

YouTube in the science classroom: tips on incorporating this popular video file-sharing website into your science lessons

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[Science and Children](#). 46.9 (Summer 2009): 32. [Academic OneFile](#). Gale. UNIV OF CALGARY.

I can't believe that YouTube converted an educational technology skeptic like me into a believer, but it's true. Before YouTube, my history of using digital resources to augment my science teaching was spotty at best. Although I admit to happily using DVDs and their precursors in my classrooms, their content, like textbooks, is static, and unlike the resources of today, there is no opportunity to edit or update.

YouTube makes it possible for teachers to capitalize on children's appetite for self-paced, visually stimulating learning. Some of these videos attain "viral" status, getting passed on from person to person and by links on other sites. Not only are these popular videos viral, but developing one's own content and posting it for the world's access is infectious, even for latecomers to the educational technology scene like me. Incorporating YouTube into science lessons has energized my teaching and helped motivate students, too. In this article, I share some experiences and ideas for using this dynamic tool in the science classroom.

Creating YouTube Units

Although YouTube can be used to augment stand-alone lessons, I've found that YouTube-enhanced lessons work better as units of study. There is a lot of video material available, and students are so energized by the YouTube clips that, depending on the complexity of the topic, most of the YouTube-enhanced units I have developed run about two weeks long. Some of the interdisciplinary units I have developed focused on gravity, sound, and most recently weather.

The first step in creating a YouTube-enhanced unit is to find out what students know about the topic. I usually start this process about three weeks before instruction. This allows me time to survey students' prior

knowledge and solicit input on what students want to learn about the topic.

For example, in our weather study, I showed students a NASAConnect video and a video recorded directly from the Weather Channel (see NSTA Connection for a list of all the websites used in my weather unit). As they watched the videos, students were asked to record in their notebooks what was familiar and what was new and interesting. Students' answers laid the groundwork for classroom instruction and explorations.

In the past, I have relied on paper-and-pencil techniques to gather feedback on initiating activities; however, I am currently experimenting with computer-based options. For example, Survey Monkey (see Internet Resources) lets me pose open-ended questions that students can comment on while posing their own questions about a topic. Survey Monkey neatly consolidates students' responses, saving time in the planning process, and it can be used as an alternative to traditional KWL (what I Know, what I Want to know, what I Learned) charts.

It can be helpful to work with colleagues as you create YouTube-enhanced units. I have found it useful to divide the work among the group, with one teacher collecting and organizing video content and others overseeing quality-control issues (e.g., making sure that the electronic format of each unit is in working order and that activities are age appropriate, student friendly, and closely aligned with district curricula and national standards).

Once the anticipatory activities are completed and a unit outline developed, the group can then search YouTube for videos that meet certain criteria. The videos must:

- * be age appropriate,
- * be aligned with instructional objectives,
- * meet audio and video standards,
- * be accurate and devoid of misconceptions, and
- * correspond to classroom time limitations.

Try to include a mix of informative videos with those promoting experimenting or hands-on activities. As with every form of media used in schools, it is imperative that the teacher view each video closely and in its entirety. For example, as innocent as the topic of weather may seem, I rejected many impressive videos dealing with severe weather due to expletives being screamed in the background (it is difficult to find someone who is calm chasing a tornado!). Also, keep in mind that the stately titles and creative synopses accompanying each video may have little to do with the actual quality of the video or audio production. Shaky camera work, fuzzy audio, and misspelled words are common and can distract students from the importance of the lesson.

In my weather unit, I included a mix of professionally produced videos and videos written and produced by teachers and home videographers (see NSTA Connection). I feel that this mix of video sources adds interest and authenticity to the unit.

Once the videos are selected, I arrange their presentation in order from simple to complex (i.e., from concrete to abstract). I also present classroom activities that way, ensuring that students have multiple hands-on experiences before challenging terminology is introduced. For example, in the weather unit, students learn about wind, precipitation, and temperature before learning about more complex issues, such as the conditions in which tornados form. Students also develop an understanding of forecasting weather over the course of the entire unit as they collect and record real weather data in daily logs.

Next, I build a simple webpage that serves as the foundation for the entire unit. In the past, I copied and pasted YouTube addresses into a simple "html" document that would link directly to YouTube (YouTube provides easy-to-follow, step-by-step directions on how to integrate or "embed" video in a number of formats--see Internet Resources). However, shortly after getting comfortable with this technique, my school district installed security software that blocked student access to YouTube. So, I needed to find computer software that allowed me to download onscreen video to my hard drive. Two user-friendly programs met my needs--RealPlayer and Mozilla Firefox Video DownloadHelper (see Internet Resources). Both programs have options that permit offscreen downloading of video. The downloaded videos can then be dropped into any html document and saved to disk, which is the process that I now follow when preparing these

units.

YouTube, Plus You

When incorporating YouTube in your lessons, keep in mind the unit's learning goals and purpose for doing so. YouTube can inform, but there's no substitute for a teacher's selection of content, instructions, and running commentary. Teacher input adds depth, poses additional questions, encourages students to look at details, and makes connections that align the video with school curricula and standards. For example, in the weather study, I incorporated many additional questions that were not covered in the selected YouTube videos:

- * What is the relationship between weather and climate?
- * What are the weather patterns where we live?
- * What are some extreme types of weather where we live?
- * What are some extreme types of weather in coastal areas?
- * What are safety procedures for extreme weather at home?

Finally, remember that the content posted on YouTube is from diverse sources and should not be viewed without an expectation of flaws and factual errors. Often, explanations of scientific concepts are incomplete, naive, or are simply misconceptions. Teachers may elect not to include these flawed videos in their study or, on some occasions, they can use them as an opportunity for students to analyze and rewrite scripts.

Assessment

Like other traditional units, assessment in YouTube-enhanced units is driven by instructional objectives and standards. Teachers assess students on their ability to complete the unit's various tasks and how students respond to their own questions and those provided by the teacher. In the weather unit, performance assessments were also used as students demonstrated skills in taking measurements using weather instruments, collecting and analyzing data, and maintaining a daily weather log.

Where possible, I also look for ways for students to share their knowledge with others. For example, in the weather unit, after learning about tornado safety, my students modeled procedures for adjacent classrooms prior to a formal schoolwide drill.

Other YouTube Uses

Beyond enhancing units with content clips from YouTube, there are also other ways to incorporate this technology into your lessons. Below are a few ideas.

Creating Your Own Videos

You can and should try producing your own videos for uploading. A broad range of teacher-friendly video editing software exists--I use Microsoft MovieMaker (see Internet Resources). Likely, your school has everything needed bundled on their computers. YouTube provides a "toolbox" to assist users how to produce quality videos; issues such as sound quality, lighting, and special effects are described. Video production is not complicated but may be time consuming--at least in the beginning. Start small. Consider a two- or three-minute demonstration using video or a slideshow format (still pictures and graphics). My first production dealt with Sir Issac Newton, and it included transitions, audio and video editing, special effects, and graphics, and it took an entire day to create! Less elaborate videos, such as a short feature on music and vibrations, require only an hour of production from start to finish. You will experience a sense of accomplishment as students view your own productions.

As you get more comfortable creating videos, you may want to consider involving students in the process and having them create their own videos. With guidance, students can write scripts, become videographers, and do rudimentary editing.

Learning Science History

YouTube is a compendium of current and historical events. Students can watch actual video and listen to audio of scientists in their laboratories or in the field. Watch Carl Sagan describe the universe, visit with Issac Asimov, view footage of Einstein, or have Linus Pauling discuss the nature of science ... it's all on YouTube.

YouTube allows students to explore independently, observe phenomena from multiple perspectives, and see science as a human endeavor. Students can view personal stories that identify requirements for jobs and actually see daily field- and lab-based routines. Such career-oriented videos provide names of scientists and their work location; therefore, with a bit of additional research, students can e-mail presenters directly or leave comments and questions on the YouTube page to learn more about what scientists really do.

Virtual Field Trips

My community is in a geographically flat, rural, isolated area. The nearest science center and planetarium is 90 miles from school; mountains, though plentiful in New Mexico, are out of range for our elementary students. Recently, school districts have been restricting travel for safety and financial reasons. Virtual field trips are not bound by geography, school budgets, or personal safety. However, before including a virtual field trip into a YouTube-enhanced unit, remember to prescreen the sites to make sure they are appropriate for students.

Through virtual field trips, students may visit an ocean, mountaintop, rain forest, or polar region. Some websites specializing in real-time streaming video allow viewers to manipulate the view by rotating and tilting the camera. Time is not an obstacle on virtual field trips; in fact, virtual field experiences are reversible, repeatable, and may be suspended from day to day. Students are not confined by conventions of size and distance. They can zoom out into space for a view of a hurricane or inward to examine a dust mite or grain of salt. Students may scuba dive or fly an airplane. In my weather unit, students visit a dozen states and become storm chasers.

Benefits for All

YouTube is unique and offers many positives. Unlike an entire class viewing a film or DVD, integration of YouTube content allows students to work at their own pace. The YouTube environment allows students to watch, review, pause, and research in real time.

Another benefit is that YouTube encourages interactive participation. Unlike texts, atlases, and self-contained kits, YouTube encourages viewers to comment and rate the value of each video. Many students want to post

questions for the creators of the content, or others want to offer suggestions for future productions. This is an opportunity to encourage students' constructive contributions and criticisms of sites visited.

Opening the door to critiques of others' work invites the inevitable observation that "I could do a better job." YouTube and other file-sharing sites may be used as vehicles for information exchange among students. Students can collaborate with others to conduct experiments, share results, and participate in competitions. Encourage students to pose their own questions and explore science-based social and political issues with others. Doing so builds community and can hone internet etiquette.

For teachers, YouTube can even be a valuable venue for professional development. Excerpts from well-known theorists and authors are posted on the site that I use often in university education courses. Master teachers have posted instructional ideas and other content for others to access. TeacherTube (see Internet Resources), though much smaller than its YouTube counterpart, is emerging as a useful reference for educators. I have watched science activities on YouTube and TeacherTube and then replicated the experience with the students in my university classroom.

Just a few years ago, YouTube didn't exist. Now YouTube has the potential to become an educational phenomenon. The exponential growth of the YouTube's content and popularity suggest that this resource is here to stay. Use of video file-sharing in elementary science classrooms is relatively unexplored territory, and this article suggests only a few possibilities. Whether teachers choose to sift through the mounting library of videos or produce their own, using YouTube is a great way to add interest, depth, and student ownership to elementary science.

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Internet Resources

Embedding a Video From YouTube Into Blogger

www.youtube.com/watch?v=3l0feGWTi0&feature=related Easy-to-follow

instructions for embedding videos in html documents

Google and Yahoo

<http://video.search.yahoo.com/video>

<http://video.google.com>

Google and Yahoo offer teachers the option to search for videos using their familiar browser formats. Both have a content filter that can be set to monitor inappropriate materials.

Microsoft Windows MovieMaker

www.microsoft.com/windowsxp/using/moviemaker/create/default.msp

Teacher friendly video editing software from Microsoft

Mozilla Firefox

www.mozilla.com/en-US/firefox/

A browser with add-ons that include a video capture feature

Mozilla Firefox Add-Ons: Video DownloadHelper

<http://addons.mozilla.org/en-US/firefox/addon/3006>

RealPlayer

www.real.com/realsuperpass.html

A free video player that allows the user to capture video directly from the computer screen

Survey Monkey

www.surveymonkey.com

A free service that allows a password-protected individual to easily construct a variety of tests and surveys. Survey Monkey will automatically compile results.

TeacherTube

www.teachertube.com

TeacherTube is an education-specific video resource that specializes in student- and teacher-produced content. This site promotes and monitors material appropriate for school use.

Connecting to the Standards

This article relates to the following National Science Education Standards (NRC 1996):

Content Standards

Grades K-8

Standard E: Science and Technology

* Understanding about science and technology National Research Council (NRC). 1996. National science education standards. Washington, DC: National Academy Press.

NSTA Connection

Download the list of websites used in the author's YouTube-enhanced weather unit at www.nsta.org/sc0907.

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