

The Economy of Multimedia: Documenting Art Studio on a CD-ROM

Jared Ethan Bendis
Case Western Reserve University
jaredjared@earthlink.net

Abstract

Beyond technical considerations, the integration of multimedia in education requires the consent, participation, and enthusiasm of the educator. To foster this relationship, I volunteered to develop a CD-ROM documenting a Raku ceramics workshop to demonstrate the power of technology in cooperation with established pedagogical goals. This paper outlines in detail the technical considerations that went into the production of this diverse CD-ROM. The production was grounded in the idea of the 'economy of multimedia' following a pragmatic path of realism and compromise to obtain a goal with available resources. These constraints did not limit the variety of media elements or the technical and creative application of their use.

The purpose of the CD-ROM is to follow the pedagogical outline of the workshop and to share experiential learning as well as concrete instructional demonstrations on Raku; it also serves to educate about the potentials of multimedia and of instruction with multimedia.

Keywords: multimedia, education, QuickTime VR, anaglyph, panorama

1 What is Raku?

Over the past 16 years Tim Shuckerow, the Director of Art Education at Case Western Reserve University, has been conducting a two-week intensive workshop in Raku ceramics. The workshop, which is offered as a 3-credit academic studio course, is also offered as a continuing education workshop open to members of the community. This workshop is taught, not on the main campus, but at Squire Valleeve, the University owned farm just outside of Cleveland, Ohio. Students in the class learn how to design projects in clay and to fire them using the Raku process in which ceramic pieces are buried in fiery pits creating a smoky black appearance. More than an art studio class, the workshop is an experience for all involved, which incorporates art, culture, performance, friendship, and often some good food. Students who complete the workshop are invited to participate again the next summer as advanced students and some have repeated the workshop 3 or more times.

2 Why a CD-ROM?

Having attended the workshop in 2000 and again in 2001, I wanted to find some way of sharing the experience and some of the lessons from the class with others. While discussing what projects I could do over the summer of 2002, Tim Shuckerow suggested I do 'one of these CD-ROM things you are always talking about.' Tim, as my graduate advisor and longtime friend, has often heard me evangelize teaching with multimedia and the teaching of multimedia, and he was willing to let me show him first hand. Already a 2-year veteran of Raku, I had a good idea of

what the process and projects were going to be, and what would be involved in documenting things along the way.

The course is ever changing, so I also knew to expect some surprises. This year the biggest surprise was having over 20 students, comprising beginning and advanced students, as well as numerous community members. Even with a larger class size, it is still a small workshop, and many who would be interested are not able to attend. While a CD could not serve as a replacement for taking the workshop, it allows the viewer to get a sense of what the workshop was like. The pedagogical goal of the CD was to mix instructional demonstrations, student work, cultural experiences, and the space of the farm itself to create an experience for the viewer as well as a repository of useful information.

3 The Economy of Multimedia

At every stage during the development of a CD I need to focus on the 'economy of multimedia'. Everything about multimedia production is a compromise, and my constant attention to this results in a stronger final product. What equipment do I have available to be used during shooting? during post-production? How much time will I have to shoot? What sort of access will I get? How much room do I have on the CD? Will serendipity work for or against me? How much time do I have to post? At every step along the way it is important to be able to weigh the consequences of compromise and know when to walk away from a part for the good of the whole. Multimedia is about perception: how much detail, information, quality, and time need to be invested to make the viewer effectually and affectually experience your vision? This is the 'economy of multimedia' and it is the key to the successful completion of any project I work on.

4 The Multimedia Elements

As a producer of multimedia I tend to work with 8 types of media elements: Video, Panoramas, VR Objects, Photography, 3D Photography, Text, Animation and Computer Modeling.

1 - Video

Digital video is at the heart most CD-ROM projects. Today, when MiniDV cameras are so inexpensive, many are surprised to find that I used an 8mm Sony camcorder for this project. There are several reasons for this. First, I already own one, and I was funding this project completely out of pocket. Second, the slightly larger body on the Sony 8mm camcorder makes it a little easier to hold and gives a steadier image. Lastly, the final video was to be encoded as a Video-CD (VCD) quality MPEG1, so in the end there wouldn't be a noticeable difference in quality.

VCD MPEG1 streams are encoded at a resolution of 352x250 at 29.97FPS with a data rate of approximately 10 Megabytes per minute. VCD video provides sufficient resolution when incorporated into a multimedia project, and it provides a consistent level of quality at 10MB per minute. As with most projects involving video, I went in knowing that I would be able to incorporate about 1 hour of video (in clips) into the final CD.

For editorial and technical consideration (see section on Post Production) I needed to incorporate more than 1 hour of video on this CD. In order to be able to lower the data rate from 10 Megabytes per minute to 5 Megabytes per minute I would have to lose something. Not wanting to sacrifice video resolution, I halved the frame rate from 29.97 to 14.985FPS and converted the audio track from stereo to mono. This process allowed me to create smaller video files and in the end, I incorporated more than 2 hours of video on the final CD.

2 - QuickTime VR - Cubic Panoramas

Whenever the 'location' or space of a project is of interest I know I will need to include QuickTime VR Panoramas in the project. VR Panoramas are inherently multimedia. Video and stills can stand alone in their respective elements, but VR Panoramas are by nature interactive: they must be viewed with multimedia technology. The magic of a panorama is taking a view that encompasses more than human perception—an image which sees everything at once—and then translating that with an interface that allows the user to view it within the scope of human perceptions. A panorama presented in this way effectively transports someone into that space and allows them to study it, often with greater attention to detail than if they were there.

My original foray into VR Panoramas was using a Casio digital camera with a stitching mode that allowed me to create very rough cylindrical panoramas. The technology has greatly improved since then, and instead of that Casio I use a Nikon 880 with a spot fisheye, a Bogen tripod, and a Kaidan tripod head which allows me to take 3 pictures and convert them into a single cubic representation from a point in space.

3 - QuickTime VR - Objects

QuickTime VR Objects are like panoramas inside out. Unlike panoramas, where the camera spins around, with VR Objects, the object spins around and the camera remains stationary. In the end, what looks like a picture of an object is actually the object on a Virtual 'Lazy Susan,' and you can spin it and see it from all sides. It is rare that I get to incorporate VR Objects into a project, but with art, particularly in this case with ceramics, where working 'in the round' and viewing objects from all sides is a significant lesson of the class, I knew how useful it would be to include them.

4 - Photography

While video, panoramas, and virtual objects are exciting and potentially interactive, sometimes you just need good old photography to glue multimedia together. Still images work. Whether taken with a digital camera or a film camera and later scanned, digital photography is an essential part of the documentation process and is useful for capturing a moment in time, a detail, or a point of view.

5 - 3D Photography

Stereoscopic/3D photography is a personal passion and hobby of mine. Stereographic views add (literally) an extra dimension to the visuals in a project. It is surprising how often 3D photography adds something extra to a scene.

The 3D photographer's camera of choice is the 'Stereo Realist' camera, and I had used one during the summer of 2001 to take some shots of the workshop. However, this camera is fully manual and is too much to juggle with everything else. Instead, I opted to use the Argus 3D Camera kit (marketed at the time via the Discovery store). This camera is a fixed focus, fixed shutter speed, point and shoot 35mm camera. The lack of controls on this camera means it's a little harder to compose effective 3D, but development and processing are easier. To include the stereo views in a multimedia piece I needed to post-process the images

and create anaglyphic (red/blue) views that can be seen with red/blue glasses (which then get included with the CD).

In my experience, the inclusion of red/blue glasses brings added enthusiasm and curiosity to a project. While this phenomenon was originally unintentional, I appreciate anything that gets people excited about my work.

6 - Text

Many overlook text as a media element. As a computer professional you get acclimated to text. Text is everywhere; text is part of everything. However, as an artist you learn how text is something you can consciously choose to include or exclude. As this CDROM is an educational piece, I knew I wanted to include text. That said, I spent time taking notes and gathering any of the textual materials given out in the class, as well as composing the text and gleaning out textual elements from unused video segments.

7 - Animation

If you can't video it, animate it. Sometimes it is easier to demonstrate something in a cleaner or clearer fashion by using computer animation. For the Raku CD I didn't need to do much animation. Tim is a very good teacher and his demonstrations were very clear and the realism of the video is more powerful than a 'simulation' of a demonstration. However, animation was used as an effect for the user interface: titles move; buttons swell and add just a little bit of multimedia continuity to the whole. This animation is gravy—but its importance to multimedia should not be overlooked. If the interface isn't pleasant then the entire CD will be less effective.

8 - Computer Modeling

The previous summer I had used Caligari trueSpace to model and plan out a coil pot that I was going to build in clay. This was a great theory that worked only to a point. I didn't take into account gravity's effect on wet clay, and the pot collapsed before it dried. Nonetheless, the idea that items could be modeled via the computer or visualized (pre or post) is something that I kept in mind during the entire process. In the end the workshop is about real-world experience with clay, not about the theory of working with clay, and the only computer modeling that was done was the translation between a satellite image of the farm and the simplified vector layout of the key elements of the farm for the interactive map. While on the face this is just eye-candy, it creates a strong bridge between the photographic reality of the panoramas and the photographic reality of the satellite image which is less familiar than a regular map.

5 Documenting the Workshop

When it came time to record the workshop I packed up all my equipment (see Resources section) and brought it with me daily to the farm.

Recording the video posed the biggest difficulty for this project. Tim Shuckerow is a very dynamic speaker; he is loud, boisterous, in your face and very unpredictable. While these qualities make him an excellent teacher and a great subject for the camera, I knew that I couldn't just lock the camera to a tripod and let it run. Instead, I handheld the camcorder during Tim's demonstrations and much of the student interactions. In between videotaping, I would pick up my other equipment to record other elements. Only once during the two weeks was I able to shoot video via a tripod while simultaneously shooting stills. My seemingly random process of recording the workshop was, ironically, very well suited to the experience.

The Raku process itself is an exercise in organized chaos. In Raku, ceramic pieces, which have been previously fired, are fired

again in an outdoor gas kiln to a temperature of 1500 degrees Fahrenheit. These pieces are pulled from this kiln (still at 1500 degrees) and taken to pits in the ground filled with combustible materials and then sealed. The carbon from the smoke is sucked into the clay, coloring it a smoky black and gray.

My goal was to participate in the class, record as much of everything as possible, and stay out of everyone's way. I soon realized that even during quiet times it was critical to always have the camera nearby and in standby mode to capture the unpredictable moments such as small explosions in the kiln or someone saying something off the cuff and funny.

I experienced some audio recording difficulties along the way. The built-in microphone on the camera is fantastic: it picks up all of the ambient noise, which in this case is useful, for you can hear the overlapping conversations, the birds chirping, and, regretfully, the wind. Most of the class takes place under a gazebo outdoors and I was a slave to the environment. I didn't give Tim (or anyone else) any direction and people stood or sat where they liked and moved around as they felt. This was the big tradeoff. By staying out of the way I was able to record people naturally but I was unable to rig microphones or set the shots in the most professional way. This lends spontaneity to the project that is one of its strengths, for it captures the communal and interactive feeling of the workshop.

During the 2-week workshop, we work on several projects, and many of the procedures are repeated: we have several Raku firings; students create several coil pots and masks taken from plaster molds of their faces. After I had recorded a section of video, I went back and recorded the process again using the digital and 3D cameras. The panoramas were shot in between the workshop activities since shooting them is quick (post processing them takes more time).

When working in ceramics it is very common to work 'in the round' using a banding wheel. This is a metal wheel that spins smoothly on a heavy base. I purchased one of these wheels and painted the top surface black. I then subdivided the edge of the wheel into 16 equal spaces and marked them with dots. As students would complete a piece, I would place it on the banding wheel, place the camera on the tripod and shoot 16 images, rotating (by hand) the wheel each time. The biggest difficulty with this was that I was shooting outdoors over time and the sun would often change and some of the lighting isn't perfect from shot to shot.

Over the 2 weeks I shot over 7 hours of video, hundreds of digital and 3D film images, and dozens of raw panoramas and objects. During this time I also managed to build a coil pot, several sculptures, and a whistle; I even participated in several Raku firings.

6 Filling in the Gaps

Before Post-Production began I started to inventory, categorize, and in general review the material I had recorded. During the workshop I had been 'at the mercy' of the course. I couldn't storyboard, I couldn't script and whatever I was able to capture was what I had to work with. Upon reviewing the material it became clear that I needed more images of the final products to round out the project. Six weeks after the workshop the students held a Raku show at the Art Education gallery on the main university campus. At this show I shot stills of many of the finished masks; I was also able to shoot many VR objects, all in a fairly controlled lighting environment and with a white background.

I also decided to cheat a little bit. I had been given some funny digital shots of Tim and myself by someone who had visited the class, and I realized that I might have other images in my possession that could fill in the blanks. I went through the 3D

photos I had taken the summer before and found many images that 'fit' in with the images from this summer. The best part of this was that many of the students in the pictures from the previous summer repeated the workshop and would match this year's pictures and video.

When I started to mine for additional footage I also found that sometimes I was able to find one medium inside another. For instance, ineffective 3D images could turn into decent regular stills or on occasion I could use a still from the video instead of the video clip itself.

7 Post-Production

The post-production process started with an intensive, note-filled viewing of the over 7 hours of raw video footage. During this time the footage fell into the main categories forming the primary units for the CD: The Experience, The Projects, and The Process. A further breakdown would create the individual modules of the CD. The Experience contains Location, Lunch, Animals, Culture and Fun. The Projects contains Kiln God, Pinch Pot, Beads, Masks, and Coil Pot. The Process contains The New Kiln, Glazing, Bisque Firing, Pulling/Cleaning, and Safety/Oops. All media elements would be sorted into these units and modules during post-production.

The video was digitized using a Hollywood DV Bridge and an IEEE1394 card that converted the analog 8mm tapes to a DV encoded AVI stream. The simple video clips were edited using QuickTime Pro, and the more complex montages were created using Adobe Premiere; additionally, some audio was tweaked in Sound Forge XP. My original intention was to edit down or time-lapse the demonstrations to get the total video time under the available 1 hour. After watching the tapes, however, it was clear that the power of the demonstrations was their spontaneity and clarity. It was much more effective to watch Tim actually build the base and several coils of a pot in 10 minutes than to shorten it and feel that you missed something. Once I decided to keep the demonstrations uncut I knew I would have more than one hour of video and economy would come into play. By changing the data rate I was able to squeeze over 2 hours of video onto the final disk. This was done using TMPGEnc to transcode the video to an MPEG1 clip with a data rate of 5MB per minute.

QuickTime VR is a passion of mine, and I feel that not only is shooting the images an art, but that the post-production is as well. The 3 fisheye spots are loaded into PTGUI (the user interface to Panotools), the control points selected, and the image is converted into an equirectangular image. This image is loaded into MGI Photovista (now by IseeMedia) and converted into 6 cubic faces. These faces are loaded in Photoshop and are color corrected and cleaned up (dust and lens flare manually removed). This image is then loaded into Neat Image, which removes the digital noise. Then I go back into Photoshop for a 'title cap' over the tripod spot. The image is brought back into MGI Photovista to convert it back into an equirectangular image. It is edited one last time in Photoshop (for stray pixels). The image is loaded into a panoramic viewer to obtain the initial Pan and Tilt. Finally, the image is converted into a QuickTime VR file using the PanoCube utility by PanoShow.com. I have to make sure to always set the field of view to between 50 and 65 degrees to be close to the field of view of the human eye. There are faster ways to make a QuickTime VR panorama, but this process makes a very clean and 'natural' image.

The images for the QuickTime VR Objects are edited and color corrected in PhotoShop and then loaded into PictureWorks' Spin PhotoObject. This software was purchased by IPIX and taken off the market, but it was bundled with 2 of my Casio cameras and is still functional (if the images are scaled down below 800x600 first). The software aligns the images and outputs

a QuickTime VR Object. There are several other packages on the market that create objects; however, Spin PhotoObject is just a good example of a tool that works just as effectively even though it is many years old. The surprise with the QuickTime VR objects is how well they actually factored into the final work. Often on the CD I will show a video of Tim talking about an object while simultaneously presenting the QuickTime VR object for study. Not only does the QuickTime VR object complement the video, but perceptually it enhances the quality of the video as the object serves to fill in the details on the lower resolution video.

To anaglyph a photo (turn it red/blue) I first needed to decide if it would look better as a black and white anaglyph or a color anaglyph. Black and white anaglyphs give a truer 3D and a cleaner look because there is less of a chance that a color (like yellow) will distract one of the eyes. It is a judgment call, and I chose to go with color anaglyphs because most of the time viewers prefer a color picture. To convert the two images into a single red/blue image, the right image needs to have the levels of the blue and green output channels reduced to zero; this leaves the red image. The left image needs to have the levels of the red output channel reduced to zero, leaving a blue image. These two images are brought together as layers blended with Multiply. The next step is to adjust the stereo window by aligning the two images together for the most effective depth. The image is then flattened and saved. Images that don't work out as 3D images might still be useful as 2D images. I had originally intended to include a feature on the CD that allowed the viewer to toggle the 3D views on and off but had to drop this due to time and space considerations – again the effects of economy.

After all the media was assembled, I had more data than I had room. One simple solution was to go back and re-JPG the images. This was a quick and easy way of dropping about 20 megabytes of data.

With all the media prepared, I started to build the interface. The easiest way to integrate video, QuickTime, and other media elements is to author in Macromedia Director. I used Director to create the modules and units and the navigation between them. For the interface elements I used Macromedia Flash to create the buttons and menus. Text content was added to each of the modules, and then the modules were reviewed, revised, and re-ordered. It was very important in this stage to have a clear idea of what the CD would look like, to keep it consistent and then to make sure that the content delivered the correct message.

I've worked on enough multimedia projects to know that I would want a quick way to jump to various media elements, and I decided to include a framed HTML index to access the media elements, which is secondary to the main multimedia interface.

Post-production took many months, and while squeezing all the content to fit on one CD is challenging, the hardest part was the identification of pedagogical goals, sorting the content, and the creation of an effective user interface.

8 Results

The final CD was stuffed with content. In the end the CD contained: 84 video clips with over 2 hours of video, 18 - QuickTime VR cubic panoramas, 40 QuickTime VR objects, 64 - 3D photos, and 62 - 2D photos, all wrapped in a user interface with animated elements and the QuickTime installer for Windows.

The Raku Experience CD-ROM premiered at the 'Semester in Review' show at the Art Education Gallery in the Fall of 2002. The response to the CD has been very positive. People found the user interface easy to navigate and poked around the various elements of the CD. I was sure to include a small guide to help users locate some of the highlights of the CD such as the interactive map. The only mistake that I made (which is easily

corrected) was the inclusion of anaglyph (red/blue) glasses with temples instead of the hand held ones—people tended to leave the glasses on when viewing non-3D material. Next time I will be sure to use the hand held glasses. The best critique for me was that Tim Shuckerow was very pleased with the CD and intends to show it to students and other Art teachers. The success of this project has spurred discussions on the possibility of working on less experiential and more instructional CDs for the education of art techniques.

9 Acknowledgements

It's fun to think of the CD as a solo project: I shot all the film and video, I post processed the media and designed the interface, but the truth is that there was a lot more to this CD. The content is all Tim Shuckerow teaching his students without script or multiple takes, and I want to thank Tim for letting me participate in the Raku class and giving me free reign to photograph, videotape, document, and edit the CD the way I wanted to. In addition I want to thank, and give credit to, all the students from the summer 2002 class who let me record them (and their artwork) and who really are the heart and soul of what is seen on the CD.

Thanks also to the Raku students of 2000 and 2001 who might show up in a photo or two that I took during those classes, Chris Zielski for all her support, Anna Locci for providing the satellite photographs of the farm, John Richards for the Giant-Tim/Mini-Jared photos and to whoever was holding the camera in the few pictures that you can actually see me. Lastly, thanks to my fiancée Amy McAlpine for editing this paper.

10 Resources Used in the CD Development

Hardware: Nikon Coolpix 880 3.3 Megapixel digital camera, Bogen tripod legs, Kaidan Kiwi 880 tripod head, Nikon FC-E8 fisheye lens, Cullman Magic II tripod, Banding wheel, Zio! USB Compact Flash reader, AcerScan 320U USB scanner, Dazzle Hollywood DV Bridge, Sony 8MM HandyCam camcorder, Argus 3D Camera kit, Stereo Realist, Pentium III 933Mhz system with 512MB RAM and 80GB HD, Mindstor Digital Wallet

Software: QuickTime Pro, Adobe Premiere, TMPGEnc, PTGui, PanoTools, Adobe Photoshop, Neat Image, PictureWorks Spin PhotoObject, MGI Photovista, PanoCube, Macromedia Director, Macromedia Flash, Microsoft Word, Microsoft Excel, Data Becker Sound Clips 10,000, Sound Forge

Links of Interest/References

ADOBE – PHOTOSHOP & PREMIERE – [HTTP://WWW.ADOBE.COM](http://www.adobe.com)

APPLE QUICKTIME – [HTTP://WWW.APPLE.COM/QUICKTIME](http://www.apple.com/quicktime)

ARGUS - 3D CAMERA KIT -
[HTTP://WWW.ARGUSCAMERA.COM/ACCESSORIES.HTML#3D](http://www.arguscamera.com/accessories.html#3D)

BEREZIN - 3D GLASSES -
[HTTP://WWW.BEREZIN.COM/3D/DEFAULT.HTM](http://www.berezin.com/3d/default.htm)

CASE WESTERN RESERVE UNIVERSITY - ART EDUCATION HOME -
[HTTP://WWW.CWRU.EDU/ARTSCI/ARTEDU/CONNECT.HTM](http://www.cwru.edu/artsci/artedu/connect.htm)

CASE WESTERN RESERVE UNIVERSITY - SQUIRE VALLEEVUE FARM
- [HTTP://WWW.CWRU.EDU/FARM/INDEX.HTML](http://www.cwru.edu/farm/index.html)

DAZZLE – HOLLYWOOD DV BRIDGE -
[HTTP://WWW.DAZZLE.COM/MAIN.HTML](http://www.dazzle.com/main.html)

ISEEMEDIA – PANORAMIC SOFTWARE -
[HTTP://WWW.ISEEMEDIA.COM/](http://www.iseemedia.com/)

JARED BENDIS' HOME PAGE – [HTTP://WWW.JAREDJARED.COM](http://www.jaredjared.com)

K Aidan – PANORAMIC TRIPOD HEADS - [HTTP://WWW.KAIDAN.COM/](http://www.kaidan.com/)

MACROMEDIA – FLASH AND DIRECTOR -
[HTTP://WWW.MACROMEDIA.COM/](http://www.macromedia.com/)

NEAT IMAGE – IMAGE CLEANING SOFTWARE -
[HTTP://WWW.NEATIMAGE.COM/](http://www.neatimage.com/)

PANOGUIDE - PANORAMIC TUTORIALS-
[HTTP://WWW.PANOGUIDE.COM/](http://www.panoguide.com/)

PANOTOOLS – PANORAMIC SOFTWARE - [HTTP://WWW.FH-FURTWANGEN.DE/~DERSCH/](http://www.fh-furtwangen.de/~dersch/)

PHILO'S PANORAMIC PHOTOGRAPHY PAGE – PANORAMIC
TUTORIALS - [HTTP://PHILOHOME.FREE.FR/PANORAMA.HTM](http://philohome.free.fr/panorama.htm)

PTGUI – PANORAMIC SOFTWARE - [HTTP://WWW.PTGUL.COM/](http://www.ptgui.com/)

TMPGENC – MPEG TRANSCODING SOFWTARE-
[HTTP://WWW.TMPGENC.NET/](http://www.tmpgenc.net/)