

Digital Portfolios
Senior Project portfolios from notebooks to CDs
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Rationale

The portfolio is an essential component of the Senior Project experience. It documents the application of the research into a project and demonstrates the ability of the student to complete fundamental information gathering and dissemination skills. The Senior Project experience lends itself well to the exhibition and application of technological skills. Senior Project teachers should see that students who would like to move beyond the notebook portfolio are given the opportunity. Those digital portfolios can be more easily disseminated to the community judges for evaluation. Digital portfolios are not difficult to create using current software and hardware commonly existing in nearly every school

The acquisition and exhibition of technological skills by a student is a good reason for the student to choose to demonstrate his/her abilities in a Senior Project portfolio, which lives on a CD, rather than in a notebook. The student furthermore, can more completely document his/her application of the research with sounds, animation and images.

Many students choose to create web pages as projects. Many others use formats that are easily digitized like photography or music. Technology is the base of many projects and because of this, most students have the technological skills necessary that they can integrate and apply in the creation of digital portfolios.

The integration of technological skills necessary in the development of the portfolio is impressive. It is exactly what the student will have to do in higher education and work; digitally research, write about it digitally, prove they applied the research through digital documentation, and then talk about the project to a panel of adult judges with a digital presentation.

For the teacher, the digital portfolio offers important portfolio evaluation possibilities. From linked sources in the research paper to greater evaluation possibilities. A research paper may have its sources linked on-line thereby preventing plagiarism.

The evaluation process is important to the students; they want the evaluators to take the portfolio as seriously as the student took it in its creation. A web-based or portfolio CD aids giving evaluators more time and flexibility in the evaluation process. Access for evaluation is greatly expanded. More than one evaluator can view the portfolio at his/her own leisure. The best thing for the teacher is that he/she doesn't have to lug around boxes of notebook portfolios.

Digital portfolio examples

Joe O. produced an exceptional CD portfolio. Essentially, Joe's portfolio is a web page on a CD. Joe wrote his paper on copyrights and for his project he composed music. In the paper section of his portfolio, Joe linked his sources, a powerful documentation resource for teachers to check for plagiarism. To document the composition of his copyrighted music, Joe recorded the music in WAV and midi formats to the CD in the portfolio with the relevant journals. Joe used Macro Media Director and sound applications to create his portfolio. Joe's work is at the higher end of the digital portfolio creation process, but not beyond many students.

To demonstrate the possibilities of the web-based portfolio this teacher produced a web page portfolio. The portfolio is posted at <http://www.teachweb.org>; look in the upper left hand frame for "G. Thomson's Senior Exhibition" at the top of the left frame. The posting of a portfolio has advantages, accessibility is greatly increased but so too is privacy reduced. This privacy issues can be solved through the limited distribution of the URL address of the portfolio or by saving the web page to a CD that can then be view in by an Internet browser.

To create this portfolio the teacher wrote the required documents (letters, research paper etc.) on a word processor, and then transferred the documents to the PDF format using Adobe Acrobat 4 0. and HTML using Netscape

Composer. The various PDF documents were then linked on a Netscape Composer web page in an HTML format. An introduction page containing the research paper, letters, journal and documentation, speech and other portfolio documents were linked to the PDF and HTML files in a web page

The research paper is also posted is HTML based. The reference citations in the research paper are linked which allows for easier verification of citation sources. The teacher can click on a citation in the works cited page or in the text and, if on-line, jump to that citation directly. This is the future of research paper citation. Most word processors offer this option, but for the paper to be viewed by any person, regardless of the word processor they use the text must be saved as HTML or in PDF. In PDF the links are "hot."

The journal of the teacher's web-based portfolio includes links to other web sites that verify the project hours. Also included in the journal are photographs and scans of other documentary material. Netscape Composer, which is free, was used to create the HTML files. Composer is much like using a word processor; it is easy to use. The creation of links and the insertion of images are easy

Gaby M's digital portfolio combines traditional and digital components. Gaby composed and recorded original music as her project. She developed a traditional notebook, hard copy portfolio, but her primary documentation was the digitally recorded CD, "Alas." Many students may wish not to go completely digital, but use a combination and digitize some aspect of the portfolio.

Skills and standards

The development of a digital portfolio can be an interesting approach for the student to demonstrate technological, vocational and other skills. Given the pervasiveness of the web in work and school settings, the development of digital portfolios can give the student essential practice with skills in demand.

In 1991, the Secretary's Commission on Achieving necessary Skills (SCANS), U.S. Department of Labor, issued a report on the competencies, skills and personal qualities needed to succeed in the high performance workplace. SCANS has become an important foundation for the training of the skills needed for success in the workplace. SCANS skills are met well by student development of a digital portfolio.

SCANS skills are divided in to two areas, workplace competencies and foundation skills. Workplace and the connection to digital portfolios competencies include:

- Resources – time, money, materials, and staff.
- Interpersonal skills- working in teams and taking individual initiative.
- Information – acquire, evaluate, maintain and organize data with computers.
- Technology –select and apply the correct technology to do the job.
- Systems - design and understand technological systems

Arizona, like most states, sets standards in many subject areas. Arizona's technology standards, listed below, are similar to other states. All of the standards are covered completely in the development of a digital portfolio. In the development of the portfolio the student exhibits the application and integration of these standards, no paper and pencil test can match that test of real-world knowledge and problem solving.

Arizona Technology Education Standards

<p>STANDARD 1: Fundamental Operations and Concepts - Students understand the operations and function of technology systems and are proficient in the use of technology.</p> <p>STANDARD 2: Social, Ethical and Human Issues- Students understand the social, ethical and human issues related to using technology in their daily lives and demonstrate responsible use of technology systems, information and software.</p> <p>STANDARD 3: Technology Productivity Tools - Students use technology tools to enhance learning, to increase productivity and creativity and to construct technology-enhanced models, prepare</p>

publications and produce other creative works.

STANDARD 4: Technology Communications Tools - Building on productivity tools, students will collaborate, publish, and interact with peers, experts and other audiences using telecommunications and media.

STANDARD 5: Technology Research Tools - Students utilize technology-based research tools to locate and collect information pertinent to the task, as well as evaluate and analyze information from a variety of sources.

STANDARD 6: Technology as a Tool for Problem Solving and Decision-Making - Students use technology to make and support decisions in the process of solving real-world problems.

In addition to technology standards, Arizona also sets workplace standards. Arizona's workplace standards are based in the SCANS, as are most states workplace skills. Arizona Workplace Standard #5 states, "Students will demonstrate a set marketable skills that enhance career options." The development of the digital portfolio is fun for the student because it incorporates technology and creativity, but it is also the application of marketable skills. Standard #7 states, "Students demonstrate technological literacy for productivity in the workplace." The skill required in the design, production and presentation of the digital portfolio accurately meet these skills.

Digital portfolio development approaches

There are many approaches to the development digital portfolios. Digital portfolios can also be created in either slide or card type applications such as PowerPoint, Digital Chisel or Hyper Studio. These applications are highly self-contained allowing the student to have access to most to the tools necessary to create a sophisticated portfolio. There are a few problems that cause the card-based applications not to be as workable for the Senior Project portfolio as HTML based applications.

In the Senior Project process, the required letters, research paper, journals and other documents are created throughout the school year. These stand-alone documents, as well as documentation are difficult to put into one portfolio that is card based. The card applications work better with report-type projects or portfolios designed for creation during a limited period of time. The card type applications can also be saved to CD.

Two problems with card-based programs are first; the distribution to the judges is more difficult. Second, in the process of the Senior Project, taking nearly a full school year the portfolio needs to be continually updated. This is more easily accomplished on an HTML based program.

For that reason an HTML CD or web based portfolio works better for the development of the Senior Project portfolio. Documents can be created, saved and posted in progression. The letter of intent written early on in the process can be posted to a web based digital portfolio as can the board speech or self-evaluation that is about the last step in the process.

Adobe Acrobat is an excellent tool to use for the digital portfolio developer. Adobe PDF (portable Digital Format) takes documents typed in any word processor and turns them into a format which viewable on any computer with the free Adobe Reader software. Adobe PDF files are common at web sites and Adobe Acrobat Reader is free. It takes a full version of Adobe Acrobat to create PDF files.

Acrobat 4.0 is an excellent resource for production of digital portfolios because the student takes the documents they would produce normally on any word processor and easily produces a PDF with those documents. Once the PDF file is created it can then be saved to the web or CD and read, as it looks on the word processor, by anyone with Adobe Acrobat Reader.

Once the PDF and HTML files are created, an index.html or front page is developed in HTML. To create the index or home page of the portfolio a student can use the free Netscape Composer, a variety of inexpensive web page development applications to advanced applications.

The index page lists the PDF and html files of the portfolio, like a table of contents. The front page and all it's linked files then are transferred "burned" to a CD or saved to the web. Development of HTML web pages is easy, a lot like using a word processor, in a program like Netscape composer, Front Page or Adobe Page Mill. All work well, are easy to use and inexpensive or free.

To create a CD of the digital portfolio a CD burner is needed. CD burners are inexpensive and available at most schools. CD-R can be recorded once, so the student will develop and save the portfolio on a hard drive before burning the final draft to a CD. It is also possible to post as you go with FTP (file transfer protocol) or to use a CD-RW (read and write) that can be erased and rewritten, but need special CD readers/players to access the CD-RW disc.

To post to the web space on a server an FTP application is needed. Fetch for Mac or WS-ftp for windows are examples. Both are freeware most Macs come with Fetch installed. Windows applications and can be downloaded free from Tucows (<http://www.tucows.com/>). Please see a paper, "Class Web Page Options for Teachers," written by this presenter for instructions on the creation and posting of web pages at <http://nusd.k12.az.us/nhs/gthomson.class/web.teachers.paper.html>

Technological skills and hardware required

Current applications for producing web pages in HTML are based in the "What You See is What You Get" (WYSIWYG) idea making page development easy. Knowledge of HTML language is helpful, but not necessary. Web page authoring programs are much like using a word processor, skills well know by most students in their senior year.

Helen C. Barrett of the University of Alaska wrote in *Learning & Leading with Technology*, April, 2000 an excellent listing of the skills and software necessary for the development of a digital portfolio, Please see Appendix A for a hyperlink to the article and for the tables of skills and software needed.

Posting of a web page takes a little more, but not many more computer skills. Consider carefully the issue of the server upon which to post the web page. The school can choose to post all of some of the Senior Project digital portfolios. Permission and school administrative review of the portfolios necessary if posted at a school's page. It is possible to use the Internet as a complete showcase of the senior's project portfolios. The public showcase of projects is an import consideration of the Senior Project concept.

A student may choose to post the page at his/her own address. Most ISPs offer space of 1mb of server space with a subscription. The student could then be taught the ethics of web posting but would be ultimately responsible for the portfolio's public accessibility

An important consideration for the student is the amount of disk space necessary for the posting of a portfolio. For that reason, and to limit accessibility, a burned CD-R of the web page digital portfolio is a good option. The completed portfolio on CD is then distributed to the evaluators.

Because the CD is in HTML format, it can be viewed with any HTML browser like Netscape Communicator or Internet Explorer. The CD format also works with a card/slide type such as with PowerPoint, Hyper Studio or Digital Chisel possible for saving on a CD. Evaluators must have the proper applications to view the portfolio

Evaluation of the digital portfolio

Evaluation of the digital portfolio should be based in a grading rubric provided to the students before the students begin to work on the portfolio. The rubric should cover the content application and complexity of the paper's application in a project as well as the relevant technological skills demonstrated. Nearly all Senior Project schools already have a paper-based portfolio grading system. For a content grading rubric please go to Nogales High School's Senior Project grading rubric at, <http://nusd.k12.az.us/nhs/seniorproject/proj.port.rubrics/proj.port.link.pg.html>

For a technology grading rubric go to La Canada High School's grading rubric see "Digital Portfolios: An Enduring Promise for Enhancing Assessment" at <http://www.lcusd.net/lchs/portfolio/rubric.htm>

Teacher and school resources required

Schools can choose to produce digital Senior Project portfolios as an inter or intra class project in practically any technology related class. The school may also offer workshops during an intersession for year-round schools or as an after school workshop. The teacher pay required is well worth the school's investment for the integration technological skills that result.

For those students who do not have access to the necessary hardware and software and home, nearly all schools are technological goldmines. The integration of technology as an aspect of a public education is taken seriously by all nearly all schools. The student then, nearly always has the technology necessary for the portfolio's creation.

The digital portfolio does not eliminate the need for paper copies in the school; drafts, class Senior Project assignments and even a printout of the entire digital portfolio are often required. Students should be given the option of a digital or traditional Senior Project portfolio. The students will know that creation of a digital portfolio will be more fun, interesting and useful. PDF makes transformation of routinely produced word processor into web or CD based projects easy.

Conclusions

The student creation of Senior Project Digital portfolios provides the student with the opportunity to exhibit his/her ability to integrate technological skills and solves many evaluation accessibility and storage/transportation problems of Senior Project portfolios for the school.

Most of the software required to complete the task is free or inexpensive. Schools can do much to prepare their students for the technological problems they will surely face through the expectation of a digital Senior Project Portfolios.

Appendix A

Levels of software and hardware skills required

Taken from: "Create Your Own Electronic Portfolio Using Off-the-Shelf Software to Showcase Your Own or Student Work"

By Helen C. Barrett

Published in *Learning & Leading with Technology*, April, 2000

<http://transition.alaska.edu/www/Portfolios/iste2k.html>

Table 2. Levels of electronic portfolio software strategies based on ease of use.

- 0 All documents are in paper format. Some portfolio data may be stored on videotape.
- 1 All documents are in digital file formats, using word processing or other commonly used software, and stored in electronic folders on a hard drive, floppy disk, or LAN server.
- 2 Portfolio data is entered into a structured format, such as a database or Hyper Studio template or slide show (such as PowerPoint or Apple Works) and stored on a hard drive, Zip, floppy disk, or LAN.
- 3 Documents are translated into Portable Document Format with hyperlinks between standards, artifacts, and reflections using Adobe Acrobat Exchange and stored on a hard drive, Zip, Jaz, CD-R/W, or LAN server.
- 4 Documents are translated into HTML, complete with hyperlinks between standards, artifacts, and reflections, using a Web authoring program and posted to a Web server.
- 5 Portfolio is organized with a multimedia authoring program, incorporating digital sound and video. Then it is converted to digital format and pressed to CD-R/W or posted to the Web in streaming format.

Table 3. Technology skill levels.

- 1 Limited experience with desktop computers but able to use mouse and menus and run simple programs
- 2 Level 1 plus proficient with a word processor, basic e-mail, and Internet browsing; can enter data into a predesigned database
- 3 Level 2 plus able to build a simple hypertext (nonlinear) document with links using a hypermedia program such as Hyper Studio or Adobe Acrobat Exchange or an HTML WYSIWYG editor
- 4 Level 3 plus able to record sounds, scan images, output computer screens to a VCR, and design an original database
- 5 Level 4 plus multimedia programming or HTML authoring; can also create QuickTime movies live or from tape; able to program a relational database

Table 4. Technology Available

- 1 No computer
- 2 Single computer with 16 MB RAM, 500 MB HD, no AV input/output
- 3 One or two computers with 32 MB RAM, 1+ GB HD, simple AV input (such as QuickCam)
- 4 Three or four computers, one of which has 64+ MB RAM, 2+GB HD, AV input and output, scanner, VCR, video camera, high-density floppy (such as a Zip drive)
- 5 Level 4 and CD-ROM recorder, at least two computers with 128+ MB RAM; digital video editing hardware and software. Extra Gb+ storage (such as Jaz drive)

Appendix B
On-line Resources

Mt. Edgecumbe High School Digital Learner Portfolios

<http://www.mehs.educ.state.ak.us/portfolios/portfolio.html>

Excellent examples of non-senior project student produced digital portfolios. Good demonstration of the possibilities.

La Canada High School Digital Portfolio Page

<http://www.lcusd.net/lchs/portfolio/>

Excellent page of this high school's digital portfolio project. Includes project abstract, proposals, examples and instructions. Excellent, but not Senior Project related.

The Digital Portfolio - A Richer Picture of Student Performance by David Niguidula
Coalition of Essential Schools Annenberg Institute for School Reform - Welcome to the electronic report on the Digital Portfolio Project!

A paper from the coalition of Essential Schools on digital portfolios, complete, useful.

http://www.essentialschools.org/pubs/exhib_schdes/dp/dpframe.htm

Digital Portfolios by: Jeff Williamson of Del Rey Elementary School King City, Ca. _ excellent page of samples, how-to directions and software hardware issues. For all levels.
<http://www.monterey.k12.ca.us/~drey/disney/present1.html>

Directions for:

Converting MS Office 97 Documents to HTML.

Converting MS Office 2000 Documents to HTML.

Converting PowerPoint 97 to HTML.

Using Netscape Navigator and Composer.

Using Internet Explorer and MS Word.

<http://www.lcusd.net/lchs/portfolio/directions/index.htm>

Portfolio Samples by Martin Kimeldorf, author of *Portfolio Power*

This *Portfolio Sampler* is an example of a career portfolio which may look much like a Senior Project digital portfolio.

<http://amby.com/kimeldorf/sampler/>

Digital Portfolio Evaluation Rubric

<http://www.lcusd.net/lchs/portfolio/rubric.htm>

Digital Portfolios: An Enduring Promise for Enhancing Assessment

Regional Educational Technology Assistance of New Mexico- Lessons of elementary school digital portfolio development.

“Using Technology to Support Alternative Assessment and Electronic Portfolios”

<http://transition.alaska.edu/www/portfolios.html>

Dr. Helen Barrett, Assistant Professor, Educational Technology, School of Education, University of Alaska Anchorage write extensively about student developed digital portfolios. This is an excellent collection of links on the topic.

“Dr. Helen Barrett's favorite links on Alternative Assessment & Electronic Portfolios”

<http://transition.alaska.edu/www/Portfolios/bookmarks.html>

More collections of material on digital portfolios by Dr. Barrett

“Electronic Portfolios: A New Idea in Assessment” by Anna Maria D. Lankes. From ERIC

<http://ericir.syr.edu/ithome/digests/portfolio.html>

Digital Portfolios Reference Links

http://share1.esd105.wednet.edu/bishopcj/portfolios/Reference_Links.html

A collection of links for portfolio construction development construction lessons and other background info. Very complete.

“Digital Portfolios: An Enduring Promise for Enhancing Assessment”

Technology and Learning Network

http://www.techlearning.com/db_area/archives/WCE/archives/mricons.htm

Excellent articles on one teacher’s experience creating digital portfolios.

Pro-View 2.0- a standalone digital portfolio develop software for purchase.

http://www.e-magine.com/pv2_1.htm

CD-me <http://www.cd-me.com/>

A comprehensive, easy-to-use, *Digital Portfolio* creation system for purchase.

Multi-Media Enhancements

<http://www.mehs.educ.state.ak.us/multimedia/enhancements.html>

Directions and ideas for adding multi-media to a portfolio, as well as Adobe Acrobat and Hyper Studio instructions.

Digital Portfolios

<http://home.att.net/~digitalportfolio/>

A site for information about technology, assessment, and portfolios for students, educators, and schools.