**CAM Animation Project Handout for Grades 6-12**

Abstract/Summary: Using paper, clay, a whiteboard, chalkboard, or other commonly found objects in the classroom, your media production team will create an animated video to represent one of the many feedback loops that influences climate change. Your team will write a narrative and create a storyboard before filming your animated video using stop-motion photography.

Essential Questions: Why is climate considered a complex system? What happens if there is a change in a component of the climate system? How can we use animation to simply, accurately, and dynamically represent a feedback process/loop that influences the climate system?

Culminating Performance Task: You will read and interpret a scenario of a currently known feedback loop that can influence the rate of climate change. Using stop-motion photography, your production team will create an animated video that accurately illustrates this feedback loop. You will then present your finished animated video to peers for critique.

Objectives:

When you produce your animated climate feedback video, you will:

* Gain and apply systems-thinking strategies and tools to understand climate as a system, how key variables change in the climate system over time, and how a change in one or more of these variables can cause perturbations and instability within the climate system.
* Learn about a feedback process/loop that influences climate change.
* Use a causal-loop diagram to map your chosen feedback loop and identify the feedback as an amplifying (positive) feedback or a balancing (negative) feedback.
* Create a storyboard for an animation of your own design.
* Write a narration that is paired with the visual, animated depiction of your chosen climate change feedback loop. Your narration will effectively explain the key elements of the feedback loop and how the feedback loop influences climate change.
* Use a still camera and tripod to shoot approximately 150 shots (10 frames per second) for a 15 second animation.
* Present your animated video and be critiqued by your class, critique other teams’ animated videos

Materials and resources:

* \*\*CAM Animation: Arctic Temperature-Albedo Feedback Loop Scenario
* \*\*CAM Animation: Thawing Permafrost Feedback Loop Scenario
* \*\*CAM Animation: Pine Bark Beetle Feedback Loop Scenario
* \*\*CAM Animation: Drawing Causal Feedback Loops Scenario
* \*\*CAM Storyboard Template
* \*\*CAM Animation Stop-Motion Demo (video tutorial)
* \*\*CAM Peer Review Form for Video Projects
* CAM Animation Critique Template (attached)
* CAM Animation Rubric for an Animation Storyboard (attached)
* CAM Animation Rubric for an Animation of a Causal Feedback Loop (attached)
* Post-it notes or cut pieces of paper in similar size. Alternatively, use whiteboards and dry erase markers or IPAD or other template apps that allow you to draw and erase, such as Drawing Pad by Tap’d or CorkulousPro
* Materials for animation components: construction paper, tape, scissors, pins, markers, glue, painter’s tape, etc. Some materials can be pre-made (arrows, lines, pluses, minus, letters, numbers etc.). You may want to consider bringing in some materials from home.
* Tupperware containers or large plastic Ziplocs to keep your animation pieces organized.
* Still camera and stand for camera (one set-up for 2-3 students). The following are examples of possible set-ups:
  + Digital video camera attached to a computer with animation software
  + Webcam and computer
  + Flip camera on a stack of books
* Flat surface for filming (table, lab bench, whiteboard, or chalkboard)
* Access to computers with animation software such as SamAnimation or FrameThief (see CAM Media Resources at http//cleanet.org/cced\_media/your\_classroom/media\_res.html for suggestions)
* Projector and screen (for presenting animated videos to peers)

\*\*\* you can access all of these resources directly from the project page for this media project at http://cleanet.org/cced\_media/your\_classroom/activities/animation.html

STEP 1 Pre-Production:

In the pre-production phase, you will:

* Read and interpret one of the **CAM Animation** climate change/**feedback scenarios** your teacher gives you and discuss answers to the following questions with your team members:
* What are the "elements" or "variables" of this climate change scenario? For example, a “warming climate” is a variable in your climate change scenario. Put the variables on post-its or cut pieces of paper.
* What's happening to these variables? Does a change in one variable lead to or cause a change in another variable? Think about these changes using “If….then” causality statements. For example, the diagram below tells you that - “If the concentration of CO2 in the atmosphere increases, then this will cause an in increase in global atmospheric temperature.”
* What is changing and how?

Atmospheric CO2 concentration points to Temperature chart

* Next, write your climate change scenario variables down on separate post-it notes (or alternative material). Draw arrows between the variables and look for a circular closed loop, where one variable in the loop is causing a change in the next variable and so forth. This will be the basis of your causal feedback loop. Use the **CAM Animation: Drawing Causal Feedback Loops** to guide you.
* Decide if your causal feedback loop is an example of an amplifying/reinforcing feedback loop (positive feedback loop) or a balancing loop (negative feedback loop).
* Have your teacher check your causal feedback loop before you begin to put your animation together.
* Decide on your roles: one person operates the camera or computer and one or two people manipulate the animation set. Everyone should contribute to writing the storyboard and narration and creating the animation pieces.
* Write a 15 second narration (less than half a page, double space). Read the narrative aloud and time it.
* Using the **CAM Storyboard Template,** draw a storyboard indicating the sequence of images with the narration written underneath in order to determine how images and narration should align.
* Create all the elements/pieces needed for your animation.

STEP 2 Production:

In the production phase, you will:

* View with your class the **CAM Animation Stop-Motion Demo** video tutorial about animating feedback loops. Take notes on the techniques used.
* Set up the camera
* Move your animation pieces very slowly, making tiny incremental movements. Remember, it is easier to take frames out than to add them later.
* Have some back up materials ready to use, if necessary.
* Record the narration. Do a few takes. Check timing.

STEP 3 Post-Production and Critique:

In the post-production phase, you will:

* Import your images into digital nonlinear editing software
* Reverse direction for appropriate sequences.
* Import audio
* Cut in audio
* Add any pauses by extending the time an image is in the timeline
* Add titles
* Present your animation to peers in a critique session. Use the **CAM Animation Critique Template** (attached) in critiquing each other's animations.

CAM Animation Critique Template

Use the table below to make comments on your peers’ animations. Comments must be written in complete sentences. Questions to think about as you critique each other’s animations :

In what ways is the animation successful in illustrating the science of the causal feedback loop? In what ways dothe choice of animation materials, and filming and editing techniques make this an interesting animation? What did you like the most about this animation Why?

|  |  |  |
| --- | --- | --- |
| Animation Group | Draw a diagram of the feedback loop | Critique comments |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |

CAM Rubric for an Animation Storyboard

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categories | Insufficient | Needs improvement | Satisfactory | Exceeds Expectations |
| Storyboard has a brief narrative for each image |  |  |  |  |
| Storyboard has a clear sense of the scientific causal feedback loop |  |  |  |  |
| Storyboard shows a clear roadmap for the animation sequence |  |  |  |  |
| Storyboard can be reasonably executed |  |  |  |  |

CAM Rubric for an Animation of a Causal Feedback Loop

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categories | Insufficient | Needs improvement | Satisfactory | Exceeds Expectations |
| Animation clearly shows a scientific concept |  |  |  |  |
| Animation is at least 15 seconds |  |  |  |  |
| Animation is logically edited |  |  |  |  |
| Students were able to use technology efficiently to complete the project (such as framing, rule of thirds, focus, 10 shots per second) |  |  |  |  |
| Final product was completed on time and screened by the class |  |  |  |  |