Several lesson prompts can be used throughout an entire grading cycle for the research process and should include topics ranging from ideas involving botany to concepts surrounded around physical science. Being able to access so many different sources virtually allows me to undercover scientists that were also artists and observe the great influence of their profession within their artwork.

These high school art lessons are planned to identify with topics and useful information to the student that can help them understand and appreciate the art of science. Creative thinkers such as artists and art teachers seek out topics that are inspiring and create interests beyond the norm. When combining science and all its amazing wonder to the world of art, this relationship can only result in something extraordinary. Imagine experiencing nature without color or lines. The utilization of art brings the world to life and helps us appreciate the beauty of it nature. The art of science is utilizing visual arts to create interest to science topics. Using technology and hands on activities develops the student into a well-rounded 21<sup>st</sup> century learner. I recommend that other teachers planning to use this type curriculum development have all of your research information together and always have extra information or a backup lesson theme in the case the first attempt does not go as planned. The next thing I would recommend is to use themes that will be relevant to your students learning experience. Talk with science teachers at your school and find out what topics they are discussing. Lastly, enjoy the moment-remember you have to show a sense of excitement or interest in the theme also.



Figure 2: Screenshot from the research blog, [www.scienceuvsart.blogspot.com/](http://www.scienceuvsart.blogspot.com/) , 2013.

iPad 4:04 PM 65%

ameliakenniso6.wix.com/scienceluvart#lemotic Search

Visual Arts & Science | Scoop.it scienceluvart | Creative Lessons | Wix.com

HOME ABOUT Creative Lessons More

**Creative Lessons:**  
**LEARNING EXPLORATION ONE**

Lesson OBJECTIVE:  
 Exploration of chemical reactions, animals in their natural environment, and botanical themes utilizing paper sculpture as the media.

Texas State Standards:  
 Art: 2A Creative expression. The student expresses ideas through original artwork, using a variety of media with appropriate skill integrating information from a variety of sources.  
 Science: Knowledge and skills. 2E Design and implement investigative procedures, including making observations, and asking well-defined questions.

Vocabulary:  
 nature  
 habitat  
 zoology  
 art nouveau  
 curvilinear  
 landscape

Warm- UP (discussion question, the hook, intro):  
 Students are given an index card with one idea on it that they will have to create an illustration for then explain their idea to one of their table mates.

Materials needed:  
 variety of colors in card stock or construction paper, glue, scissors, pencil, poster board.

Studio Activity:  
 The Instructor will select a science related theme and provide useful reference images for the students to use. Once the students choose one subject of the selected theme, they will prepare a layout sketch. Once the instructor approves, the student will begin preping the paper.

Reflections:  
 Class critique and display.

Assessment:  
 Did the student successfully illustrate the theme?  
 Was the paper sculpture neat and visually pleasing?  
 See attached rubric for ideas.

Inspiration Artist: Calvin Nicholls



Retrieved from [www.bloodyloud.com](http://www.bloodyloud.com)

This site was created by WIX.com. Create your own for FREE >>

Figure3:Screenshot from the curriculum website, [www.ameliakenniso6.wix.com/scienceluvart](http://www.ameliakenniso6.wix.com/scienceluvart), 2013.

The screenshot shows an iPad browser interface with the address bar displaying [www.scoop.it/visual-arts-science](http://www.scoop.it/visual-arts-science). The page title is "Visual Arts & Science | Scoop.it".

The main content area features a grid of articles:

- Top Left:** A digital 3D visualization of a human face with a complex network of lines overlaid. Text: "From adamakis.blogspot.com - Today, 3:52 PM", "The art works of digital 3d visual artist Adam Martinakis". Rescoped by Ana Cristina Pratas. 3 reactions.
- Top Right:** A detailed scientific illustration of a butterfly's wing structure, showing internal organs and skeletal elements. Text: "From scientificillustration.tumblr.com - June 22, 5:02 PM", "Draw like a scientist! Great collection of truly inspiring images about science and nature by @lukaslarge". Rescoped by Amelia Kennison from Digital Delights for Learners. 5 reactions.
- Middle Left:** Article titled "Spongelab | A Global Science Community - with science animation, images, games & more". Includes a search bar and thumbnails for "NSF Award", "Animations", "Graphics", and "Site Tour". Text: "From www.spongelab.com - June 22, 5:01 PM", "Spongelab is an online learning platform with science animations, images, videos and games integrated into a teacher content management system." Rescoped by Ana Cristina Pratas. 19 reactions.
- Middle Right:** Article titled "Microbiology: Bacterial communities as capitalist economies". Includes a thumbnail of various green and yellow microorganisms. Rescoped by Amelia Kennison from Science News.
- Bottom Left:** Article titled "Anatomia Collection - University of Toronto Libraries". Includes a thumbnail of a human anatomical drawing. Text: "From link.library.utoronto.ca - June 22, 4:57 PM", "This collection features approximately 4500 full page plates and other significant illustrations of human anatomy selected from the Jason A. Hannah and Anatomy of Medicine collections". Rescoped by Amelia Kennison from Studio Art and Art History.

Each article includes a comment box and social sharing icons. A vertical "feedback" button is visible on the right side of the page.

Figure 4: Screenshot from Scoop-it, [www.scoop.it/u/amelia-kennison](http://www.scoop.it/u/amelia-kennison), 2013.

iPad 3:57 PM 67%

www.scoop.it/visual-arts-science

Visual Arts & Science | Scoop.it

### Polygon Medical Animation - Medical Illustration



From www.polygonmedical.com - June 22, 4:56 PM

Polygon creates custom 3D medical animation and illustrations for visual communication, publication, trade shows and events. Effectively communicate your product message and awareness.

Via Polygon Medical

Comment 

Polygon Medical's curator insight, May 10, 9:35 AM  
Polygon Medical Illustration Gallery  
<http://www.polygonmedical.com/medical-illustration.html>

Write a comment... Show 2 reactions

Rescoped by Amelia Kennison from D\_sign

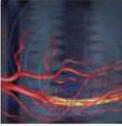
### Insane art formed by carving books with surgical tools



Write a comment... Show 7 reactions

Rescoped by Amelia Kennison from shubush design & wellbeing

### These gorgeous medical illustrations look like scenes from another world



From io9.com - June 22, 4:56 PM

"When viewed from a new angle, a different scale, or in a slightly different light, even something as familiar as the human body can look utterly alien."

Via petabush

Comment 

Write a comment... Show 1 reaction

Rescoped by Amelia Kennison from Ariix Canada Daily

### Hospital reports more patients with antibiotic-resistant bacteria



From www.southshorenw.ca - June 22, 4:56 PM

"Artwork of bacterial cells becoming resistant to antibiotics. This resistance is acquired from a donor cell's plasmid (circular unit of deoxyribonucleic acid, DNA), which has resistance seen at upper left (red/yellow, red is resistance). Viral transmission involves a virus (pink, lower left) obtaining a resistant gene, and passing it to a bacterial cell that incorporates it into its plasmid. Bacterial cells also acquire segments of DNA released from dead cells (upper left). Mutations (not seen) may also occur, which may be antibiotic resistant and thus allow the bacteria to survive and reproduce.

© Bryson Biomedical Illustrations / Custom Medical Stock Photo - South Shore Regional Hospital's experiencing another flare-up of cases of patients contracting an antibiotic-resistant bacteria. The hospital's fourth-floor medical unit, the same area where problems were found in September, is where nine cases of MRSA (methicillin-resistant

feedback

Figure 5: Screenshot from Scoop-it, [www.scoop.it/u/amelia-kennison](http://www.scoop.it/u/amelia-kennison), 2013.

## Conclusion and Recommendations

Having so many reasons why this project would be beneficial to teaching students about connections can only end up being a positive add on to the students' educational experience.

After creating some curricular resources and creative project ideas that focused on science ideas and the creation of visual imagery affects, I hope shows how art is a major component when learning about different topics in the science discipline. Not only is art a major contributor to science it is beneficial to all subjects. Several lesson prompts can be used throughout an entire grading cycle for the research process and should include topics ranging from ideas involving botany to concepts surrounded around physical science. Being able to access so many different sources virtually allows me to undercover scientists that were also artists and observe the great influence of their profession within their artwork. From chemists to physicists, the appreciation of the visual arts is quite evident. The use of visual images through art can aid in understanding the overall concepts or processes of many subjects in science and opens up many doors of respect towards what the arts can do for any topic or subject. Artists that have a focus more towards abstract art are subconsciously creating visions of science even if the knowledge of certain concepts is not prior explored. Reflecting from the results and outcomes of several art lessons that include science related topics will allow the students to improve their science knowledge while creating a beautiful piece of art. If you plan to use this type curriculum development I recommend you have all of your research information together and always have extra information or a back up lesson theme in the case the first go round is a failure. The next thing I would recommend is to use themes that will be relevant to your students learning experience, talk with science teachers at your school and find out what topics they are

discussing. Lastly, enjoy the moment-remember you have to show a sense of excitement or interest in the theme also.

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## Appendix A

### My Research Data Collection Sources:

[www.scienceluvart.blogspot.com](http://www.scienceluvart.blogspot.com)

[www.pinterest.com/amelia29/](http://www.pinterest.com/amelia29/)

[www.scoop.it/u/amelia-kennison](http://www.scoop.it/u/amelia-kennison)

<http://ameliakenniso6.wix.com/scienceluvart>

[www.mrskennisonartclass.weebly.com](http://www.mrskennisonartclass.weebly.com)

### **Author Biography**

Louisiana-born Artist, Amelia Kennison. I am a secondary school Art teacher in Houston, Texas. I am inspired by the beauty of nature from the soft petals of a blooming flower to the aged roots of an oak tree. I love using color combinations that create a sense of warmth within the viewers' soul. Creating a sense of excitement or to know that your eyes will light up when you look at my artwork gives me confirmation that I have accomplished what I had in mind when I picked up my drawing tool or paintbrush. When my clients are filled with happiness after hanging their piece of art, I am inspired to create more Art. Art has always been a passion of mine. Using organic shapes to create a piece of Art that is thought provoking is my main focus when I begin the creative process. My goal is expressing movement throughout my Artwork from the curves of the body to the organic shape of a leaf. I always knew that Art would be a strong influence in my life; Art has always brought joy to my heart and to others close to me. I have years of my personal Art displayed in private homes. It takes years of practice and patience to be an educator especially in the Arts and as an Artist. I'm devoted to doing my very best in both. I helped build my school art program to get positive recognitions among the school district and throughout the community. I am focused on establishing several ways for my students to look at their work and be extremely proud, from an online Art gallery to having a permanent Art display with the Texas Children's Hospital. After receiving my BA in Visual Arts, concentrating in Advertising Design and Illustration from McNeese State University in Lake Charles, LA, I still had an urge to learn more. I attended St. Edward's University in Austin, TX where I studied painting, printmaking, and Art Education, specifically in child psychology. My goal was to continue furthering my education so I began my graduate studies at University of Florida in

Gainesville to receive my Master's in Art Education and eventually I will open my own Art Gallery with open studio places.