Art Media and Technology

Nicholas Leonard

Northern Illinois University, USA

CHAPTER MENU

This chapter summarizes some of the media commonly included in art curricula for the teaching and creation of art. The entry has three separate sections: two-dimensional media, three-dimensional media, and newer media electronic and digital (Beal and Miller 2001; Wands 2007; Wigg and Hasselschwert 2001). While the media discussed in the two-dimensional and three-dimensional sections are frequently considered traditional media in art curricula, all of these media and materials are still used by artists and designers. The section on newer media discusses some recent developments in artistic materials and tools that have expanded the resources available for artistic creation. The aim of this summary is not to provide a guide to their implementation in the classroom. Instead, this chapter aims to contribute an overview of the major media concepts and skills included in curricula so that educators and school administrators have a greater awareness and understanding of the media available for artistic production in order to promote art-related learning.

Two-Dimensional Media and Techniques

In teaching two-dimensional media and techniques the art educator instructs students on how to make images. There are various media and techniques that can be used in image-making to create different effects in order to convey a meaning. A student who is well equipped with a visual vocabulary and the abilities to use different media has more outlets for expression and meaning-making in their art. As every artwork is made in a context, meanings, connotations, and associations are connected to each image as part of the artist's visual culture. The following sections outline some of the media and techniques that students may use to compose an image to convey a desired meaning.

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Drawing

Drawing is one of the first artistic media that students are usually taught and with which they engage with in art curricula. The act of drawing can be used even at a young age to communicate information, show expression, or act as visual note-taking. Drawing to communicate ideas has taken place throughout human history and in many forms, such as religious symbols, maps, and scientific diagrams. Expressive drawing focuses on an artist's representation of an idea or feeling and may or may not directly portray an object in real life. Visual note-taking is commonly referred to as sketching. Sketching allows students to draft an idea or concept that can be referred to later and a sketch can be developed into a finished drawing or work in another media. When designing a curriculum, art educators can use these different drawing methods as exercises, individual projects, or an entire course.

Drawing can encompass many techniques and utilize various materials. The teacher can decide to use any material that leaves a mark on a surface. Some of the most common materials used in drawing are pencils, pens, crayons, markers, chalks, pastels, and oil pastels. The application of these materials can be used by the teacher to explore line-making for such artistic processes as gesture line and contour line drawing. Gesture lines are expressive lines that are used to show a motion or emotion, while contour line drawing uses lines to define and describe the edges of objects.

Each drawing material results in a different quality of line. Students wanting to create an image with fine details may use a pencil or fine-point pens and markers. These drawing utensils generally create very smooth and delicate lines that can result in highly detailed drawings. Contrary to the thin, smooth lines produced by pencils and pens are the lines created by crayons, chalks, and pastels. These materials are generally thicker than pencils and pens and crumble when used, creating dust or residue on the canvas. Many drawing materials have variations such as thickness and hardness, which influence how the media leaves a mark the canvas, ultimately impacting the creation of lines as well as their blending properties.

The quality of a line can also be influenced by the type of drawing paper selected. Paper can be described by such characteristics as acidity, weight, and tooth. Paper is formed by pressing a fibrous pulp flat. Most common papers use wood- or cotton-based fibers which naturally deteriorate over time as a result of their acidic composition. In order to preserve an artwork, an artist or teacher may choose to use acid-free or archival paper. Paper can be measured in terms of its weight (grams per square meter), or of its thickness on the caliper scale. Paper texture can be described by its tooth. When fibers are rolled together without heat the paper is described as cold-pressed and results in a very sporadically bumpy and textured paper. If the paper rollers are heated the paper produced is described as hot-pressed, resulting in a smooth paper.

Painting

Painting is the act of applying paint onto a surface. There are multiple paints and paint application tools that an artist or educator can use. Paints are generally broken down into categories of water-based paints and non-water-based paints. Water-based paints include watercolor, tempera, and acrylic. Non-water-based paints usually have an oil base. The tool used to apply paint can vary from different sizes and shapes of brushes to

rollers, palette knives, and spray applicators. Traditionally, since the Renaissance artists have used a brush to apply oil paint to a canvas or wooden panel. In most educational settings, students use a water-based tempera paint or watercolor until the latter part of secondary school. When historical artworks are introduced to students, it is important to note the kind of paints used in them. Contemporary artworks may involve the use of water-based paints such as acrylics. Artworks created with spray paints are commonly found as street art in the form of graffiti in public locations. There must be proper ventilation when teaching spray paint techniques, as the paint fumes can contain harmful compounds. Spray paint applicators also have a wider reach, so extra space is required for their use.

The surface onto which an artist or student decides to apply paint can determine the choice of paint medium. For example, certain materials absorb watercolor paints quickly, so these paints require special papers. Watercolor paper made with cotton rag fibers, which is more sturdy and much thicker than basic printing or drawing paper, enables students to work more successfully, as it is less likely to deteriorate from the water. Other paints, such as oil and acrylic, are commonly used on a canvas consisting of a stretched linen over a frame. The linen can be treated with products like gesso, which acts as a primer, preventing the fibers from absorbing all of the paint as well as creating an even surface. Art educators may decide to use other, more economical, flat surfaces such as wooden panels or dense cardboard, along with an application of gesso.

Painting can also occur on surfaces other than a flat canvas and specialty papers. Paints can also make marks on three-dimensional sculptures and other uneven surfaces. While painting on these types of three-dimensional materials can be difficult in certain situations, the choice of paint type and method of application remain just as significant as when painting a flat canvas. Many sculptures are painted after construction to enhance their meaning and to add visual appeal. Murals are another great example of painting on a non-flat canvas. Murals are images created on permanent surfaces such as walls and ceilings, and often incorporate or utilize the architecture of the given space. One of the most famous examples is the Sistine Chapel ceiling painted by Michelangelo in the early 1500s.

Printmaking

A unique characteristic of printmaking is the media's capacity for image reproduction. An image can be printed in various ways, including monoprint, collagraph, block carving, intaglio, and serigraphy. Printmaking involves techniques that range from the simple to the complex to produce multiple reversed images on a new surface. Printmaking is a significant medium in visual culture and various printing techniques can be seen in our modern environment. In a curriculum that includes printmaking, students should be made aware of the various forms of printmaking and the differences between printmaking techniques and their uses. Students engage with a wide range of printmaking as part of their everyday visual culture, for example, printed designs on their clothing, on product packaging, on toys, and in printed books, magazines, and comics.

One of the simplest techniques is monoprinting, which, unlike most printmaking processes, creates only one print. Monoprints are made by painting or inking a hard, flat surface and then pressing paper onto the image to create a single reversed duplicate. This process can be repeated as many times as the artist wishes, but the images will

not be exactly identical. Collograph printmaking involves the attaching of objects to a surface to create a raised image. The raised sections of the surface are then inked and pressed onto paper to create a printed image multiple times. Block printing, or relief printing, is created by carving or removing material from a flat surface, such as wood or linoleum, so that the ink sits on the remaining uncarved surface when applied with a rolling tool called a brayer. A printing process known as intaglio works inversely by scratching into a surface, such as a plate of metal or plastic, to create crevices to hold ink. The ink is then applied and wiped off the flat surface leaving only ink in the cuts of the plate for transferring by pressing the paper into the cuts. Depending on the printing method used and what resources are available, there are two options for pressing: a printing press may be used for pressing the paper onto the inked surface or a handheld rubbing tool called a baren may be used.

Film Photography

Film photography is an interaction between film and light; without light there can be no photography. Cameras commonly use a photographic emulsion film (light-sensitive silver crystals suspended in gelatin) to capture an image. When light comes into contact with photographic film, the silver crystals are altered and, through the developing process, they turn black to create an image.

In addition to the positioning of the photographer in relation to the subject, film photography involves controlling the light that enters the camera. The interaction of light with film is generally controlled by two main features of the camera, the aperture and the shutter. The aperture is created by circular blades that create an opening to control how much light enters the camera, in a similar way to how the pupil functions for the human eye. The settings for the aperture are referred to as f-stops (an abbreviation for focal ratio and focal stop). The shutter speed is a sliding door that controls how long the film is exposed to light. The shorter the exposure the darker the image. By balancing the exposure time and the size of the aperture that allows light to reach the film, an artist can capture a desired image. When working with film photography, students may bracket an image by taking multiple pictures of the same subject using a range of settings to ensure a desirable outcome, since the final image is not revealed until it is developed in a darkroom.

In teaching film photography two processes need to be included in the curriculum: capturing an image and developing an image. Capturing an image can occur at any time and in any location, and, as with all image-making, instruction should include composition and the message being conveyed. Cameras may be provided by the instructional institution and monitored; for example, students may be allowed to take the cameras outside the school grounds to capture their images. Students should be taught to develop the film using chemicals: developer, stop, and fixer bath. The film needs to be processed in the baths in this order to allow it to be safely handled in the light. Once it is dry, the film negative is taken into a darkroom and the image is projected onto light-sensitive paper to create the final printed result. This process once again requires a delicate balance of light and time. Film photography requires very close attention to detail, as exposure to light or an incorrect development process can ruin a set of images.

Mixed Media

There are two categories of two-dimensional mixed media commonly found in curriculum: collage and montage. Collage derives from the French word *colle* meaning glue. A collage is a two-dimensional image created by gluing various media to a surface. A montage differs from a collage in that it uses only photographic images. In a montage, an artist may, for example, recycle printed images from newspapers, advertisements, and magazines as well as photographs they have taken themselves.

A curriculum can include introducing students to examples of collage and montage by artists such as Pablo Picasso and Georges Braque, who coined the term "collage." The wide range of inexpensive two-dimensional materials that can be used to create a collage makes it ideal for inclusion in the curriculum to teach a range of concepts and skills across educational levels. Younger students may be shown artists such as Henri Matisse, who created colorful mixed-media artworks, to aid learning about color and composition. As students mature, the curriculum may include the gathering and sorting of magazine images and other printed materials to promote learning of concepts such as identity and skills such as collecting.

Three-Dimensional Media and Techniques

In teaching three-dimensional media and techniques the art educator has many options to choose from to explore form and composition. The different characteristics of each media and technique can be used to produce and convey a desired meaning. In selecting a medium, art educators must consider its place in the curriculum and the issue of storage. Depending on their size, three-dimensional artworks and materials may need to be put away safely on shelves or in cupboards to prevent damage or environmental degradation. Ceramic artworks that require firing in a kiln also require planning in the schedule to avoid delays. Art educators need to take such factors into consideration when planning for three-dimensional work in the curriculum.

Sculpture

Sculpture involves the creation of a three-dimensional work with a focus on form and space. While the commonly selected media included in curriculum are wood, metal, glass, found objects, and stone, sculptural media can vary greatly. The two sculptural processes that are typically found in the curriculum are additive and subtractive. As its name suggests, additive sculpture involves the artist adding material to a base to create the desired composition. Additive sculpture can range from gluing together wooden blocks to welding together metal sections. Assemblage is an additive process that involves a three-dimensional work created from the recycling and repurposing of found objects. The possibilities for these objects are endless and allow for great variety. Sculptures created through the removal of material such as clay, wood, or stone utilize the subtractive process. The act of carving a wooden block to produce a desired form is an example of the subtractive process in sculpture.

Four types of sculpture are common in the curriculum: freestanding, relief, kinetic, and interactive. Freestanding sculptures may be additive or subtractive and are works

that are not attached to another object, other than a base. Relief sculptures are created by removing material from an object so that the desired end product is still completely attached to the original material, or by adding objects to a flat back. Relief sculptures can be carved into wood, stone, and metal as part of building decorations in public spaces. Kinetic sculptures, sometimes referred to as mobiles, require motion to create the intended effect. The final type of sculpture, interactive, requires viewer interaction in order to produce the intended effect. Interactive sculptures may require a viewer to push or pull on elements that can create sounds, lights, motion, or a combination of the three. Without the viewer's interaction the desired effects are not possible.

Ceramics

Ceramics are sculptures made primarily or entirely with clay. Curricula typically include lessons in both natural, water-based clay and plasticine, which is oil-based. Natural clay is made of water, rocks, and minerals and can be found in river beds and similar environments. The composition of the rocks and minerals in the clay and its texture determine its properties such as color, grain, and firing temperature. Three common types of clay include those used for earthenware, stoneware, and porcelain. Wet clay can be molded into flat slabs, rolled into coils, pinched, or spun on a throwing wheel and manipulated with tools. Natural clay must be kneaded to ensure that air bubbles are released before a ceramic piece is created, otherwise it may be destroyed when fired. Natural clays need to be dried, then fired in a kiln in order to harden the clay and make it more durable. The first time the clay is heated in a kiln it is called a bisque fire; the second time is called a glaze fire, since glaze is applied to add color and strength prior to firing. Plasticine is a manufactured clay that comes in many colors and is generally used for practice as it cannot be fired or hold its form indefinitely.

Art teachers who plan to use clay in their curriculum typically spread out their projects over the course of the school year where possible in order to better accommodate storage for the artworks when wet, dry, and finished. Kilns should be stored in a separate room that is free of fire hazards and safe from student access as they reach very high temperatures for long periods of time. The use of a kiln also dictates the timing of projects as there is a finite amount of space in a kiln and the process cannot be rushed. Most modern electric kilns have various firing speeds. The fast speed should only be used for low-temperature firings, never in an attempt to save a few hours at the expense of the projects.

Textiles

Textiles are created from spinning fibers to create yarn. The fibers can originate from various materials such as plants, animals, or synthetic elements. During the spinning process the fibers can be used to produce yarn varying in thickness from thin thread to thick rope, with a wide range of thicknesses in between. When studying textiles, students can learn how to weave, braid, loop, or knot yarn to create fabrics, cloths, and other products. Embroidery and other types of needlework, such as knitting, sewing, and crochet can be used to create or embellish an item. Textile arts, such as clothing or quilts, may be functional or simply admired for their form. Textiles are another great example

of everyday visual culture as there are many thread-based items in the environment that students overlook or take for granted, or they may not understand the processes of how and where they are designed and created. Important concepts can be taught and critical discussion about mass production and labor encouraged by including textiles in the curriculum.

Installations

Installations are three-dimensional artworks that are commonly site-specific and designed to transform a given space for the viewer. Installations are defined by their use of space as much as by the materials used in the work, and in this sense are very similar to sculptures. An installation may be passive or interactive, as well as indoors or outdoors. When including installations in the curriculum, an art teacher will typically first designate a space to be used. The space is analyzed by the students and then embellished to give viewers a specific experience. Installation spaces can vary greatly in size, from the corner of a hallway to an entire school. Given the space needed for installations, some artists work together to repurpose old homes and other buildings in order to create a new experience. Art educators can include visual examples of artists' work to illustrate how space can be altered through installations. For example, the works of Yayoi Kusama, Ai Weiwei, Kara Walker, or Christo Vladimirov Javacheff and Jeanne-Claude show a range of installation sizes and content.

Three-dimensional materials can be used by students to create a multitude of sculptures across all age levels in an art curriculum. Younger students can explore the elements and principles of sculptures with cheaper and reusable materials such as plasticine or fabrics. As students develop, the curriculum may be used to introduce additional materials and more advanced techniques such as needlepoint textile work or the use of multiple glazes in ceramic works. As the techniques and materials available to the students become more advanced, the art educator can focus on the development of meaning and identity within an artwork.

Newer Electronic and Digital Media

In teaching electronic and digital media and techniques the art educator must first address what is feasible and then how to incorporate the technology into the curriculum in a meaningful way. Technology availability can be a problem for some teachers. Obtaining grants for technology items that are multifunctional, such as laptops or tablets that can be used by several students, each with their own individual account (provided by the school), is a great way to introduce technology into an art room. Once technology is introduced into the classroom, the teacher should teach students safe habits in relation to internet safety as well as the critical use of programs to avoid using technology as a novelty. Art educators can also greatly benefit from the use of technology in art advocacy by being able to present digital media online as well as to store projects. As the field of digital media is growing rapidly, the proposed media in this section are just some of the commonly found technology in schools at present. The critical use of future technology is essential for continued student growth and technological efficiency.

Computer Graphics

Teachers with access to computers, computer rooms, or digital tablets can build a curriculum around computer graphics. Computer programs for the manipulation and creation of digital images are defined as computer graphics. When computer graphics is included in the curriculum, students can use images sourced from the internet or from digital cameras, or digitally scanned, manipulating these images in various painting and editing programs. Current software also enables students to create art and design work that is entirely digitally produced within a computer. The use of computers for digital artworks and graphic design has greatly increased as technologies have advanced, with the development of touchscreen monitors, advanced graphic tablets, and program-coding capabilities. Since digital artworks originate in computers, there is a close connection between digital art and design creation and sharing and publication via the internet. Image rights and artist integrity are, therefore, highly important aspects of this medium that teachers need to address with their students. As technology develops, there are more opportunities for teachers to develop a computer-graphics-related curriculum in their art program. Technology grants, developer educational discounts, and free online programs can be of great assistance to art teachers who are interested in teaching digital art with limited supplies or access.

Video and Animation

When a computer is used to produce the illusion of movement, it is generally categorized as digital video or animation. Videos can be recorded using many devices, such as camcorders, smartphones, tablets, and computer cameras. Video files can be edited and manipulated using software to alter the visual and audio properties and create a desired effect. A digital visual culture curriculum should include both aspects of capturing and editing video to provide students with appropriate production concepts and skills. The ability to share videos online through various websites such as YouTube and Vimeo allow students to engage in a large-scale visual culture, but the curriculum should help students to think critically about the balance between the convenience of an online sharing platform and the possible exploitation of material by other users or companies.

Animations are videos that are not recorded by devices but, instead, are fabricated completely through the use of computer programming or camerawork, such as stop-action photography. Computer-generated animation can be artworks in their own right or juxtaposed with a video for enhanced effect. While this process can be highly complex, there is a wide range of paid and free programs that allow for the teaching animation at any educational level.

Virtual Art

Virtual art is an interactive experience for the viewer in a digitally created environment. Virtual art can be completely fabricated using computers, as in video games, or a form of augmented virtual reality that offers various levels of control and interaction for the viewer. Video games offer the viewer an environment for safe exploration, risk-taking, hypothesis testing, and altering unchangeable factors of the real world. Augmented reality involves the use of juxtaposed computer images to

create the illusion that participants are interacting with the real-world environment around them. Augmented reality has greatly advanced in the twenty-first century, benefiting from the development of portable personal devices with internet connectivity and improved camera quality. At presently, products that allow for virtual three-dimensional painting, and for collaborative works and digital sharing, have also become available.

Various programs allow for different levels of user complexity. To aid student understanding of animation and augmented reality, simple video games can be created using pre-programmed parts and little coding. Older students with advanced programming skills can create unique works of art. These programs can vary greatly in features and cost. Augmented reality programs are commonly prewritten by a developer and then modified by the user for a desired outcome. As technology advances, these the digital forms of virtual art will become increasingly blended for a more immersive experience.

Robotics and Three-Dimensional Printing

Robotic and three-dimensional printing utilize automated technology to either produce or assist in the production of a tangible artwork. Three-dimensional printing uses a computer program and printing machine to construct, through an additive layering process, a plastic object that has been designed digitally. Three-dimensional printing processes enable these plastic sculptures to be printed in multiple colors and include both bottom-up and top-down printing methods. When three-dimensional printing is included in a curriculum, it should include both the design of the visual product and the coding and printing processes needed for the machine to produce the product. Three-dimensional printers can range in size and features and vary in price. Much like a kiln for ceramic artworks, one three-dimensional printer can be used by a whole class or program, but the printer limits the speed at which the class can produce works. Technology and art grants are a good option for acquiring a three-dimensional printer for an art program.

The use of robotics in the creation of art has increased as new technology has developed and expanded. One example of robotic integration in the creation of art is called cyborg art. Cyborg art is created when humans have enhanced abilities or senses for artistic production as a result of technological integration. An example of a cyborg artist is Neil Harbisson, who had an antenna surgically implanted to allow him to perceive ultraviolet and infrared colors. As the levels of cybernetic and other digital technologies improve, the creation of robotic art will undoubtedly increase.

The technology listed here can be used to produce many forms of digital artworks both interactive and non-interactive. When considering the inclusion of newer media in the art curriculum it is important to evaluate the financial investments in products that offer a long shelf life to stay on the cutting edge of technology. Online resources are readily available to help integrate newer technology into the curriculum. As students mature, the focus on identity in digital artworks and online environments should be addressed by the art teacher. The critical use of new technology products and programs equips both educators and students to stay ahead of the curve in a rapidly developing field.

SEE ALSO: Design Curricula in Higher Education; Design in the Secondary Curriculum; Early Childhood Art Curriculum; Elementary Art and Design Curricula; Middle-Level Curriculum in Art and Design

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Nicholas Leonard is an art and design education doctoral student, researching technology integration and art assessment practices, at Northern Illinois University, USA. Prior to that, he was an elementary art teacher in Michigan. He received his undergraduate degree in art education from Hope College, USA, and his master's degree in art education from the University of Nebraska at Kearney, USA.