Movie Clip Lesson Plan –

Indiana Jones and the Raiders of the Lost Arc

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Abstract:
The movie clip lesson plan uses a small portion of a Hollywood film to engage students in a critical examination of a scientific concept. There is not enough time in the curriculum to show the whole film but a 10 minute clip can serve as a catalyst to a serious discussion of science behind a film. A lesson plan is presented that uses the 1981 movie Indiana Jones and the Raiders of the Lost Arc, along with a demonstration that explores the scientific concept. Movie Clip Lesson Plan – Indiana Jones and the Raiders of the Lost Arc

Teachers have been using films in their classrooms for many years. Recently, several authors have suggested ways in which to use Hollywood, science fiction or sci-fi films in the physics classroom (Dennis, 2002; Daley 2004, Dubeck, et. al., 1990 and 1998; Freudenrich, 2000; and Hickam, 2000; Massenzio, 2001). Lighthart (2000) lists movies for the earth science classroom. Although some of these authors suggest activities to accompany the film most only list possible films. I would like to present a lesson plan that uses Indiana Jones and the Raiders of the Lost Arc (1981). I used this in my physical science classroom for many years, much to the delight of my principal and the students.

There are three NSTA/NCATE standards (2005) that want teachers to engage students effectively in the classroom. These three are the Nature of Science; standard 2, Issues; standard 4, and Science in the Community; standard 7. These standards address the studies of the history, philosophy, and practice of science by enabling students to distinguish science from nonscience, critically analyzing assertions made in the name of science, being prepared to make decisions and take action on contemporary issues of interest to the general society by being informed citizens, and being prepared to relate science to locally important issues.

The Biological Sciences Curriculum Study (BSCS; 2005) has developed the 5E Instructional Model Learning Cycle Model that invites students to: Engage, Explore, Explain, Elaborate, and Evaluate. The engage part of the BSCS instructional model is the key to hooking the students into the unit they are studying. There is no longer time in the curriculum to show an entire 90 minute Hollywood film, but films offer a perfect opportunity to actively engage students to think about the science behind a film. What's more high student interest is achieved when live-action scenes are used over notes on the board (Lighthart, 2000)! Plus, Hollywood films also appeal to the visual learner as well as the auditory learner (Royce, 2002).

Dennis (2002) recommends that potential movies have; scenes in which the director trusts Mother Nature, but avoid any slow motion. Possible movies are ones with on-screen measurements or where the actors are reading out an important number. Good science episodes can also be found in all types of films. For example, the last scene in Ice Age (2004) has an unexpected scene at the end where the iceberg with the squirrel and nut in it, is floating above the water not 2/3 below, it as it should be.

Try to stick to movies that are no more that 15 years old and that have a rating of PG-13. Dennis (2002) says that students are turned off by stars they don't know, by old-time fashions or machines, and by black-and-white pictures. Films that the students have seen recently are more fun and they will focus on the film more. However, some films such as Indiana Jones and the Raiders of the Lost Arc are considered classics and I believe these can still be used.

Dennis (2002) suggests a movie clip can be used in the classroom as a class opener with questions on the overhead for after the clip or as a group estimation problem to calculate something. He also recommends using the clip as practice or reinforcement activities to review science or to handle bad science. To get help with movies that have bad science in them you can use www.nitpickers.com, a website which points out errors in films.

In my Earth Science Teaching Methods class at Eastern Michigan University one preservice teacher's assignment is to write a lesson plan that uses a Hollywood movie clip. The students were also required to include an activity to supplement the conceptual question the

MOVIE CLIP LESSON PLAN – (CONTINUED)

movie presented incorrectly. As an example for my preservice teachers, I show the first 10 minutes of Indiana Jones and the Raiders of the Lost Arc (1981). The series of still photographs shown below are some of the important scenes to look for.

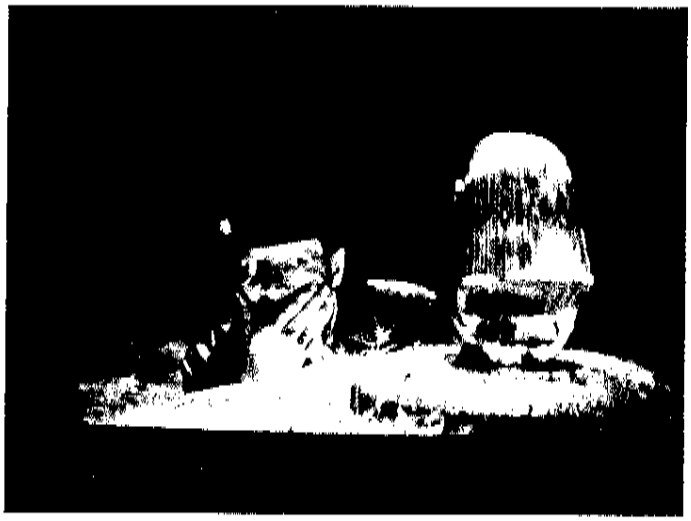

Figure 1: Indiana assessing the golden idol.

Figure 2: Indiana removing sand from the bag before he replaces the golden idol with the bag. What physical property is he using here?

Figure 3: The switch which causes the room to break apart.

Figure 4: Notice the guide is carrying the golden idol with one hand.

Figure 5: Indiana is running away from the ball and is carrying the golden idol with one hand. The film can now be turned off.

Movie Clip Lesson Plan – (continued)

After the students have looked at the film I would take out a coffee can approximately 326 grams (12 ounces) in size and put my hand on the outside of the can. I would question the students as to whether they believed this was the approximate size of the golden idol? Usually they agreed with me. I would proceed to fill the coffee can up with water. Then pour the water out into a graduated cylinder to obtain the volume of the coffee can. I would then write this measurement (925 milliliters) on the board along with the density of gold which is 19.3 g/cm^3. I would then ask the students to calculate the mass of the golden idol using the formula for density in kilograms. I would then walk around and see how the students are doing.

$M = V \times D = 925 \text{ ml} \times 19.3 \text{ g/cm}^3 \times 1 \text{ kg}/1000 \text{ g} = 17.8 \text{ kg}$

The students would be surprised that the mass of the golden idol was approximately 18 kilograms. This was why I was looking for the actors carrying the golden idol with one hand. How much sand should Indiana have carried in with him? The reverse situation can be calculated, knowing the density for sand is approximately 2.5 g/cm^3 and the mass is 18 kilograms, the volume of sand he should have carried can be calculated.

$V = m/D = 17.8 \text{ kg} / 2.5 \text{ g/cm}^3 \times 1 \text{ kg}/2.2\text{lbs} \times 1000\text{g}/1\text{kg} = 7120 \text{ cm}^3$

Note the approximate amount of sand Indiana really should have carried in would have been in a box about 20 cm x 20 cm x 18 cm high! Instead Indiana is removing sand from the bag (see Figure 2)! The physical property Indiana used was volume which is not a characteristic property. He should have used the property of density which is characteristic. But if he had we wouldn't have had a fun, exciting movie!

The preservice teachers in my class often have difficulty creatively choosing a movie clip, then finding a demonstration or an activity to accompany it. However, it is worth the effort, the excitement that students display is huge! And your administrator will love your creativity!

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