Training Faculty to Create and Use Web-based Digital Audio and Video Content for Instruction

Tom Wulf, Ted Kafala, Larry Waldrop, Sujata Prakash, Sam Geonetta, and Karen Marsh
University of Cincinnati

Tom.Wulf@uc.edu, Ted.Kafala@uc.edu, Larry.Waldrop@uc.edu, Sujata.Prakash@uc.edu, Sam.Geonetta@uc.edu,
Karen.Marsh@uc.edu,

Abstract - Multimedia based curriculum materials can provide powerful and effective tools for instruction particularly in distance learning contexts. Creating multimedia content can require advanced skills and resources which may be beyond the ability of individual faculty members, who ideally serve in the role of content area experts and specialists within their field of study. This paper discusses the factors that influence the use and creation of digital multimedia based curriculum materials (including audio, video, and animation) by individual faculty members. A variety of inexpensive software packages are discussed that enable faculty members with only an average level of technical skill to easily create their own multimedia curriculum materials, including narrated presentations, screen capture video for software demonstrations, simple animated simulations, and synchronized full video slide presentation lectures. Since it is not enough for faculty members to simply know how to create multimedia curriculum content, aspects of instructional design and pedagogy which are critical to the effective usage of multimedia curriculum materials are also explored. They must also know when and why to utilize it within their instructional practices. Several existing projects for disseminating multimedia production skills and knowledge to faculty members are reviewed in addition to programs for supporting the use of these skills within the institution. Further discussion addresses more complex multimedia curriculum development projects that require specialized support infrastructures at the institutional level.

INTRODUCTION

Multimedia curriculum materials occur in many distribution formats and include basic content elements consisting of text, images, audio, and video. In addition to these elements, it is useful to categorize multimedia material by the amount of independence or interactivity that it grants to the user. For example, linear presentation media can create an essentially passive experience for the user with minimal navigation and interactivity options. In contrast, the most advanced media-based curriculum content creates rich cognitive learning environments and simulations which are highly interactive and present the user with many navigation choices.

This paper focuses on multimedia curriculum content that can be deployed through the Web. It is now common for educational institutions to rely on Learning Management System (LMS) software suites to provide uniform support for Web-accessible curriculum content. This is done for traditional face to face courses and distance learning courses, as well as hybrid courses that blend the two delivery paradigms. The typical LMS provides users with a form or menu-based Web interface that allows curriculum content them to be easily upload in the form of digital documents which can include the media content elements in a variety of formats. Thus, the LMS enables a user with basic computer literacy skills to create a course Web site.

There are a variety of models for institutional support for faculty use of technology in instruction and these vary to the extent to which faculty are expected to acquire technology skills for themselves as opposed to having the skills provided as a support service. Instructors are first and foremost, content area experts within their fields of study and often have no formal training in pedagogy or instructional design and may lack the time, resources, and skills required to develop rich curriculum resources. [1]

An ideal model consists of a curriculum development team in which faculty contribute their expertise as content area experts, and are supported by instructional designers, technicians, media artists, and project managers. In this model, faculty are not expected to develop technologic skills that otherwise might be completely alien to their area of focus. The drawback of this model is that it is one of the most costly ones to implement. However, it does have the advantage of producing the highest quality media-based curriculum content, including more advanced instructional technology that few faculty would be able to develop on their own. (This includes rich cognitive learning environments, simulations and high quality video.)

While, faculty from non-technical disciplines can not be expected to master advanced technological skills, the level of technologic skill comprising basic computer literacy, (which most faculty already utilize in their career practices), continues to increase over time in tandem with the increase in the level of consumer computer expertise. For example, the ability to

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create and deploy digital video has progressed within the last decade from a relatively advanced technologic skill, requiring specialized equipment and expensive software packages to a task that the average consumer can now easily accomplish with a standard computer and consumer electronic devices. Indeed, this skill is now prevalent within K-12 instructional practice in the United States and contributes to the increase in the level of computer literacy among the populace as a whole.

Basic computer literacy skills for faculty should include expertise with software tools for the acquiring, manipulation, and deployment of the basic media content elements mentioned previously. The technological expertise required to create these content elements vary from basic to advanced levels depending on the specific task. For instance, recording audio narration is a basic skill that most instructors can easily learn, while creating sophisticated images requires more advanced expertise. Raw media content elements suitable for use in instruction, including images, sound files, and video clips are increasingly available for download on the Web. Therefore, training efforts that focus on the acquiring and manipulating of basic media content elements and avoid the more advanced content creation skills will be accessible to a greater range of faculty.

This model is significantly cheaper to implement than the ideal model just described and enables faculty to create adequate media-based curriculum content for themselves. The discussion that follows will focus on relatively accessible tools and software packages to enable non-technical faculty to utilize media content in their instruction.

It should be noted that the list of tools covered here are not exhaustive and only represents those with which the authors of the paper have direct experience. In particular, the list reflects a bias towards tools for the Windows operating system platform although similar tools should be available for both the Macintosh and Linux platforms.

Having expertise with these technologies does not guarantee the creation of effective instructional content. Just as the team approach to curriculum development includes an instructional designer, faculty training for the utilization of media-based curriculum content must include coverage of basic instructional design principles and illustrative examples of best-practice utilization of the technology within an instructional context.

**Basic Content Element Skills and Tools**

*Digital Images*

Images can greatly enrich instructional content. The old adage “A picture is worth a thousand words.” reflects this. In addition to those users who favor visual learning styles, the skilful combination of text and images can more effectively communicate certain types of content to all users. Processes, statistical data, and relationships lend themselves to visual representation in the form of charts, diagrams, and pictures. Lohr provides an excellent resource for using images in instructional content. [2]

For digital images the basic targeted level of faculty expertise would include the acquisition of images from digital repositories and various free clip art Web sites, the scanning of existing images, and the creation of simple presentation graphics in the form of charts, graphs, and diagrams, and the manipulation and the deployment of these images within and as stand-alone documents. These basic skills are typically subsumed within a computer literacy level of expertise with standard office productivity packages such as knowing how to insert, resize, or clip an image within a Microsoft Word, PowerPoint, or FrontPage document. Similarly, the creation of the simplest kinds of presentation graphics can be accomplished with the drawing tools found in standard office productivity packages.

It is easy to teach faculty to generate screen capture images which can be useful for training software applications or similar computer-related topics. There are a number of accessible and affordable software packages which automate this process (CamStudio, Camtasia, FullShot, RoboDemo, Captivate, Microsoft Producer PowerPoint add-in,) and it is easy to do using only the innate operating system capabilities of Windows XP.

Intermediate and advanced expertise for creating more sophisticated images can be derived from training with specialized image editing software packages like Adobe Photoshop CS, Paint Shop Pro, and Microsoft Image Composer among others. A good choice for teaching intermediate expertise is to focus on training faculty to modify existing images using the various filters found in these packages.

*Digital Audio*

Sounds can be used in multimedia presentations to create mood and more effectively engage the user. Narrated presentations can be used to replace traditional lectures within both distance learning and face-to-face course deliveries and can reach students that favor aural learning styles as well as the visually impaired. Some content areas such as music and foreign language instruction emphasize audio data.

Stock sound clips are available within standard office productivity packages as well as downloadable Web resources for insertion into documents. (Microsoft Word, PowerPoint, Front Page and others.) Inserting existing audio content into a document is a basic literacy level skill analogous to inserting image content. Sound resources in commercial formats can be captured (ripped from CD or other format) and converted to suitable Web file formats. Tools include Windows Media Encoder and iTunes.

Recording new audio content is easily done by simply attaching a microphone or other audio source to the computer and using either the innate operating system (Windows Recorder, Macintosh iTunes) or a software application package (Microsoft Producer PowerPoint add-in, Microsoft Home Moviemaker, RoboDemo, RoboPresenter, and MacroMedia Captivate).

Editing audio content is a more challenging skill. Basic editing, such as trimming audio files for length or normalizing...
Digital Video

Digital video is the most challenging of the basic multimedia content elements. As with digital images, the most basic literacy level of expertise consists of being able to insert existing video content into presentations. Again the standard office application suites support this and it is analogous to inserting the other media elements into a document.

Screen capture video is the most accessible technique for faculty generation of video content. It is similar to the screen capture images described previously but consists of captured video sequences that record mouse movements and all the other user interactions from the computer screen as continuous video. Thus it does not require any external camera or other equipment. Camstudio, Camtasia, Robodemo, and Captivate provide this capability.

For instructional use, video content comparable to consumer “home movies”, while lacking the polish of film and television, can be quite effective. Expertise with this technology is accessible to faculty with basic computer literacy skills but is more challenging than the other media element types. This is useful for creating “talking head” lectures and tapping classroom and lab presentations. Consumer video equipment is quite sufficient for this purpose. The Microsoft Producer PowerPoint add-in and Microsoft Home Moviemaker are quite accessible tools for working with video. IMovie is a comparable tool for the Macintosh platform. Adobe Premiere is a more full-featured but also more challenging and expensive tool for video editing.

Video production training must include the techniques for shooting and recording (setting up shots, lighting, etc.), transferring video content to the computer workstation and editing and rendering the content. Recording live video works best as a collaborative effort since it is difficult to video tape oneself giving a lecture or presentation.

It is worth noting that extensive use of video content within an instructional program may require additional infrastructure and support. Video delivered over the Web not only requires high bandwidth but also is best done through a technique called streaming which is accomplished by means of a special configuration on the Web server. This adds an additional complexity to publishing the content.

Authoring Tools

In addition to the specific tools used to create and edit the basic multimedia content elements, multimedia authoring tools allow the user to combine the various content elements into complete presentations. These tools also typically include basic capabilities for editing the content elements.

Microsoft PowerPoint is the most common authoring tool and has the advantage of a low initial learning curve with a wide and expansive range of advanced features. It readily handles all the media content elements discussed previously and can be a good tool to use as a vehicle for training faculty to use multimedia content elements. One approach to training is to have users enhance existing presentations by adding multimedia content elements.

While commonly used for sequential linear presentations, PowerPoint does allow for the creation of more sophisticated interactive presentations that include branched and linked navigational paths in addition to the use of the multimedia content elements. PowerPoint directly supports the addition of audio narration to slide presentations. PowerPoint also supports simple non-interactive animations that are suitable for illustrating processes and temporal flows.

The Microsoft Producer add-in for PowerPoint, which is freely available for download from the Microsoft Web site, allows for the creation of synchronized presentations that can include Web documents, digital audio and video and PowerPoint slide sequences. Producer provides an easy way for faculty to create and publish a digital presentation consisting of video, PowerPoint slides and additional content. The synchronized presentation allows the user to click on a link to a slide anywhere within the presentation and the player will advance to resume the video at that point of the presentation. This allows the user more granularity in accessing the video content interactively and reduces the inherent linear aspect of the medium. [3] Because the rely on the SMIL markup technology, there are some limitations to these presentations and they only play correctly in the Internet Explorer Web browser.

ADVANCED MULTIMEDIA

Animated simulations

The capacity of simulated worlds to offer alternative realities that are useful as educational tools is a primary concern of instructional technologists, who are optimistic about the potential of the so-called immersive virtual reality (VR) to allow the user to modify virtual worlds, or to build new worlds which may or may not simulate an actual reality [4].

Dede (1995) suggests that there are three primary applications for VR in the learning process: 1) visualization, the user’s ability to manipulate and rearrange information spatially and temporally so it can be easily understood, 2) the simulation of real world, imaginary, or constructed phenomena, and 3) the development of constructivist, participatory environments and activities that can only exist within computer microworlds. [5]

Visualization is an important issue, since it permits the perception of connections and relationships between ideas and things that may otherwise be difficult to comprehend.
Visualizing within a simulated microworld allows for the modification of objects through real-time interactions, and permits the participant to manipulate and alter spatial and temporal relationships, perceptual scale, and observer point-of-view. Participants engage in responsive, navigational, full-immersion micro-environments in which they will become involved in body-mind kinaesthetic learning. [6] [7]

Advanced animations and highly interactive multimedia presentations require a high level of technical expertise that is usually not found in faculty from non-technical disciplines. However, this area holds the most promise for creating effective multimedia curriculum content including the rich cognitive learning environments described.

The de facto software tool for Web-based animations and interactive presentations is Macromedia Flash. Unlike PowerPoint, Flash has a steep initial learning curve that makes it difficult for casual users to get up and running.

One approach to enable faculty with lower levels of expertise to use advanced technologies, including Flash, is to develop intermediate implementation frameworks that allow faculty to simply add their content, in the form of basic multimedia content elements, in order to create a finished presentation. A well designed framework will not only enable faculty to make use of advanced technology but will also enforce good instructional design principles.

Frameworks can range from application based components or templates with easily followed step-by-step directions for inserting content and creating the finished presentation to menu or dialog-based wizards that collect the content and totally isolate the user from the application being used to generate the presentation. An example of the former is a series of Flash Re-purposable Learning Object templates developed by Jeremy Dunning and designed to enable faculty with lower levels of technical expertise to create learning objects that follow sound instructional design principles simply by adding their content to the template. [8] Similarly, the Softchalk and StudyMate packages provide templates that allow faculty to create Flash-based learning objects without any knowledge of Flash. An example of the dialog-based wizard approach is the form-based interface at the Wisconsin Online Resource Center Web site for creating learning objects. [9]

**INSTRUCTIONAL DESIGN**

Many faculty have no formal training in pedagogy or instructional design and technological expertise on its own does not imply good instructional practice. [1] Training faculty to utilize any technology for instruction should include coverage of basic instructional design principles and provide illustrative examples of best-practice utilization of the technology within an instructional context. There are several useful pedagogical concepts that are readily conveyed to faculty that serve well to guide the design and usage of technology within instruction.

**Somatic Learning Styles**

A useful concept for creating curriculum content is learning style theory. This theory holds that students have learning preferences and learn best from curriculum material expressed within a specific somatic style. Thus learners are typified as visual, auditory, or haptic-tactile.

The practical application of this theory leads to encoding and expressing all curriculum content in a manner that engages each of the somatic styles. This can, but need not, be done redundantly since multimedia by its very nature lends itself to expressing multiple somatic modes simultaneously.

In addition to individual learning style preferences, research shows that most people learn better from content that is encoded with multiple styles. [10]

**Multiple Intelligences**

Howard Gardner’s research in brain physiology lead him to develop a theory that human intelligence, rather than being a single measurable construct, actually occurs in distinct multiple types like spatial intelligence, linguistic intelligence, among others. Like learning styles, the theory of multiple intelligences is useful for designing curriculum content that engages all learners although it is considerably more difficult to express within multimedia content than the somatic learning styles. [11]

**Bloom’s Taxonomy of Cognitive Outcomes**

The most useful pedagogical concept for the design of curriculum materials, and one which is readily taught to faculty is Bloom’s taxonomy of cognitive outcomes. These range from the lowest level of rote memorization of facts to the higher levels of application, synthesis, and evaluation. Using the levels to map out the specific learning goals for a topic can help to insure effective instruction either with or without multimedia content. In most cases the goal of instruction will be to enable the learner with higher order cognitive skills for the topic area. [12]

**EXPERIENCES AND CONCLUSIONS**

The authors have explored the use and creation of Web-based multimedia curriculum content for the past two years at the University of Cincinnati as part of a faculty learning community. After a period of initial exploration and research, we developed workshops for disseminating the technology to other faculty.

The initial work included bringing Prof. Jeremy Dunning to the University to present his Repurposable Learning Object (RLO) templates for Flash. Conceptually, Dunning’s RLO templates offer great promise for enabling faculty to use technology for instruction.

However, we found in practice that (1) many of the RLO templates were still too technically challenging for faculty who had typical levels of expertise with technology to use as they required too much knowledge of Flash and (2) about half of the available templates had already been replicated by...
advanced features supplied by the LMS (Blackboard in the case of the University of Cincinnati) which were much easier for faculty to use because of the menu-based interface within the LMS. In particular, the online assessment component of Blackboard supports the inclusion of the basic media elements. Thus, a test question can include an attached sound, image or video element.

The LMS does not enforce good pedagogy although it certainly will support it, so we found that training faculty in basic instructional design in tandem with the technology capabilities provided by the LMS produced the best results. Media literacy, the ability to manipulate and effectively utilize the basic media content elements of text, images, sound, and video for instruction, seems to be a reasonable level of technical expertise for most faculty. As this level of expertise becomes more prevalent in the general population, it will eventually be taken for granted in the same manner that we now take it for granted that a scholar can effectively use text.

REFERENCES


