Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
2006 Volume VI: Anatomy and Art: How We See and Understand

Character Building from Inside Out

Curriculum Unit 06.06.07
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Introduction

I teach visual art at High School in the Community (HSC), a small urban magnet school. HSC is a unique teaching environment because we are a teacher run school. This means that we do not have the administrative hierarchy of a typical public school. We are run by a "teacher democracy" where the body of teachers elects a facilitator, a student membership coordinator and two officers to run the office. Teachers at HSC fill all of these positions. Each position with the exception of the facilitator includes regular classroom teaching. This benefits the entire school because all of the people holding administrative positions have been elected to those positions and are still active in the classroom, unlike in most public schools. Each teacher plays an integral role in the operation of the school. We are all encouraged to create our own curriculum in alignment with both the Connecticut and New Haven teaching standards. I have a large amount of freedom designing my courses so I try to create courses that will engage my students, integrate with other subjects and relate to their lives personally.

HSC is a magnet school serving three hundred and fifty students. Two-thirds of the students are from New Haven and are selected through a lottery process. The other third of our population are students from surrounding suburban areas who choose to come to HSC instead of attending their local public high school. This selection process creates an extremely diverse community of students from a variety of different backgrounds. In our school the student population is roughly one-third white, one-third black and one-third Latino. A majority of the two-thirds from New Haven are in a low socio-economic class, while many of the suburban students are from middle class families and their parents are attracted to HSC because of its small size. They feel that students will be more easily accepted by their peers and they will receive more one on one instruction. Each individual brings an extremely different set of experiences with him or her, creating a wonderful and sometimes challenging classroom environment.

Students attending HSC are required to take one full credit of art (some combination of visual art and music). This requirement sends many students through my door and finding a way to reach them all and keep them interested is one of my favorite challenges. Along with a diverse population there is a staggering imbalance in their art knowledge. Some of the students have a strong art background, while others have not had art for over three years. This occurs as the result of students being filtered in from many different school districts with different requirements for their students. It forces me to teach the basic elements and principles of

design while also making them interesting to those students for whom they are review.

The one class that attracts almost every student is Cartooning. The appeal of cartooning is that while you need to know the basics, everything does not have to be perfect because cartoons are often purposefully exaggerated. This class appeals to students with little art background because they can learn figure drawing, but they can create a successful cartoon at their own drawing level. It also appeals to students with strong drawing skills because many of them have already created their own characters, which they can perfect and refine through this class. This year I took the cartooning one step further and started teaching a stop animation course. The course runs for one quarter and meets everyday for and hour and twenty-five minutes. This course also appeals to a variety of students, for the same reasons as the cartooning course. It is extremely similar in design, except in the stop animation course students learn to sculpt their characters, and also learn the latest computer technology to create short movies. The course starts with students writing their own script, creating a frame-by-frame storyboard of their script and doing character sketches. Next students move from two dimensions to three dimensions by constructing a moveable model of their characters and constructing an environment for their character. Once this is complete students learn the basics camera angles and using a digital camera to film their own stop animation short.

Rationale

In order to shoot a successful stop animation film it is imperative that students understand how the musculoskeletal system functions. Their characters must have a realistic range of motion in order for their film to look believable to the viewer. Students will need to learn how our bodies move, as well as the limitations of our bodies. To gain a better understanding of range of motion students must understand what lies underneath our skin. Just as sculptors use an armature to give their sculptures form, our bones and muscles provide this armature for our bodies. This infrastructure is largely responsible for our outward appearance, along with our range of motion.

Students will need to gain an understanding of how this infrastructure is arranged and functions in order to replicate human motion in a smaller model character. Often students will draw "spaghetti arms", where their character has arms which look like the letter "C", void of bone structure and an elbow, and impossible in real life. In order to correct "spaghetti arms" students need to gain a better understanding of how their bodies are constructed. A correctly drawn arm should be composed of a straight arm, a straight forearm and an elbow joint that allows the arm to bend and move. By teaching students anatomy their final stop animation will be much more successful because they will be able to duplicate realistic motion of the figure.

Strategies

There are a variety of strategies I use to convey information to my students. Because HSC has such a diverse population I try to teach every lesson to every type of learner: auditory, visual and kinesthetic. There are a variety of ways that I present material in order to reach each of these different types of learners.

When students enter the classroom there is always a "do now" up on the board for them to begin when they enter class. The "do now" takes anywhere from three to five minutes. This is a strategy that is employed school wide, so it provides a sense of consistency for students. The "do now" can be any variety of exercises. Some common "do nows" are having students react to a piece of artwork, reviewing the material from the previous day, practicing a specific technique, etc. The "do now" is created as a lead in to the lesson. It is a chance for the students to get focused once they enter the classroom and a wonderful way to check their knowledge of the material. Depending on the "do now" answers may be discussed in class, collected and graded or corrected by peers.

After the "do now" is completed as a class we will review the information covered in the previous class. This allows students who were absent to get a brief overview of what they missed, while giving me a way to gauge the students' retention of material covered previously. This review usually takes the form of me asking questions and students volunteering to answer. I use the information from the previous lesson to segue into the new information or techniques, this way students can easily connect the knowledge that they are building on. Once I have introduced the new material one of two things follows. I either do a demonstration to explain what they will be doing for the class period, or if they have already learned the techniques I show them an exemplar I have created and ask them to walk me through what steps I would go through to create it. This way they gain a verbal understanding of what they should be doing.

If a new skill is extremely difficult we will have a guided practice. This means that I will hand out supplies and then we will complete a step-by-step process all together, with students following my directions. This is only necessary for skills where attention to detail is vital. I try to let students figure out their own way to solve problems as often as possible.

While students are working I use a variety of strategies to monitor their progress. I am constantly walking around the room looking at what students are doing and asking them questions about what they are working on. If they have a question about how to do something my first response is always, "What do you think you should do?" I find that my students are programmed to immediately ask for the answers instead of trying to solve problems for themselves. Therefore, when they have questions I try to have them answer their own questions, or look to their peers for help.

One of my favorite ways of monitoring student progress is going through their work and writing them one "Post It" note. I find this to be extremely successful for a number of reasons. The sticky notes are easily removed from the artwork. They give me an opportunity to praise something the student has done well, and also to articulate what their next step should be. This is critical. Every student works at a different pace and by being able to respond to their artwork one on one in this format is extremely helpful. This way when they first get their artwork back they already have an idea what their next step in the process should be.

While I think that it is important for me to track the students progress, I also think it is important for them to see each other's progress. I find that the students are each other's best critics. If part of a drawing does not look correct they will be quick to offer a suggestion. I try to train them to be specific and to also offer suggestions if they are going to comment on a peer's artwork. Towards the end of each project I also have students fill out a peer critique form. This allows a new set of eyes, besides mine, to look at their artwork and respond.

Lastly, and most importantly, students must fill out a self-evaluation to hand in with every project. Their self-evaluation is a rubric identical to the one which I fill out to determine their grade. This way students see exactly how they will be graded, and are given the opportunity to change anything they feel would help

improve their drawing based on the rubric. Students are usually their own worst critics and do not give themselves enough credit for the work that they do accomplish. I find the self-evaluation helpful so that I have an idea of how they think they are progressing.

Classroom Activities

Stop animation is a type of film making where a series of images is captured and the subject is only moved ever so slightly, then a new image is shot. The process is repeated until all of the necessary photographs are taken. These images are then played in rapid succession, tricking the eye and brain into perceiving motion. Some recent examples of stop animation are *Gumby* , *Chicken Run* , and *Wallace and Gromit* . This technology was developed in the early 1800s and there are a variety of theories why the brain perceives motion even though it is looking at a series of still shots.

In 1825 John Paris created a thaumatrope. A thaumatrope is a piece of cardboard with an image on each side of it. The most common example has an empty birdcage on one side of the cardboard, and a bird on the other side of the cardboard. In each side of the cardboard next to the image a hole is poked and string or elastic is attached. The image is wound up, and then when "played" or flipped around, your eye sees the bird in the cage, no longer two separate images. Students will create a thaumatrope of their own to begin to understand this process. They will take an index card and draw an image using a sharpie marker on one side of it, eliminating a part of the drawing. For instance, a student might choose to draw a face missing some of the features. Then the student will line another index card up on top of the one they just drew. One the new index card they will draw in the missing features in the correct spot. The student should be able to see through the index card, so lining up the image shouldn't be a problem. Next the student will line up the cards back to back, and rotate one. For instance, if the face is facing the correct direction on one side, the features will look upside down on the other side. This step is imperative for the thaumatrope to work. Next the student will poke a hole to either side of their image through both cards and thread an elastic through each hole. Once wound up the student will let go and watch their thaumatrope trick their brain into believing that the face is one image.

The next advancement was the zoetrope created in the 1830s. This is a drum with a strip of pictures along the inside. The strip of pictures shows something in motion, but in still shots. When the viewer looks through slits in the side of the drum, the images appear to blend together and the object appears to be in motion. I will show the students an example of a zoetrope and we will talk about how the animation strip is similar to what the film for a stop animation film might look like. We will also talk about why it is important to have a separation between the images, because if you see the zoetrope spinning from above, instead of through the slots, the images do not appear to be moving they simply blur together.

The initial explanation for seeing motion from still shots is called persistence of vision. An image remains in your retina for a fraction of a second. For instance, when you look at a pattern of lights and then look away, you can still see the shape of the lights because the image is still in your retina. This is called a positive afterimage. Since your eye retains the information for a fraction of a second, the theory goes that the image retained then overlaps with the next image shown. Your brain perceives this overlapping when played at a high speed as motion. You can perceive motion at about two frames per second, like a flipbook, but you perceive fluid motion at sixteen frames per second. Most current stop animation is shot at twenty-four frames

per second. This is a theory which many filmmakers still believe today. I will have my students create their own flipbook so that they begin to understand the mechanics of stop animation, and story boarding.

In the 1870s a photographer names Edward Muybridge made huge strides in the filmmaking trying to win a bet. Muybridge and another man were arguing about whether or not all four of a horse's legs leave the ground when it is galloping. In order to resolve the problem Muybridge set up a series of twelve cameras along the length of the track to record a horse galloping. The cameras were triggered by a series of strings along the track. As the horse ran through and broke each string the shutter of the camera would be pressed. This resulted in a series of twelve successive images of the horse in motion.

Soon after a new theory about why we perceive motion from still images was released. This theory is called the Phi Phenomenon. The Phi Phenomenon is what most psychologists today credit for our eyes perceiving motion when still shots are played quickly in front of us. The Phi Phenomenon states that when the eye sees an object move from one place to another, the brain automatically fills in the missing information. Though the object is just moving from one place to another, it is a small enough, quick enough move that our eye perceives it as motion. For instance, take the marquee signs at movie theaters. They are a series of lights which are lit one right after another. If you look at them separately in a series of still shots it will only look like one light is lit at a time. However, because the light looks like it is moving only a small distance your brain fills in the fact that it "moved" from one light bulb to another and therefore perceives motion. Students will read literature about each of these theories and after creating their own flipbook answer a CAPT modeled questions about which theory they would support and why.

Lesson Plan One

Objectives

Students will understand how a stop animation movie is created. They will be able to compare the similarities of a stop animation movie to a flipbook and will be able to successfully construct a flipbook showing fluid motion. Students will understand the different theories about why when a series of images are viewed in succession our eyes translate it into motion and be able to explain each theory.

Materials

Students will need twenty to thirty unlined index cards, a fine point sharpie and either an elastic band or binder clip to hold the cards together.

Do Now

Students will look at a movie clip of the marquee lights of a movie theater, a piece of film from a movie, and a flipbook. They will be asked to compare the similarities of these three things, and then hypothesize what allows us to perceive motion.

Procedure

Students will have a class discussion sharing their theories about how our eye perceives motion, and the similarities between the above three media.

After students have given their suggestions they will read an article about the phi phenomenon, and then an article about persistence of vision. They will be asked to put each theory into their own words to help them

retain the information.

Students will then watch a demonstration about creating a flipbook. The teacher will explain how working from back to front is easiest, and if you place on index card over another you can see the image through the cards, making tracing easy. The teacher will also hand out a variety of flipbooks which have already been made so that students can see the concept, and also so that they can see how much you can move the image from one index card to another while maintaining fluid motion.

Students will then create their own flipbook, drawing anything that they would like. Their goal will be to keep motion fluid, and keep the drawings looking similar.

Closure

Students will revisit the two theories about our perception of motion and will choose which theory they think is accurate. They will support this decision with evidence from the examples they have looked at in class and from their experience creating and viewing their flipbook.

Assessment

Students will be assessed on how fluid their motion is, how interesting their flipbook is, and whether or not they can show enough supporting evidence to back the theory they have chosen to support.

Once students understand the basic principles behind stop animation, they will begin doing character sketches. We will study the proportions of the human head. An average human's eyes are halfway down their head. One eye can fit between the two existing eyes. The nose is halfway between your eyes and your chin. The mouth is slightly above halfway between your nose and your chin. The ears start at your eyes and end at the bottom of the nose. The hairline is about halfway between your eyes and the top of your head. Students will practice drawing these proportions.

After students have looked at the frontal view proportions they will be challenged to create their own characters to begin writing a story about for their stop animation. Now that they have learned the correct proportions we will look at a variety of different cartoon and stop animation characters to see what gives them their personalities. Students will watch the movie *The Incredibles* to begin brainstorming for their own characters. After viewing *The Incredibles* students will look at a variety of the different faces and bodies that were tested for each character. Students will discuss whether or not they think that the face chosen best fits each character and why.

Students will write a brief character sketch of their own character. They will be responsible for listing traits, a brief history, friends and family of their character. They will also be responsible for drawing their character from the front, profile and three-quarter views. This sketch of their character will be the basis for their stop animation sculpture of the character they will produce.

The Face's Armature

The structure underneath the entire body is the skeletal system. Throughout our entire body are a network of bones which provide the framework for our muscles and skin. Though it may not seem so, bones determine much of our outward appearance. Height is determined by the size of the bones. Bones determine posture as well. Think about all of the places in the body where you can see the bones through the skin, for instance the bumps on the ankles. Bone structure also has a lot to do appearance of the face. More prominent cheekbones will be seen more easily through the skin. Bones create the infrastructure of our entire bodies.

If the body is viewed as a sculpture, bones are what artists call the armature. The armature of a sculpture is the structure underneath upon which everything else is built. It gives the sculpture its initial form. Armatures can be built out of anything, but are most commonly build out of wood or metal. My students will be creating small sculptures of humans and therefore it will be extremely important for them to understand the armature underneath the human body. In order to start the exploration of the idea of an armature we will look specifically at the head. Students will recreate the bone structure of a human skull using self-hardening clay. They will model a skull, along with a separate jawbone. They will add a layer of polymer clay on top of their skeleton, which will represent the facial muscles. Polymer clay remains pliable, which will allow their character's face to show a variety of different emotions by molding the polymer clay. The reasons for this are two fold. It gives students a smaller portion of the body to learn about first, so that they can understand an example of the general concepts behind bones and muscles. Second, it will provide them with a detailed, larger, sculpture of their character's head. This sculpture will be perfect for close up shots of their character expressing emotion in their stop animation film.

The skull is comprised of a series of bones which are fused together after birth. These bones make up the majority of the cranium and serve to house and protect the brain. This series of bones makes up the foundation for the scalp, where our hair grows. Also on the skull are the zygomatic arches, or cheekbones. These bones give shape to the cheeks and are also the point of origin for the muscle that closes the mouth. If you feel under your eyes all the way along to your ears you can feel your zygomatic arches. Above each zygomatic arch is a hole, or eye socket. Eye sockets are much larger than your actual eye; your eye sits in them, held in place by a variety of muscles. If you feel your eyebrows, all the way down your eye and back along the top of your cheek you can feel the general shape of your eye socket. Eye sockets are usually shaped like a square with rounded edges. In between your zygomatic arches is a triangle shaped hole called your nasal cavity. This is a very important distinction for students to learn. The shape of most of your nose is not determined by bone at all. The nose is mostly cartilage. That is why noses come in such different shapes and sizes. The mandible, or jawbone is attached to the skull by muscles. It is a completely separate bone from the rest of the skull. Students will learn the names of these bones in their faces. They will be asked to touch their faces to try to identify the bones they can feel. They will be given riddles about the bones and will also have to pair their scientific names with their more common vernacular ones. As students explore the bones on their faces I will challenge them to think about how each bone affects their outward appearance. After we have explored all of the bones students will create a small skull of their own out of self-hardening clay. This will serve as the armature for their character's head. It will be about the size of a child's fist (Gosling).

Once students have a grasp of the concept of both armature and bone structure we will begin exploring muscles. "Muscle is a tissue in which active contraction either shortens component cells or generates tension along their length" (Gosling). The muscles which I will be focusing on are voluntary striated muscles, also

known as skeletal muscles. These are the muscles which are responsible for the motion of the body. A muscle has two ends that usually remain fixed to bones. One end is called the origin of the muscle. The other end of the muscle, which is more mobile during movement, is called the insertion. For instance, your bicep is located on the top half of your arm. Its main function is to move your forearm up and down. Its origin is the top of the scapula and its insertion is the forearm.

We will study how the movement of the facial muscles effects a person's facial expression, in turn displaying an emotion. The most important difference between the muscles of the face and the muscles of the rest of the body is that the muscles of the face have an origin on some part of the skull, but their point of insertion is not attached to another bone, as it is for most of the rest of the bones of the body. Instead the muscles of the face go from bone to skin. Facial "muscles are arranged as sphincters or dilators around the orifices of the face" (Gosling). This means that the muscles of the face are mostly arranged around the eyes, mouth and nose. The muscles allow the mouth or eyes to pucker and close, or pull back and open wider. As we study each facial muscle students will feel the muscle on their own face, and flex it. Once we have identified the major facial muscles students will use a mirror to pose in a variety of different faces showing different emotions. Students will need to determine which muscles are used to create which facial expressions. Students will then begin adding clay to the skull armature which they produced in the previous lesson. The muscles will be made out of polymer clay which, students can manipulate easily, however it will still hold form and not droop or dry out when left over night. Student will add the polymer clay to the face as though they were reproducing the muscles around both the eyes and the mouth. Students will then add a thin layer of clay over this to simulate skin.

Once students have added their skin we will discuss traits and characteristics that make each individual unique. Students will use other colors of clay and other materials to add details to their characters. Students may wish to add things such as eyebrows, hair, birthmarks, earrings, etc. Students will reference the character drawings they created previously to bring their two dimensional character to life in three dimensions.

At this point students will also use this model of a face to begin experimenting with the stop animation process. Students will shoot a quick series of images capturing their character changing emotions. This is important so that students begin to understand how many frames they need to include to make motion look fluid and not choppy. They will also understand how important keeping the camera in the same place on a tripod is so that their motion does not look choppy. It will also give them a quick introduction to loading the images onto the computer and organizing them using Windows Moviemaker.

Lesson Plan Two

Objectives

Students will understand where facial muscles are located and how they relate to expressions. Students will understand how an armature supports a sculpture, and be able to create a successful armature for their character's head. Students will understand the basics of using a digital camera, and will begin to start the process of creating a stop animation film.

Do Now

Students will be given a mirror and asked to make as many different expressions as they can. They will be given a worksheet with a series of blank faces on it and will be challenged to record as many of the different

expressions as they can, playing close attention to which parts of the face actually move.

Procedure

The teacher will start by having students compile a class list of the expressions they have tried. The teacher will then challenge the students to figure out what makes your face look the way that it does.

After some class discussion the teacher will hand out copies of the skull and will also place plastic skulls at each table (borrowed from the science department). The teacher will ask the students to look at their faces again in the mirror to determine which bones on the skull can be seen and easily felt through the skin.

As a class students will discuss the different bones that make up the skull, along with eye sockets and the nasal cavity. Students will need to determine what their character's skull might look like, including cranium, eye sockets, nasal cavity and jawbone.

The teacher will give a demonstration of how to manipulate the self-hardening clay to create a skull armature. As the teacher creates each part of the skull he or she will continue asking the students the correct names for the different bones and will review the facial proportions, which also apply to the skull.

Students will then be challenged to create a skull for their character. Depending on the amount of supplies available, the teacher should limit the size of skulls, possible to an apple size. This portion of the lesson should be done in one class period because once the clay is left overnight; it will be dried out and not malleable the next day.

Closure

The teacher will ask the students what needs to be added to the skull to make the character more realistic. This will be a lead in to get the students to start thinking about adding muscles during the next lesson.

Assessment

Students will be assessed based on a rubric of different bones that should be included in their skull armature. They will also be assessed on how accurate their three dimensional sculpture coincides with their original drawings of their character.

The Body's Armature

Once students have a grasp of facial anatomy we will turn to understanding the armature underneath the entire body, the skeletal system. Just as with the face of their character, students will start by drawing their character before sculpting him or her. To start off students will explore body proportions. Each student will be given a piece of string. They will cut the piece of string to be even with the length of their face. Each student will then take three measurements (this may be easier with partners to help measure). First students will see how many "heads" (pieces of string) they are from head to toe, then from fingertip to fingertip with arms outstretched, then from hip to toe. We will record the class results and find the average. The average human is six to eight heads tall, and your arm span from fingertip to fingertip should be equal to your height. From

hip to toe the average is three to five heads, depending on how long your legs are. These are general proportions to help students gain an understanding of what the average body looks like. Students will do a quick sketch of a person using correct proportions.

Next, students will begin exploring capturing motion through gesture drawing. This is a style of drawing done to capture motion, where squiggly, quickly drawn lines are used simply to represent mass. For instance, an arm might look like a mass of squiggles, but through the mass the viewer can tell the position and motion of the arm. Once students understand and can complete gesture drawings we will begin talking about range of motion and types of joints. This exercise is done to loosen students up and to get them thinking about range of motion. The model (usually a volunteer student) is asked to pose for ten seconds to one minute, depending on the difficulty of the pose. The other students are then to complete the gesture drawing starting with the head, marking in the feet and hands, and then filling in the masses.

A joint is a place where two bones meet. There are fibrous joints that are relatively immobile, for example the joints between the skull bones. Then there are joints, called cartilage joints, with limited movement like those between your vertebrae. The end of each vertebra is lined with hyaline cartilage. In between each vertebra is a disc of fibrocartilage, a connective tissue. This disc acts as a shock absorber for your spine. Though the movement between each joint is small, when added together, all joints allow for considerable movement. Most common are synovial joints that are highly mobile such as knees and shoulders. These joints include at least two bones lined with a synovial membrane. The end of each bone and its synovial membrane are in a capsule which forms a sleeve around the joint. The synovial membrane secretes synovial fluid, lubricating the movement of the two bones. Synovial fluid also acts as a shock absorber between the two bones. Depending on how large and loose the capsule is determines the amount of mobility of the joint. Most of the joints I will be focusing on are synovial joints. (Gosling)

Synovial joints are classified in a variety of different ways. I would like my students to be able to classify joints by two categories, shape and type of movement. The two main shapes of joints we will be focusing on are ball and socket joints and hinge joints. There are a variety of ways of classifying movement. The first is by creating angles with the body or another bone. If the angle is made smaller the motion is called flexion. If the angle is made larger the motion is called extension. For instance, the bicep pulls the forearm towards the arm, decreasing the angle between these two bones. This is called flexion. The triceps pulling the forearm away from the arm is called extension. Another way of classifying motion is how the limb moves in relation to the center of the body. If a limb is moved away from the middle axis of the body it is called abduction. If a limb is moved toward the middle axis of the body it is called adduction. The last motion I would like my students to be able to identify is rotation. Medial rotation is when a limb rotates toward the center of the body, while lateral rotation is when a limb rotates away from the center of the body. I would like students to be able to recognize which joints are responsible for the motion of their bodies, and especially the limitations of movement.

A ball and socket joint is a joint where the head of one bone has a ball shaped bulb (or just one side of the head of the bone may be rounded). This "ball" then fits into a round cup shaped pocket in the other bone, the "socket". Some examples of ball and socket joints are the hip (femur and hip bone), shoulder (humerus and scapula), and part of your elbow is a limited ball and socket joint (radius and humerus). A ball and socket joint generally has the largest range of motion. For instance your hip is known as a multi-axial joint. You can move your leg on multiple axes because of the hip. You can move it forward (flexion) and backward (extension), side to side (abduction or adduction), and twist it (rotation). Your shoulder is also a multi-axial joint. Your elbow has a ball and socket joint where the end of the radius meets the humerus. This is what allows you to rotate your

forearm. The wrist has an elliptical ball and socket joint which allows it to be moved up and down, and from side to side, but it cannot be rotated.

A hinge joint is one where only uniaxial movement is allowed, because of the shape of the joint. For instance your elbow, the joint between the ulna and the humerus there is a notch in the ulna that slides in a very distinct groove on the humerus. That joint in your elbow only allows you to move your forearm forward and backward (flexion and extension), making it a hinge joint. Your knee is also a hinge joint – it only allows you to move your lower leg forward and backward (flexion and extension) with a very small amount of rotation as in "locking the knee". The ankle is also a hinge joint, it only allows you to flex or extend your foot.

I will have students learn the names of major bones in the skeletal system, and then talk about their range of motion for each. I would like students to compare their joints and see if they can deduce which ones are similar types of joints, and back up their reasons why. We will then talk about range of motion, and types of joints. I will do this by giving students a list of different joints, which they will the compare the similarities and differences of each joint to see if they can determine the structure of each.

Students will have a strong grasp of how each of these joints works, and will also understand the limitation of each joint by personally exploring the range of motion of each. By doing this they will have a much better understanding of what motions their character might realistically be able to complete. We will again review different stop animation shorts to analyze character development. Since students understand correct proportions they will be given the opportunity to defy these proportions in order to convey certain character traits about the individual characters that they have created. They will complete character sketches from a variety of views of their character.

After these views are complete each students will begin to create an armature for the skeleton of their character. The armature will be constructed using all of the information they have gained about the skeletal system and joint mobility. The skeleton will be created using straws as bones, and polymer clay for the body. Students will need to keep in mind how straws should be attached at certain joints to allow for the correct range of motion.

Lesson Plan Three

Objectives

Students will understand the skeletal system including joints and range of motion. Students will be able to explain the shape of type of motion of the shoulder, elbow, wrist, hip, knee, ankle, fingers and vertebrae. Students will also understand the muscle system in terms of range of motion and limitations. Students will translate this range of motion into both their model of their character, and their stop animation short.

Do Now

Students will watch two segments from *Wallace and Gromit* . One segment will be a stop animation created recently. The second will be the first stop animation ever created by Aardman. Students will compare the motion of the characters in each of these stop animations.

Procedure

The teacher will start by having a discussion about range of motion, and how far you are able to move each

limb.

The students will then complete a lab portion of the lesson, where they are given a worksheet with the name of each joint on it. They will need to record as much information as possible about each joint including bones involved, range of motion, and limitations of motion. Students will be asked to report their findings, focusing on which joints are similar to each other. Students will need to guess what the bones in each joint look like – how they attach and interact. They will need to be able to support why they feel the joint looks this way.

After some class discussion on findings the teacher will hand out copies of the skeleton and will also place plastic skeletons at each table (borrowed from the science department). The teacher will ask the students to look at the way each joint in question is constructed on the skeleton. Students will look at their predictions and compare them with how the joints actually look. They will learn the proper names of each joint, along with the correct terms for movement such as flexion, extension, adduction, rotation, etc.

Students will then be challenged to create a skeleton for their character using this new information. They will reference back the drawings they created of their character for proportions. Using heavy straws as bones students will construct an armature using tape at hinge joints and only clay at ball and socket joints.

Closure

The teacher will ask how their skeleton might limit their character's motion, or allow too much range of motion in some places. (As the next lesson students will add polymer clay over the skeleton to create their final character.)

Assessment

Students will be assessed based on a rubric of different joints that should be included in their skeleton armature. They will also be assessed on how accurate their three dimensional sculpture coincides with their original drawings of their character, and their character's range of motion.

Once students can draw their character they will begin to develop a story based on their character. Once their characters are created students will need to go through the motions themselves, and translate these motions to their character model. They will begin to use their character to create their story, posing the character and then taking photographs to capture the character in motion. Students will learn to use the digital cameras, the importance of having a tripod, and the amount of movement between each frame that still looks fluid and believable. Their final project will be a short five-minute stop animation film using the characters that they have created.

Assessment

Assessing a work of art is very difficult. There are some students which art comes naturally to, while others put in three times the amount of work with half of the outcome. Due to this fracture in ability I rely heavily on rubrics for assessment. I also base a large portion of the students' grades on effort, this way they are forced to push themselves to their own personal limit every day. This effort grade is almost half of their grade.

Each project is graded using the rubric referenced earlier, which students also complete as a self-evaluation. The rest of each student's grade will be comprised of quizzes about the information learned. Their final project will also have more weight than the others, since it will be the synthesis of the entire unit.

Works Referenced

The works below are appropriate for both students and teachers. The anatomy atlases are great as reference for the teacher, and as a visual reference for the students. The websites are wonderful references for both student and teacher as well.

Gosling, J. A. et al. *Human Anatomy Color Atlas and Text: Fourth Edition* . Mosby: New York. 2002. Great pictures of muscles with parallel schematic diagrams. Wonderful information.

McMinn, R. M. H et al. *Color Atlas of Human Anatomy: Second Edition.* Yearbook Medical Publishers, Inc.: Chicago. 1988. Great reference for looking at muscles next to the outside surface of the body. Easily notes flexors and extensors.

Simblet, Sarah. *Anatomy for the Artist* . DK Publishing: New York. 2001. A fantastic collection of images of the human body in a variety of poses with skeletons superimposed on tissue paper. Wonderful for illustrating the idea of an armature.

http://www.stopmotionanimation.com. A fantastic resource for first time stop animation creators, along with an extremely helpful message board.

http://www.grand-illusions.com/percept.htm An online paper which explains the theory of persistence of vision.

http://www.uca.edu/org/ccsmi/ccsmi/classicwork/Myth%20Revisited.htm Another resource about persistence of vision.

http://www.exploratorium.edu/snacks/persistence_of_vision.html Another resource about persistence of vision.

http://www.cssd.ab.ca/tech/digvid/Default.htm. A wonderful website which walks teachers and students through the process of creating a stop motion animation. Includes worksheets and great vocabulary.

http://www.bartleby.com/l07/ An on-line version of the American Edition of Gray's Anatomy, wonderful images and information.

http://www.drawsketch.ahout.com/od/humananatomy/ Shows the human skeleton in motion animation.

http://www.nlm.nih.gov/exhibition/dreamanatomy/da_intro.html. This site is designed to teach anatomy and art.

http://www.bigspence.com/skeleton_spar.htm. A neat video clip shows a skeleton doing some karate.

http://www.med.umich.edu/lrc/hypermuscle/Hyper.html. This site shows videos of simple movement.