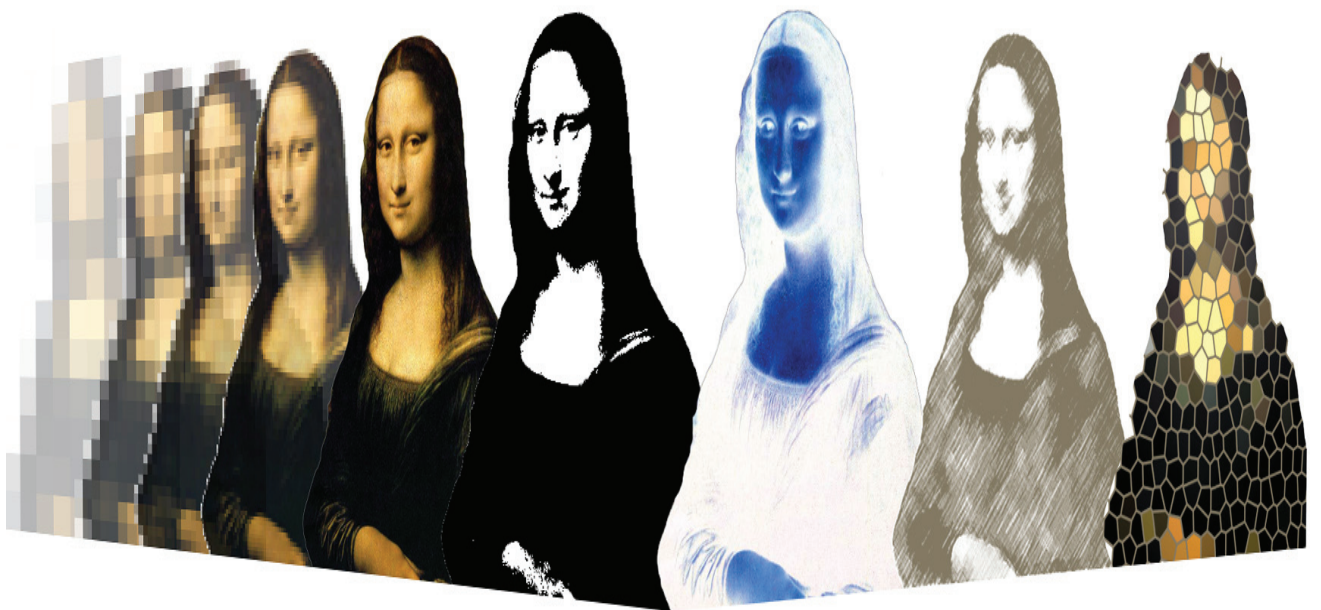


Teaching Support Services

TECHNOLOGY
BRIEF

Digital Media



I believe that the motion picture is destined to revolutionize our educational system and that in a few years it will supplant largely, if not entirely, the use of textbooks.

(Thomas Edison, 1922)

Definition

Digital media: audio, video, and images that exist in a computer-readable format, and can reside on a local device (CD, DVD, hard drive), or remote location (website).

In many ways, digital media are no different from analog recorded media, which have been around for decades. What is unique is the ability to easily create, copy, and transmit digital media. They can be streamed, downloaded, or stored on media such as CD or DVD. The recent popularity of mobile devices such as iPods that allow audio and video to be downloaded and experienced anywhere, anytime, have also increased the use, as well as the hype, around digital media.

While audio and video have a long history of use in education, the capabilities of digital media, coupled with reduced computing costs, higher bandwidth, easier-to-use technology, and greater awareness of digital media have increased their use in education, especially during the last five years. If nothing else, the quote from Thomas Edison above should serve as a reminder that we need to look beyond the excitement of the moment and carefully assess the value of any tool we consider for teaching and learning.

This brief will review some of the more common instructional uses and new technology surrounding the following subset of digital media:

1. video (including lectures, instructional video, original content)
2. audio (including podcasts and audio with visuals, e.g., narrated PowerPoint)
3. animations and simulations (e.g., Flash content)

This document will discuss unidirectional forms of digital media communication, and therefore will not discuss in detail two-way technology such as videoconferencing or web-based seminars that include voice, text chat, etc. We will leave those for another brief.

Podcasts & Other Definitions

Strictly speaking, podcast refers to a broadcast of audio or video (video podcast or vodcast) to which people can subscribe; however, some people use it to refer to any downloadable media. Live broadcasts of audio, video, or visual presentations are commonly available over the web as webcasts. Media can be streamed or downloaded. Streaming from a website is like watching a television broadcast, while downloading is more like recording that broadcast.

Video

Video can make content “come alive” and present current or relevant information to the subject at hand. It can also create innovative learning and assessment opportunities. Video also appeals to those people who prefer to learn in a visual manner.

Since digital video is an extremely flexible tool, we will focus on three general functions or categories that we feel are most relevant to teaching and learning:

- a) recording presentations or lectures for later use. The resulting video can be put on tape, DVD, or website for download, streaming or video podcasting.
- b) instructional video: a production designed to teach specific concepts or achieve certain learning objectives on its own (e.g., a training video); and
- c) original works such as a documentary, feature films, or recordings of live events.

a) video lectures or presentations

Lectures captured on video can be useful, but only if applied thoughtfully and in the right circumstances. Potentially useful activities include:

- recording guest speakers who cannot be physically present or for reuse;
- providing highly visual content for online, hybrid, or distance learning where students cannot be present; and
- providing students an opportunity to review important concepts.

Use of video podcasts or streamed video lectures should be considered carefully based on the speaker style, subject matter, and setting. Video can capture interest, but it can be challenging at times to listen to a one-way lecture for an extended period of time.

Now add that most videos tend to be quite small and one can only see the talking head. Take away any interaction, opportunities for questions and discussions, and the inability to view both the presenter and the slide show, if any, and viewing of a lecture via video can be a poor choice for learning. In fact, if the visual component does not convey any information, it might actually decrease learning (Clarke and Mayer, 2003). Ironically, features that often make lectures more effective – Q & A, interaction among students, pauses for reflection or individual work, etc. – may transition poorly to video.

However, there are ways to make video lectures more interactive and effective. Consider “chunking” a recorded lecture into smaller sections, based on topic or time segment, and make it searchable by key word (through the use of embedded meta-data). Now add an introduction to each chunk, placing it into context in terms of the big picture of the topic, along with reference from the textbook or other resources. Separate those chunks with key questions to consider or add website conferencing to allow for peer-to-peer discussions and interaction, since learning suffers when students watch lectures alone (Gibbons, Kincheloe, and Down, 1977). Where the video isn’t necessary, consider the use of an audio lecture with or without other visuals (see Audio below).

If replacing a lecture with an alternative delivery format, you must also consider how to replicate some of the not-so-obvious functions of a lecture: pacing, processing information, providing an opportunity for students to engage with peers, and generating passion for a subject. Also important is how a change in how the course is delivered will affect the roles of both instructor and students: students will need to learn to work more independently, while instructors less so as they come to require the assistance of staff to produce effective learning materials (Shephard, 2003).

b) instructional video

Instructional video can be a powerful teaching tool in circumstances when you are demonstrating a procedure (such as a lab demo or safety video) or dynamic event (e.g., language instruction). It can be quite efficient and cost effective in circumstances when the material has to be taught repeatedly to large numbers of learners. The key to good instructional video is to begin with clear learning objectives, create a story-board or script, and employ good technical practices so that content is clear.

c) original works or recordings of live events

Original content is often used in a teaching context. One of the strengths of video is narrative, or telling a story. Segments of feature films, documentaries, and TV broadcasts are shown in courses where the content relates to the learning objectives. Other uses include:

- language teaching (a drama in a second language)
- observational video (e.g., animal behaviour, surgical process, event)
- a virtual field trip (e.g., visit a farm, lab)
- monitoring a remote experiment or procedure
- dramatizations, simulations, or critical incidents for reflection or discussion
- video case studies or interviews
- recording of student presentations or teaching for evaluation or self-improvement
- student-created video projects for evaluation
- video blogging or journal recorded with video
- video portfolios

Recommendations

1. make sure use of video is best means to achieve learning objectives.
2. break online video into smaller chunks with a description and provide direct access to specific pieces; integrate with other learning activities such as discussion, quizzing, or assignments.
3. encourage active processing of content (e.g., provide questions they need to answer, specific points they need to look for, or tasks they need to complete; follow-up with discussion).
4. use instructional video for procedural knowledge that is clear-cut and doesn't change frequently.
5. use original works to bring in learning experiences into the course that wouldn't otherwise be possible.
6. instead of "talking head" video for lectures or presentations, consider using audio-only, or audio plus other visuals (e.g., PowerPoint, pictures, animations, etc.).
7. provide user control for viewing digital video (back, forward, pause, direct access to segments).
8. provide captioning or transcripts of video for people with hearing impairments.
9. provide a pacing mechanism if using video lectures (so that students keep up with material).
10. use simplest technological options applicable to your project to avoid problems or accessibility issues.
11. review free digital instructional video and original works available in digital repositories or sites like Google Video (video.google.com/), YouTube (www.youtube.com/) or Apple iTunes.
12. record video in a conversations style (people work harder to understand when in conversation than when simply receiving).
13. use a storyboard or script for creating instructional video and other productions; consider professional support.

Audio

There are a variety of ways digital audio can be used in instruction, including:

- lecture recordings
- music, historical recordings or speeches
- narration for slides and animations
- language training (both for listening and recording)

Podcasting Lectures

All manner of content is being podcast, including original programming, lectures, language training... the list is endless. Educational institutions are setting up custom portals that provide access to both video and audio lectures, other instructional content, and promotional material. Some universities have even established a presence on Apple's iTunes site (iTunes U) to host podcasting. You can access existing content or record your own. Digital audio recording for podcasts can be done with relatively simple, inexpensive tools. Many MP3 players have microphone inputs, for example. Quality will vary, however. For the best recordings, it is advisable to use a clip-on microphone and recording equipment. There are also several free or inexpensive software packages that allow you to edit sound files before making them available. The amount of work to put up digital audio recordings depends on how "polished" you wish to make it.

Recordings of lectures are typically being used as a supplement to face-to-face lectures, since audio on its own usually doesn't provide the richness of information required to completely replace face-to-face lectures. As supplements, audio lectures are used for review or to catch up on the odd missed class. If considering the use of audio lectures, one must assess how much value they would bring to the course. Reviews have found that recorded audio lectures get less than universal use from students. Students may find it tedious to listen to 50-60 minutes of audio to find the portion they need to review. Breaking the audio into chunks by topic, or even indexing the audio with keywords would make it more valuable, but this would add considerable time and effort to the process. Technology is emerging, however, that will automatically mine audio files for content.

Audio plus PowerPoint

When PowerPoint is used for visual information, combining the visuals with an audio recording of the speaker can be a very effective technique for capturing presentations – more effective than video in situations where the visual component of video does not contain important information (Clark & Mayer, 2003; Nielsen, August 2005; Shank, 2005). Visuals are synchronized with the audio and the whole presentation is controllable by the student (play, pause, rewind). To create a sense of connection with the presenter, one can add a photograph of the speaker. PowerPoint Producer, Macromedia Breeze, Captivate, or Techsmith Camtasia are examples of tools that allow you to do this.

Recommendations

1. consider audio plus a visual such as PowerPoint as a delivery technique for presentations or lectures.
2. audio-only lecture recordings are not recommended as a substitute for face-to-face lectures.
3. check out free language training, training for software, or original content available for podcasts on iTunes or other digital repositories.
4. audio for instruction should be high quality; use a clip-on lapel microphone over a built-in; get professional assistance if quality is an issue.
5. break up audio into chunks and provide key words or descriptions.
6. where audio is the only source of content, a transcript should be provided for people that are hearing impaired.

A Animations & Simulations

Animations and simulations refer to dynamic graphic content. These files may range from the very basic (e.g., showing the simple movement on a graph), to complex immersive environments which replicate situations in the "real world" and respond to various inputs (e.g., flight simulators).

Simple animations can be created within PowerPoint. More advanced simulations are possible with more sophisticated tools and programming languages. The most common way this type of content is with Macromedia

Flash; Flash can be used to create animations but can also be used as a container for other types of media including audio, video, and images. Possibilities for these tools are limited only by time, resources, and expertise.

Tools like Captivate or Camtasia can also create animations by recording what is happening on your computer screen and creating Flash or video files that include audio narration and other visual effects. This is especially useful for software training.

Animations and simulations can be very powerful teaching tools, allowing learners to visualize abstract concepts that may or may not be expressed visually in the real world. They can also allow learners to manipulate variables and see their effects or experience dangerous situations without any risk to their safety. Audio can be added to provide narration, coaching, directions, descriptions, etc., to create a standalone learning module (i.e., a learning object).

Recommendations

1. use animations for concepts that are hard-to-grasp, abstract or not readily visible.
2. use simulations when students would benefit from active experimentation and feedback.
3. search learning object repositories for animations and simulations that may already exist for your discipline.
4. apply good design principles (Clark & Mayer, 2005):
 - minimize the use of non-essential elements in a simulation or animation as they decrease learning.
 - use different senses rather than the same one; e.g., use audio narration for an animation rather than text explanations.
 - avoid use of redundant audio and text (i.e., reading what's already on screen).
 - use a conversational style for narration.
5. provide captioning when appropriate or equivalent information for student with disabilities.

General Issues Regarding Digital Media

Intellectual property: content creators are justifiably concerned that video lectures or original works, once “out there”, can be usurped and reused without their consent. Unfortunately, there are no 100% foolproof methods to guard against this. Streaming provides some protection, but can be easily circumvented, as can DVDs or other physical media. Similarly, producers are reluctant to give permission have video issued in one medium (e.g., videotape) translated to a form that can be easily copied and distributed (digital format).

Copyright: If you are using broadcast or other original works not created by you, usually there needs to be copyright clearance. Even if you own rights to one format, it does not give you the ability to transfer and use the media to another format (e.g., digitize a segment for use on a website or in PowerPoint). Check with the Library (<http://www.lib.uoguelph.ca/about/policies/copyright/>) or your copyright clerk.

Class attendance: instructors are often reluctant to post recordings of lectures because they fear that students won't come to class and there will be a lack of face-to-face contact. This concern has been validated in some studies done of these situations. Students may fail to keep up with recorded lectures thinking that they can “catch up” at any time. Some studies have shown that active processing/sense-making of the information in a lecture (e.g., notetaking) can increase retention and learning; this processing may not occur if students feel that the information is always there to refer to. Strategies, such as the timing of the lecture upload, and pacing mechanisms like small, frequent assignments or quizzes, can help deal with this.

Redundancy: In the case of online lectures, you should assess if there is value in having the content delivered in multiple ways, or would it be more effective to use either the digital medium or the face-to-face time differently?

Production Support: often instructors are forced into a “do-it-yourself” situation because of limited support, which results in time being taken from other things, and production values vary with the producer’s expertise and experience.

Standards: while standards exist for various forms of digital media, competing proprietary formats (e.g., Windows Media, Apple QuickTime, Flash, etc.) still make it difficult to decide what format to use.

Accessibility: multimedia can be problematic for users with disabilities. Whenever possible, captioning should be provided for people that are hearing impaired; in some cases where it is not possible to make a learning component accessible, it may be necessary to provide equivalent information in a different format. Accessibility in terms of access to computers or sufficient bandwidth also needs to be considered.

Searchability: to be truly useful, media ought to be searchable like text. Unfortunately, methods of accomplishing this are still in their early days.

Learning styles: learners benefit from learning in a manner consistent with their preferences, but also from constructive friction – having to learn in a manner that is beyond their “comfort zone.” (Karppinen, 2005). Learners, therefore, should be exposed to a variety of modes of learning and encouraged to stretch and grow as part of their learning process.

S *Summary of Recommendations*

Media	Strengths (+) & Weaknesses (-)	Suggested Uses	Not Recommended
digital video	<ul style="list-style-type: none"> + conveying narrative + realism/visualization + dynamic + accommodates visual learning styles + can be used for distance, independent learning (see slide + voice below) - can be a passive learning medium if not well integrated into other activities - requires high bandwidth - can lull people into false sense of security 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> recording guest speakers <input checked="" type="checkbox"/> capturing frequently used demonstrations or instructions <input checked="" type="checkbox"/> using original works video to initiate group discussion or integrating with other activities <input checked="" type="checkbox"/> capturing presentations or teaching for feedback <input checked="" type="checkbox"/> video for creative student assignments 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> video podcasts of lectures that do not communicate anything visually (e.g., talking heads) <input checked="" type="checkbox"/> small, highly compressed video where detail or fluid motion is necessary
audio	<ul style="list-style-type: none"> + low network bandwidth + easy to capture + conveys emotions, subtleties - can't convey visual information 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> use narration plus visuals (e.g., PowerPoint presentation) <input checked="" type="checkbox"/> use for languages 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> audio-only lectures as primary source of info
animation and simulation	<ul style="list-style-type: none"> + visualizing hard to see, abstract, dangerous, or dynamic concepts - more difficult to develop 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> learning objects to demonstrate difficult concepts <input checked="" type="checkbox"/> animated presentations with audio 	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> animations that deliver redundant information, especially through channels that use the same senses

Where can I go for support?

TSS provides the following support for:

- support designing, developing, or implementing digital media strategies
– contact Aldo Caputo at acaputo@uoguelph.ca or ext. 52936
- installation of technology
– contact Steve Borho at sborho@uoguelph.ca or ext. 52956
- advice on integrating digital media into classroom practice
– contact Peter Wolf at pwolf@uoguelph.ca or ext. 52468

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