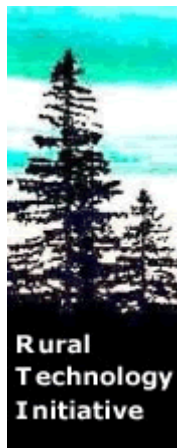


Combine Digital Media Technologies to Produce an Interactive Distance Learning Tool

By Matthew McLaughlin

The Rural Technology Initiative (RTI) implemented a web browser-based distance learning tool to convey information across the internet, closed networks, and on local computers using a free Microsoft® PowerPoint® add-in (Microsoft Producer®) to combine video, audio, slides, images, HTML links, and an interactive table of contents. This combination of media and its application as a distance learning tool across multiple delivery platforms is important in its potential to improve the effectiveness of information dissemination.



Combining Digital Media Technologies

The Microsoft Producer software provides the workspace where multiple media sources, including video, audio, PowerPoint slides, images, and HTML links, can be combined and published into a single project. Once the different media sources are imported into the project, they can be easily dragged and dropped onto a timeline to be edited and, when PowerPoint slides are included, synchronized with the corresponding video. Thirty-eight templates are included in the existing software, providing different media combination options such as video screen size, resizable slide viewing area, table of contents, and HTML links. The entire process of editing and combining the media can be done very rapidly; a one-hour presentation can be made available on the internet within four hours.

Publication of the single project can begin when the timeline edits are finalized and the table of contents correctly displays the project's navigation. Microsoft Producer includes a Publication Wizard that gives step-by-step options to help tailor the final publication to best match the intended audiences' connection speeds or viewing platforms. A project can be published at a higher speed and resolution for an audience using a broadband connection or at a lower speed and resolution for an audience using a dial-up modem. There is also the option to publish the project for local playback or from a CD-ROM, which provides the highest quality resolution of video, audio, slides, and images.

The final multimedia publication allows the end user to simultaneously view a video presentation and the corresponding slides. The table of contents, extracted from the title of each slide, is shown under the video screen. A mouse click on any title in the table of contents will advance or reverse the video to the respective slide. Also included are control buttons to pause and restart the video at any point in the presentation. These options allow users to skip around in the presentation and view the presentation on their own timeframe, providing a truly interactive aspect to a distance learning tool.

Multiple Delivery Platforms

The ability to publish a project at multiple levels of speed and resolution makes the output accessible to an array of end users through several platforms: the internet, closed networks, and local computers or CD-ROMs. Delivering these combined media over the internet and through closed networks in a dynamic and interactive form is possible through the use of streaming video. Streaming video is delivered online to coincide with the PowerPoint slides using a streaming media server—a specialized piece of hardware and software that accepts requests for video files, knows about the format, bandwidth, and structure of those files, and in many cases, pays attention to the performance of the player that is receiving the video. Streaming servers deliver the correct amount of data necessary to play, pause, stop, and move to particular parts of the video file, at precisely the rate needed to play it on the user's media player.¹

The files published by Microsoft Producer can also be downloaded onto and viewed from a local computer or burned to a CD-ROM and watched from a local CD drive. Viewing the combined video, audio, slides, images, and table of contents from a local computer results in the highest quality and fastest response to user controls, given the lack of bandwidth or internet connection congestion issues. The HTML links to internet and network locations, however, will not be accessible unless the user is also on-line.

This flexibility in multiple delivery platforms increases the size and diversity of the potential audience for any given presentation. Additionally, it increases the accessibility of information presented at seminars, conferences, and workshops by making it available to local and remote audiences.

Applications of the Technology

The Rural Technology Initiative first applied the use of this combined interactive media at the RTI Annual Review, held at the University of Washington in January, 2003. Digital video footage was recorded at each presentation, synchronized with the corresponding Microsoft PowerPoint slides using Microsoft Producer, and published to the RTI media server. Within two days all of the presentations from the review were streaming from the RTI website.

The speakers and audience members from the review provided both enthusiastic and critical responses. The ability to rapidly reproduce an entire seminar, or even one presentation, through a medium that conveys speaker oration, body language, and informative slides proved to be an enticing concept. The criticism stemmed from the low quality of video, due almost entirely to the poor lighting during the recording.

The outreach potential of the new technology encouraged the purchase of lighting, a canvas backdrop, and portable audio devices to improve the video and audio quality. This proved to be successful and added consistency and quality to the combined multimedia product.

Since the initial trial of this combined digital media technology, RTI has applied this tool as a vehicle to deliver a host of forestry-related information. The initial concept of quickly reproducing individual presentations and entire conferences for rapid dispersal was realized when over 100 different productions were streaming from the RTI website. These productions can be used by the speakers to improve their delivery, by conference attendees as a source of continued review, and as

an easily accessible and sharable resource location. Since the publications are housed on the internet, they can also be discovered by otherwise unaffiliated persons via internet search engines.

This technology can also be applied to a field trip setting by capturing the speaker with a portable digital video camera while taking digital still photos of the various discussion topics. A slideshow of the discussion topics can then be made with the digital stills in Microsoft PowerPoint to be synchronized and published in the same manner as a formal presentation. To produce an instructional tutorial is another application that would allow the user to focus on concepts or repeat directions when necessary. This interactive combined media technology fits well with RTI's goal to increase access to forestry technology and information. It should not be expected to replace personal contact, yet rather used as a powerful supplementary outreach tool.

Costs and Limitations

The application of combined digital media technology has its costs and limitations. The initial cost is the purchase of equipment (see Table 1). This cost has a high level of variance related to the many grades of equipment and the intended quality of the final product. There is also a substantial amount of work that goes into recording and production that will vary in cost depending on the salary and efficiency of the individual working (see Table 2). The cost of the software is usually negligible due to the fact that most organizations and institutions run Microsoft Windows® on their local and network computers. A major contributor to RTI's decision to use Microsoft Producer was its availability as a free add-in to Microsoft PowerPoint.

Equipment	Estimated Cost
Digital video camera	\$400 - \$2000
Tripod with remote	\$100 - \$200
Wireless microphone	\$200 - \$800
9-volt rechargeable batteries and charger	\$50
Lighting and stands	\$800 - \$2000
Canvas backdrop and stands	\$300
Video editing workstation (PC computer)	\$2000
Streaming media server	\$2500
Web server	\$2500
Software – Microsoft Windows 2000 or XP	\$100
Total Estimated Cost	\$8,950 - \$12,450

Table 1: Estimated cost of equipment needed to record, produce, and serve combined digital media as a distance learning tool.

Record and Production Activity	Estimated Time
Record a 1-hour presentation	1 hr
Transfer presentation to computer	1 hr
*Synchronize and edit in Microsoft Producer	1 – 4 hrs
**Publish project to local computer or network location	1 – 2 hrs
Total Estimated Time for a 1-hour Presentation	4 – 8 hrs
Estimated Cost at an Hourly Rate of \$15	\$60 - \$120
* Variable due to efficiency and skill of editor	
** Variable due to the number of different speeds the final project will be published at (56 kbps, 100 kbps, 150 kbps, 300 kbps, and/or 800 kbps).	

Table 2: Estimated amount of time and related cost to record, edit, and produce a 1-hour presentation.

The main limitation of this technology is that the process is purely Microsoft based. The final combined digital media product is built to work in Microsoft Internet Explorer®; although it works in several different web browsers, there is often limited to no interactivity between the table of contents and the user. Additionally, there are some web browsers that will not open or play the final production. This technology, as used by RTI, is also PC-based, and does not consistently work well with Mac computers. The cost to produce a comparable product that would work across all computer and browser platforms would be substantially increased, both in the equipment and production time. Since RTI monitors the operating system and browser use of all website visitors, and knows that 95% of the visitors use Microsoft Windows and 85% use Microsoft Internet Explorer, it was decided that this limitation was acceptable for the purpose of using combined digital media as a distance learning tool.

Measuring the Results

The Rural Technology Initiative has adopted the process of combining several different forms of digital media into one interactive distance learning tool. Over 100 presentations given in lectures, meetings, studios, and conferences have been recorded, edited, and published to stream from the RTI website (<http://www.ruraltech.org/video/>). The user statistics recorded for the RTI media server are used to gain a general understanding of the success of specific presentations or entire collections. In 2004, the number of unique visitors to access video from the media server was almost 600, and doubled to nearly 1300 unique visitors in 2005. The ability to sort the videos by the number of times they were accessed by a unique visitor makes it possible to rank the presentations and can be used to gauge the success of the presentations and the interactive distance learning tool. This is not a perfect source of feedback, however, since it lacks user response with regards to how well the technology worked for them. Given the high cost associated with an actual survey and the difficulty in contacting the multitude of users that have accessed video from the RTI media server, however, the use of media server statistics has been deemed an acceptable measure for RTI's purpose.

Other forms of feedback encourage the continued investment into this combined digital media as a distance learning tool. The Digital Information Specialist at RTI trained staff members at Washington State University (WSU) Cooperative Extension and Montana State University (MSU) to use this technology, enabling both institutions to provide additional learning tools to their constituents. That WSU Cooperative Extension has hundreds of video presentations streaming from their website is testimony to their perceived value of this technology. Personal contact with the recording and editing staff at MSU continues to be positive; faculty interest and funding there has increased enough to justify the purchase of a new digital video camera, lighting, and a web server. Lacking a formal survey, these sources of feedback, along with a multitude of unsolicited responses, are enough to merit continued support and use of this technology by RTI.

Conclusion

The power of this distance learning technology is in the capability to combine several digital media into one interactive package. The ability to publish this combination of video, audio, slides, images, HTML links, and an interactive table of contents at multiple levels of quality over the internet, closed networks, and to local computers makes this tool accessible to a wide variety of audiences. The short amount of time between recording a presentation and serving it over a network guarantees the timeliness of the information being published. And, the interactive aspect of on demand

streaming video allows multiple users to watch and navigate through a presentation at their own paces.

The Rural Technology Initiative perceives that the potential application of this technology to increase the audience of lectures, conferences, workshops, and fieldtrips, and to be used as an instructional device and a presentation critique, outweigh its costs and limitations. This interactive distance learning tool has already helped RTI better attain its goal to increase the accessibility of forestry technology and information, and the technology will continue to be improved to make it more streamlined, more user-friendly, and more accessible.

The research in this Fact Sheet was sponsored by the National Commission on Science for Sustainable Forestry (NCSSF). For more information visit the RTI website at www.ruraltech.org or contact Kevin Zobrist, Rural Technology Initiative, University of Washington (206) 543-0827.

¹ Bouthillier, Larry. Streaming vs. Downloading Video: Understanding the Differences. July 22, 2003.
<http://www.streamingmedia.com/article.asp?id=8456&page=2&c=11> (as of 05/05/2005).



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