

# Computer Assisted Meat Science Education

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## Introduction

As instructors, we are always trying to find new ways to present information in a clear and concise manner that students will be able to grasp and retain. There have been many changes since the time that instructors used the chalkboard and lecture format. Today with the use of computers it is possible to bring into the classroom multimedia presentations to liven up instruction and improve student learning. The computer has also redefined the classroom, allowing instruction to be shared in different locations via the internet. Today, most of the classrooms have equipment, which makes it possible to use a computer in classroom. Most households have a computer that is generally connected to the internet. Today's students are very computer literate and have used computers for instruction since they began their formal education.

As instructors in Meat Science, we can utilize this tool to improve our instruction and expand our influence to more students. Before one can fully utilize computers in Meat Science instruction the why, what, how, and who questions must be answered. Hopefully, this presentation will answer some of these questions and stimulate some interest in incorporating the computer in Meat Science education.

There are generally four areas to be considered to successfully use computers in instruction. They are:

1. Who is the audience the instructional material is intended for?
2. What is the content you would like to share with the student?
3. What medium will be used to present the material?
4. How will the information be organized for use by the student?

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## Audience

When examining the audience there are several details that must be considered to determine what multimedia tool can be used. The computer resources the student has available must be taken into consideration. Computer speed, type of network connection, graphics and audio capability will determine what you can provide to the student. If the information is going to be used for resident instruction, most students will have access to a high-speed connection. This will make it possible to share video and other media, which requires a large bandwidth. If students are using a modem connection and there is video information you would like to share, it can be copied to a CD and distributed. The best way to present the information is in a web format because most computers will have a web browser that can be used. This will make it possible to share information over the web, but it can also be read from a CD with the purchase of propriety read software. Also, be aware not all web browsers are created equal. An application that works on Microsoft Internet Explorer may not function properly on Netscape Navigator, this may also be true with the version of the browser that is in use. If the information is going to be shared on a CD, be sure it has been tested on many operating systems and computer platforms to assure proper operation.

## Content

This presentation will not deal much with the actual content. Every instructor knows what he or she would like to have the students in their course learn. Other factors you must consider are your teaching philosophy, your expectation for the students, your teaching models, and tools and resources at your disposal. These factors will all affect your use of the computer in the classroom.

To be successful in creating computer teaching aids it is necessary to divide information into concepts or principles. For example, to demonstrate thaw rigor, one may want to take time lapse pictures of a muscle frozen pre-rigor then thawed. Another example may be use of animation to describe the process of contraction. The more the concept is defined the easier it will be to develop a computerized presentation. It will also help to identify the medium that can be used to demonstrate the concept. Remember, developing computerized instruction material is an evolutionary process. Begin with specific concepts you want to show in your class then slowly add other computer-assisted presen-

tations. Keep in mind what your learning objectives are and the direction you are going to take the course.

#### *Presentation Medium*

As one goes through the process of selection of which medium will be used to demonstrate a concept or principle, a key point to remember is to use the medium most suited to demonstrate the concept without going overboard. If we were to examine the resources, both time and computer resources, necessary to develop computer aided instruction concept, they could be listed from greatest to least as follows: video, animation, audio, pictures, and finally, text. For example, if a single picture will show the point that needs to be made, do not go through the effort of developing an animation or video. Not only is this time consuming in development, it will also require more bandwidth to transmit to the users.

The question is, what resources are required for each of the various types of medium. This presentation will focus on what is needed.

#### *Text*

Providing text information is probably the easiest method of putting information on a web site or in a computerized presentation. With the addition of HTML coding, text documents can be placed on the Internet. Most of the word processing programs have a save feature which will insert HTML coding. If one wants to be more sophisticated, there is software that will prepare documents for web publication quickly. The following is a list of popular web editing programs:

- Dreamweaver ([www.macromedia.com](http://www.macromedia.com))
- Front Page ([www.microsoft.com](http://www.microsoft.com))
- Go Live ([www.adobe.com](http://www.adobe.com))
- Pagespinner ([www.optima-systems.com](http://www.optima-systems.com))

A second method of sharing text information is through a dynamic web site. With this method of presentation, information can be entered into a database separate from the actual website. The web page would then be programmed to access information from the database. An example of this is in the bovine myology and muscle profiling web site. The user is able to "click" on a muscle and fetch the relevant data in a format that is easy to read and interpret. As a desktop or web-based application, this process can be accomplished by constructing dynamic presentations that are constructed "on-the-fly". In this manner the content is separated from the design and a single routine or program can generate an infinite number of different web pages (or screens) using content from a database. Dynamic sites are common, with news organizations providing some of the best examples. Unfortunately, dynamic sites are driven by the web-server not the web browser. Such an application is possible to host on a web server, but not possible to run from a CD-ROM, unless the computer can run both a web server and database server.

If the information is going to be used in a classroom presentation, a Microsoft Power Point presentation may be the easiest method available. This has been used in many instances and in most situations, has replaced transparencies on the overhead projector. Power Point presentations can also be incorporated into a web page. Courseware programs such as, Blackboard or Web CT will allow access of the presentations to the students. The student will need to have Power Point on their computers or a Power Point player. Since Power Point is a Microsoft product, it works best using Internet Explorer.

Another method of using a Power Point presentation is to save it as an HTML document. This will allow Power Point to be viewed through the browser. The disadvantage of this is it will be too large to be viewed adequately if the student is on a modem connection. One way to get around this is to save it as a flash animation, which will make it easier to access and reduces the file size.

#### *Photo Images*

A picture is worth a thousand words and can really help the student to understand a key concept. If there are plans to use photos in presentations and on a web site, then purchase of a digital camera is important. One can spend thousands of dollars on a camera, but in most cases it is not necessary. The high end mega-pixel camera is important if the pictures are intended for print copy, but in most cases the pictures taken with these cameras must be resized to effectively run in a web-based environment. Features that are useful are: high quality optics, ability for time lapse photography, macro capabilities, use of outside lighting, large image storage capacity and camera recovery time. There are many other features that digital cameras have, which will assist in obtaining quality pictures.

Once the images have been obtained, they can be modified using one of the many image software programs. These programs can perform functions from cropping to color adjustment. Labels and other graphics can be added to the images to assist in describing the picture. Some of the programs that are available are:

- Photoshop; Adobe Inc ([www.adobe.com](http://www.adobe.com))
- Photoshop Elements; a smaller version of Photoshop with most of the features
- Fireworks; Macromedia ([www.macromedia.com](http://www.macromedia.com))
- Paintshop Pro; Jasc Software ([www.jasc.com](http://www.jasc.com))
- Corel Draw; Corel ([www.corel.com](http://www.corel.com))

The size of the picture you plan to use on the web is also important. If they are too large they will upload very slowly frustrating those using a modem connection. The general rule of thumb is that web-page size should be 50 -80 Kb per page, so if you plan to put two pictures on the page their file size should be around 30 KB each.

### Audio files

Sometimes you would like sound included in a presentation. There are several ways you can do this. Most windows programs have the capability of recording sounds and utilizing them in presentations. Also, Power Point has the ability to provide narration to a slide show. A point to remember is to not embed the sound file into the presentation itself because it will make the presentation too large and you will not have the ability to edit the file. Another possible method of collecting sound is through a digital video recorder. Once this has been done the video can be discarded and only the audio portion used. Transferring a recording from an analog source can be done by using a male-to-male connection from the earphone jack to the microphone jack. Generally, most narration will need some editing to remove any pauses or mispronounced words. There are several software programs available that can accomplish this. It is possible to open the sound file and remove and replace words or sentences and to combine files. Some of the audio editing programs are rather sophisticated and are expensive. However, there several programs available with options to do most of the audio editing needed for web presentations. These programs are:

- Cool Edit 2000 ([www.syntrillium.com](http://www.syntrillium.com))
- Sound Forge, Sonic Factory ([www.sonicfactory.com](http://www.sonicfactory.com))

### Illustrations

There are many illustration programs on the market. The programs mentioned in the Photo Images section can be used for illustrations as well. However, most of those software programs will only make bitmap graphics. For small file sizes, it is good to use vector based illustration software. Vector based graphics can then be integrated with Flash, which will be mentioned later. Vector illustration software that is available is:

- Freehand, Macromedia ([www.macromedia.com](http://www.macromedia.com))
- Illustrator, Adobe ([www.adobe.com](http://www.adobe.com))
- Corel Draw, Corel ([www.corel.com](http://www.corel.com))

### Vector Animation

Vector graphics based animation programs with full-screen navigation interfaces, graphic illustrations, and simple interactivity are in an antialiased, resizable file format small enough to stream across a normal modem connection. Animation software of this type is widely used on the Web, both because of its speed (vector-based animations, which can adapt to different display sizes and resolutions, play as they download) and for the smooth way it renders graphics.

These types of animation software allow the user to use any artwork, using whatever bitmap or illustration tool they prefer, to create animation and special effects, and add sound and interactivity. The content is then saved as a file with a .SWF file name extension. Vector based animation is also ideal for CD-ROM and use in video. Vector animation software available is:

- Flash, Macromedia ([www.macromedia.com](http://www.macromedia.com))
- Live Motion, Adobe ([www.adobe.com](http://www.adobe.com))

### 3D Modeling and Animation

Everyday we interact with a three dimensional (3D) world. Therefore, seeing things this way is intuitive to us. It only makes sense that the ideal way to interact with graphical computer data should also be in three dimensions. Instead of seeing flat pictures, things can be moved, rotated, and examined closely just as in real life. In order to do this within the computing environment, objects must be modeled within the computer itself or scanned into the computer.

Modeling 3D objects is one major function 3D software serves. Modeling objects most commonly consists of points and polygons. Points are just that, a single point in 3D space. A polygon is at least 2 points connected to make a line or 3 points or more to make a plane. Many polygons combined can construct the likeness of an object within the computer. These objects can then be textured to resemble real life objects more closely and be animated. These animations can be rendered, at the users desired resolution, as movie files of various formats. 3D software is also used to make still images. The advantage to this is once you have a 3D object created, it can be lit in any way and rendered out to any resolution desired.

The Bovine Myology project relies on CT scanned data, which is then converted to 3D data using a high-end medical imaging software package. We are in the process of constructing an interactive beef carcass that can be rotated and zoomed in on, in different viewing modes. This allows a student to interact with a completely 3D model. One can move and rotate the carcass or skeleton to any angle they wish and overlay muscles in order to learn the animal's anatomy. Producing interactive 3D requires additional software, this works with the files output from 3D modeling and animation software.

Three dimensional graphics and animation generally require powerful hardware. It should be noted, although the use of 3D over the web has grown immensely, it is still very bandwidth intensive. 3D graphics can also be used on CD-ROM and video. Three-dimensional modeling and animation applications available are:

- Lightwave 3D, Newtek ([www.lightwave3d.com](http://www.lightwave3d.com))
- Maya, Alias | Wavefront ([www.aliaswavefront.com](http://www.aliaswavefront.com))
- 3DS Max, Discreet ([www.discreet.com](http://www.discreet.com))
- Softimage, Avid ([www.softimage.com](http://www.softimage.com))
- Animation Master, Hash ([www.hash.com](http://www.hash.com))
- TrueSpace, Caligari ([www.caligari.com](http://www.caligari.com))
- FormZ, Auto des sys ([www.formz.com](http://www.formz.com))
- Blender, Blender Foundation ([www.blender.org](http://www.blender.org))

Some of the interactive 3D applications available:

- Director, Macromedia ([www.macromedia.com](http://www.macromedia.com))
- Axel 3D, Mind Avenue ([www.mindavenue.com](http://www.mindavenue.com))
- Blender, Blender Foundation ([www.blender.org](http://www.blender.org))

#### *Digital Video Production*

There are times when video is useful in getting a point across. The easiest and most popular way is to work with digital video. This requires a digital video camera, and software to edit and compress the video for final delivery. There are many choices available for digital video cameras, keep in mind that the higher priced models will buy you better lens optics and bigger, better, and more Charge Coupling Device chips (CCD). The CCD chip(s) in a camera converts the image to digital format and has a direct effect on color reproduction, noise filtering, and resolution. Other features that are important are a high quality microphone and image stabilization. Features that are useless in most situations, but often hyped by companies, are things such as digital effects filters and digital zoom, so it is wise not to base your purchase on these features. There are a wide variety of high quality cameras available from major manufacturers such as Canon, Sony, JVC, etc.

Once video is taken with a digital video camera, the next step is to capture the footage on a computer for editing. Most digital video cameras transfer video to the computer through a firewire cable so it is a requirement to have a firewire port on your computer. Also, all digital video editing software have a capture function built in, which requires a lot of hard drive space since digital video generally produces large files. Once the video is captured on the hard drive of the computer, you can begin the editing process. You can add fades, transitions, and titles to the video. Once the editing process is complete, you are ready to export a movie file for your medium of choice. You can export the finished movie out to tape or you can export a compressed version for the web or CD-ROM. Some of the digital video editing software available is:

- Premiere, Adobe ([www.adobe.com](http://www.adobe.com))
- Final Cut Express, Apple ([www.apple.com/finalcutexpress/](http://www.apple.com/finalcutexpress/))
- Pinnacle Edition 5, Pinnacle Systems ([www.pinnaclesys.com](http://www.pinnaclesys.com))