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## Portfolios--from traditional to digital : research for understanding and implementation in the art classroom

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## Portfolios--from traditional to digital : research for understanding and implementation in the art classroom

### Abstract

Portfolios are a method in which educators assess student work. The traditional portfolio is generally a collection of papers stored for an intended purpose. There are many types and purposes for portfolios. Technology, however, has yielded some inventive methods for managing the many papers in the portfolio in a digital format. This term, digital portfolio, represents a technological presentation of student work. The differences in hardware, software, and peripherals have been investigated in this review. Along with the tools for management, the implementation in an art classroom is explored. The sustaining impact of the digital portfolio in the art classroom or any classroom is to broaden the assessment of the curriculum and to encourage student self evaluation and reflection through a presentation developed using technology.

Portfolios--From Traditional to Digital:  
Research for Understanding and Implementation  
in the Art Classroom

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by

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## Abstract

Portfolios are a method in which educators assess student work. The traditional portfolio is generally a collection of papers stored for an intended purpose. There are many types and purposes for portfolios. Technology, however, has yielded some inventive methods for managing the many papers in the portfolio in a digital format. This term, digital portfolio, represents a technological presentation of student work. The differences in hardware, software, and peripherals have been investigated in this review. Along with the tools for management, the implementation in an art classroom is explored. The sustaining impact of the digital portfolio in the art classroom or any classroom is to broaden the assessment of the curriculum and to encourage student self evaluation and reflection through a presentation developed using technology.

## Introduction

Educators commonly store folders of student work known as portfolios.

Portfolios can be used to assess student achievement, to improve instruction, and to find alternatives for norm and criterion-referenced testing. The traditional portfolio, a paper folder, can evolve into a richer picture of student learning when technology is introduced as the tool for managing the portfolio. By requiring students to present their learning and achievement in a digital presentation, the student actively demonstrates, assesses, and understands his/her skills and knowledge. The result is a product, an electronic portfolio, which can be useful for graduation requirements. The electronic portfolio fundamentally involves the student in a union of assessment and technology.

What are they? How can they be created in an electronic format? Why should they be used in art education? These are some questions to be addressed in this summative review of research and findings on portfolios, digital and traditional, in a variety of classroom settings which will then be applied to an art classroom. As Potter (1999) suggests, "Portfolios are a widely recommended way to assess the work and document the progress of students of all ages" (p.210). The keyword here is progress; progress is synonymous with growth, achievement, and improvement. In the art classroom, the portfolio is utilized for performance assessment of the student, not the teacher; the reasons for portfolio production are much different when compared to the core classroom, but should they be? Portfolio production can be useful in making connections for the student and teacher which will impact the learning environment and instruction. This makes the classroom more relevant for the learner. For this reason, it is important to discuss the advances of technology in portfolio production and ways to supplement and enhance the learning environment for both student and teacher as the need for more authentic and performance based assessment becomes a reality.

## Methodology

Viewpoints from researchers and educators using portfolios, digital and traditional, provide the information to consider for structuring and utilizing the portfolio in any classroom, but especially the art classroom. Milone (1995) suggests, digital portfolios “include integrating technology into the curriculum as a natural and essential part of learning, creating a student-centered educational environment, encouraging students to use many of their ‘intelligences,’ and offering projects which are rigorous and possible for all students” (p. 29). These ideals are representative of a constructivist approach to teaching which is representative of the work by educational psychologists, Vgotsky, Bruner, Piaget, and Gardner, and later translated into teaching practices by Brown, the Cognition and Technology Group at Vanderbilt, Spiro, Perkins, Brown, Campione, Bereiter, and Scardamalia (Roblyer and Edwards, 2000).

Information sources were selected from Electric Library, ProQuest, and EricSearch databases as well as professional educational and technology journals. Inquiries that included portfolios, electronic portfolios, and digital portfolios were selected for scanning and review in relation to the topic of portfolio development and production as well as the many ways to structure and use the content for assessment of the learner and instruction. Final sources offered perceptions on traditional portfolios, assessment strategies, organizational structuring of a portfolio, studies on schools implementing a system wide use of portfolio management, and digital/multimedia software implementation.



## Analysis and Discussion

Portfolios have been defined by many. Lankes (1995) suggests, "A portfolio at the K-12 level is essentially a collection of a student's work which can be used to demonstrate his or her skills and accomplishments....it includes other features such as teachers' evaluations and student self-reflection" (p. 3). Grace (1992), on the other hand, defines portfolios as "...a record of the child's process of learning: what the child has learned and how she has gone about learning: how she thinks, questions, analyzes, synthesizes, produces, creates; and how she interacts--intellectually, emotionally, and socially-- with others" (p. 2). Comparing these two definitions yields a comprehensive definition for portfolios; a collection of work, but more importantly, a record of the learning, cognitively, psychologically, and socially. The idea of portfolios being just a collection of work, eliminates the important aspects of learning that are not always evident with paper and pencil tasks. The psychological and social processes used are not always observable in cognitive tasks, such as standardized testing; through a variety of entries into the portfolio, the educator is able to assess and the student communicate the growth and achievement that have occurred through the delivered instructional activities.

As portfolios record growth, the type of portfolio used will be an important decision which sometimes confuses the educator. Danielson and Abrutyn (1997) identify three major types of portfolios: working portfolios, display portfolios, and assessment portfolios. Danielson and Abrutyn note, "Although the types are distinct in theory, they tend to overlap in practice...as a result, it is important for educators to be clear about their goals, the reasons they are engaging in a portfolio project, and the intended audience for the portfolios" (p. 1). Lankes (1995) identifies six purposes for the portfolio; the purposes include 1) developmental; 2) teacher planning; 3) proficiency; 4) showcase; 5) employment skills; and 6) college admission. Great

similarity in terminology exists between Lankes, Danielson and Abrutyn, and Johnson and Rose (1997). Appendix A clarifies the overlap between the three authors. Johnson and Rose suggest similar ideas, but are more specific, see Appendix B. The authors each identify a purpose and audience for the portfolio. The purpose, generally, is defined in terms of the educational outcomes while the audience is designated as the receiver of the information in the portfolio. Herbert (1998) suggests "Defining an audience is crucial" (p. 584). The audience and purpose are definitely two factors which must be taken into consideration before implementing a portfolio project into any classroom. Herbert goes on to say "Portfolios serve as a metaphor for our continued belief in the idea that children can play a major role in the assessment of their own learning" (p. 584).

Portfolios are more than just a product, there is a developmental process in which the teacher or school assumes responsibility for the transformation of instruction and assessment. Danielson and Abrutyn (1997) discuss a four-step process in portfolio development for the classroom. Another perspective (Niguidula, 1997) bases the steps of development on a series of systems with questions, vision, assessment, technology, logistics, and culture. Niguidula's steps will be discussed in future case studies. Danielson and Abrutyn's (1997) steps include *collection*, *selection*, *reflection*, and *projection*. The first stage, *collection*, requires much planning and organization. A purpose, the collection of materials, and communication with parents are essential components of the collection stage. The *selection* stage is demonstrated when the collected materials are sorted towards a final assessment portfolio or display portfolio. In this stage, the teacher will need to clearly state the criteria for choosing the pieces for inclusion in the selected portfolios. These criteria should be reflective of the overall learning outcomes of the curriculum. Along with criteria in the selection of the pieces, the educator must decide on quantity and the time element, meaning, when will one

have the students choose the pieces. The next stage of the process is the *reflection* stage, this stage allows student articulation about learning that has occurred with the individual selections. Lankes (1997) suggests, "Through this process of reflection, students become increasingly aware of themselves as learners" (p. 15).

The reflection skill is one that will need fostering in students lacking this skill. Specific instruction and support must be demonstrated through prompts, such as "I like this piece of writing because I..." (p. 16). The end result, in the reflective process, will be one of greater satisfaction for both the student and educator. A climate characterized by cooperative learning, volunteering, openness, respect, and trust will be visible in a portfolio centered classroom. The final stage, *projection*, is the goal setting stage. Students make judgments about their work. The portfolio is looked at as a whole to determine strengths and weaknesses and plan for future learning goals. These stages provide the background necessary to develop a portfolio project which will be educationally formed around the learner.

The advantages of portfolios, either traditional or digital, outweigh the disadvantages. These advantages stem from the process of building, rather than the product, even though it is of great value, because the portfolio allows students to become more involved in their own learning. "Portfolios," as stated by Danielson and Abrutyn (1997), "have been found to exert a powerful influence on school culture, affecting areas at the heart of the school and its mission: assessment, parent communication, professional development, and action research" (p. 19). Assessment is one of the key advantages for the movement in the use of portfolios. A reason for this is the movement to find better and alternative ways to evaluate how much the students actually know or have learned from the instruction. "Traditional testing and the reports for schools and districts are not particularly revealing about what students actually know and can do," (p. 21) claims Danielson and Abrutyn (1997). For this reason, the

study of portfolios as alternative assessment instruments has been addressed by many educational experts. Herbert (1998) states:

During the past 10 years we have learned so much more than we imagined. We now know quite a bit about what a portfolio is and probably more about what a portfolio is not. But what continues to energize our thinking after all this time is what a portfolio can be. (p. 583)

Potter (1999) has outlined a few advantages to portfolio use, they include the following: students can reflect upon their progress; the portfolios are useful as a focus in parent-teacher conferences; the children's self-assessment skills are developed; a child-centered approach to learning is established; and the motivation and responsibility of the student increases when they are held accountable for their learning. Farr (1991) suggests that portfolios support the following advantages: addresses goals; includes authentic assessments; valuable for both teachers and students; requires students to construct responses; requires students to apply knowledge; poses problems for students to solve with multiple solutions and resources; and presents realistic tasks and situations. Johnson and Rose (1997) explain the advantages in terms of the skills the students will utilize, such as, analysis, investigation, experimentation, cooperation, written, oral, and graphic. Johnson and Rose feel:

Portfolios allow students to internalize and reshape information. By actively working with the information, new cognitive structures called schemata, or mental models, are developed. The emergence or refinement of new cognitive structures enable students to rethink and understand their individual worlds. (p. 45)

As the research clearly shows, the advantages are numerous, but certain disadvantages do exist, they include: the inability of students to evaluate their own work; practical matters such as the purpose; logistical matters such as content

selection and access/storage problems; issues related to time; and measurement and evaluation of the portfolio. For the system of portfolios to be effective in the classroom, educators should start small and gradually increase the coverage of the portfolio systems they decide to use. As the comfort level increases for both student and teacher, the level of complexity in the portfolio can be adjusted for higher expectations.

Overall, the traditional portfolio is a useful tool for reflecting the learning which has occurred in the classroom. Shaklee, Barbour, Ambrose, and Hansford (1997) claim "Artists have long used portfolios to demonstrate the development, quantity, and quality of their work. Included in an artist's portfolio might be examples of her artwork; documentation of training, awards, or gallery showings; works in progress; and future plans for works" (p. 37). As the purpose and rationale are identified in these developmental stages, the reality of a productive portfolio system will be implemented, but how can these ideas be transferred into a digital format?

An electronic or digital portfolio is a portfolio saved in an electronic format. Tuttle (1997) defines electronic portfolios as "a concise, annotated collection of student work that reflects educational standards" (p. 33). Through an electronic portfolio, a much broader picture of the learning that has occurred is presented to the teacher and parent. Lankes (1995) states, "Electronic portfolios contain the same types of information as the portfolios discussed earlier, but the information is collected, stored, and managed electronically" (p. 3-4). The storage concerns which have often haunted the traditional portfolio user can be solved by using computer technology. The use of text, graphics, sound, video, and projects can all be compressed into one comprehensive document which can be transported from teacher to teacher and level to level. Wiedmer (1998) explains, "The use of electronic portfolios is gaining popularity as educators and businesspeople alike are discovering their benefits of validating individual performance" (p. 586). The electronic portfolio can potentially

contain checklists of goals and competencies which have been achieved and to the degree of mastery, almost like telling a story of achievement. Overall, an electronic portfolio can be a system of assessment which ties student work to district, state, and national goals and standards.

The advantages to using electronic portfolios, as stated by Tuttle (1997) include the following: "Portfolios demonstrate wider dimensions of learning than just paper-and-pencil reports or exercises, various parts of electronic portfolios can be interconnected through hyperlinks, and electronic portfolios save space" (p. 34). The portfolio, as stated by Herman and Morrell (1999) "allows learners the ability to demonstrate their skills over a period of time, as they will for future employers. A portfolio will chart the progression and highlight their individual achievements" (p. 86). This means a student works to show mastery of skills and knowledge. The achievement which could not be measured on paper tests can be transformed into video and recordings which become part of the finished document. This way, students display their mastery through the video and recording. The education becomes active and personal, less passive. This active learning environment promotes greater knowledge retention and interesting learning experiences (Herman and Morrell, 1999). With this in mind, the teacher becomes more of a facilitator, and less of a lecturer; students become the creator of their own learning experiences. The atmosphere changes to a collaborative, open environment with freedom from rejection and putdowns. The use of multimedia program software and portfolio software permit the connection of pieces of the portfolio to one another. Interconnectedness allows various ways to show student work. Many educators think the components of an electronic portfolio must be paper, but through the use of video, audio, and web pages, students can demonstrate conferences, speeches, science projects, and other events or products. Lastly, the documents can be stored through one of many methods, a CD-

ROM, zip disks, and servers. All in all, the benefits are factors which sustain the importance of using the electronic portfolio as a way to assess student learning by using technology as a transparent tool for learning.

The developmental process in the formation of an electronic portfolio is similar to developing a traditional paper portfolio. The difference occurs with the method of constructing the individual portfolios using the technology. By addressing the technology as the fundamental tool for developing the portfolio, the planning continues with locating software, peripherals, and storage devices which will accommodate the quantity of information to be included in the portfolio.

Software utilized for the electronic portfolios ranges from actual electronic portfolio software to multimedia software. The following sections will address case studies or scenarios in which a variety of software is utilized to form digital portfolios. The case studies include, The Coalition of Essential Schools & Annenberg Institute for School Reform in Brown University (Niguidula, 1993, Niguidula, 1997, and Niguidula, 1998), Horizon Community Middle School in Aurora, Colorado (Milone, 1995), Rose-Hulman Institute of Technology (Rogers and Williams, 1999), and Ithaca City School District, Ithaca, New York (Tuttle, 1997).

The Coalition of Essential Schools and Annenberg Institute undertook a study called the *Exhibitions Project* in the mid-1990s (Niguidula, 1998). This research study researched how schools adopt and use performance assessments to graduate students from grade to grade and to present a more vivid record of student's capabilities. These studies encompassed several schools and were sponsored by the IBM Corporation. A community partnership was established between school and

business which included teachers, students, administrators, technology specialists, and academic experts. Niguidula notes:

Collections of student work, they discovered can provide a much richer picture of a student's abilities than letter grades or test scores. Portfolios, however, have their drawbacks, including trying to figure out what to do with all of the material students collect over a school year or longer.

Enter technology. (p. 184)

The computer provided technology for collecting, storing, and organizing the information in the portfolio. The technology was meeting an important need. The *Digital Portfolio*, a funded project from 1994 to 1996, became a software product which would aid the process of school reform (Niguidula, 1997). The product, using a hypermedia program *Multimedia Toolbox* from Asymetrix Corporation, was designed to demonstrate three facets of student work. The facets were described as: "the vision should be the lens for looking at student work, the student work itself must be prominent, and the student work must be presented in context" (Niguidula, 1998, p.185). Addressing the vision, assessment, technology, logistics, and culture systems of the school are key elements to make a digital portfolio work (Niguidula, 1997). A planning backwards approach by McDonald (as cited in Niguidula, 1993) addressed examining the skills or qualities desired of the graduates. This approach helped define a vision and matching goals for the school community. The concluding software product, *Digital Portfolio*, asked students to demonstrate achievement in three areas: "Who am I as a Communicator?, Who am I as a Researcher?, and Who am I as a Problem Solver?" (Niguidula, 1998, p.185). This "hypermedia" document consisted of buttons, labeled Communicator, Researcher, Problem Solver, and a fourth called Individual. When pressed, the buttons opened subsequent screens which contain a menu of the entries showing the student's abilities in the four areas. Entries were sorted by curricular area, and revealed a comprehensive view of the student. A limit of



four pieces of information would be allowed for each portfolio entry. "Self reflection, assignment, criteria, and assessment" (Niguidula, 1988, p.188) buttons permitted descriptions by the student. The "assessment" button was for teachers and other judges, such as peers or parents. Niguidula (1993) notes:

We imagine that when a student enters a school, he or she will be given a blank portfolio, containing only blank screens. The student can browse through the goals and see what it is that he or she is expected to be able to know and do before graduating. (p. 3)

An advantage, such as the ability to store multiple media, is an important reason for using a digital portfolio . In a digital portfolio, drawings, video, and audio can be put into the computer through input devices and peripherals. Another advantage is that the portfolio paints a picture indicating what the student is capable of doing. Students demonstrate their skills in portfolio content as well as in producing the portfolio.

Niguidula (1997) noted, "Digital portfolios bring a school's vision and standards to life, students take ownership of their digital portfolio, and communicating with digital portfolios is easier than using paper" (Niguidula, 1997, chap. Introduction and Observations, p. 1-3). A disadvantage, the size of the completed document, caused a need for alternative storage devices. Documents with graphics and video take up large amounts of computer space. Writeable CD-ROMs and larger networkable servers were the answers to these problems, but unfortunately the industry was still in the early stages of data transmission and development of the "information superhighway" and these tools were not always accessible. From this prototype, the idea of "digital portfolios" would become a reality for a school initiating school reform. Niguidula (1997) suggests, " While the software is designed to allow easier organization and communication of a portfolio's contents than paper portfolios, it is also meant to serve as a provocation for and a tool of radical school redesign" (Niguidula, 1997, chap. Introduction and Observations, p. 1). Appendix C, Appendix D, and Appendix E

contain summaries of specific schools, Carrie E. Thompkins Elementary School, Pierre van Cortlandt Middle School, and University Heights High School, involved in the *Digital Portfolio* project.

While the Coalition of Essential Schools and Annenberg Institute at Brown University underwent an extensive research project on a digital portfolio, funded by business partners, others incurred portfolio projects independently (Milone, 1995). One of these such schools was the Horizon Community Middle School in Aurora, Colorado. Milone (1995) found the portfolios in the Aurora school district were developed using a software program, called *Hyperstudio*. Roger Wagner is the developer of this multimedia program which allows the inclusion, of text, graphics, video, and audio. The staff at Horizon Community found "portfolios motivate students to go far beyond what is expected of them" (Milone, 1995, p. 29). Horizon Middle School teacher, Christine Archer-Davison, implemented a pilot portfolio project. The pilot project lasted six months, initially planned for two months. Archer-Davison had difficulty pulling together the tools necessary for the project. The students bought into the project quite extensively. Milone noted, "At every step of the way, the students in the pilot group looked for ways of making their portfolios better. This tendency led to the second surprise: the level of excellence exhibited" (p. 29). Archer-Davison reported the use of technology allowed the low to average students to excel. Archer-Davison states, "My goal was to have students assemble samples of their best work and provide color commentary on it" (p.32). Students additionally presented the portfolios to large audiences through LCD projection systems and copied their stacks to VCRs for home viewing. Archer-Davison tied the portfolios to state standards in various subject matter. Collaboratively, the teacher and student assessed the work. Archer-Davison found after initial setup, the portfolios added very little extra work. From her experiences, Archer-Davison found the need to start earlier and recruit

volunteer staff and parents. As viewed from this study, the learner was highly motivated and excelled using the digital portfolio as a way to document achievement.

Another sample of electronic portfolios demonstrating use at the collegiate level, is representative of the Rose-Hulman Institute of Technology. Rogers and Williams (1999) note "Portfolios, touted as the 'next step' in student assessment, are a great tool to exhibit a student's efforts, progress, and achievements, and are being adopted by numerous engineering schools" (p. 30). Computers are commonplace and essential at the university. A planning committee investigated the use of the portfolios by examining the widespread use in elementary and secondary schools. The Accreditation Board for Engineering and Technology was a driving force for the university. The university choose to adopt the Engineering Criteria 2000 which deemed the need to document and assess student outcomes. Portfolios were an acceptable method to perform this assessment. Thus, the evolution of electronic portfolios, dubbed "RosE-Portfolios" became a reality and proceeded in the fall of 1998 with a pilot study. Reducing storage and unlimited access provided an equitable opportunity for students to document learning through multimedia. "The RosE-Portfolios were deemed an efficient and cost-effective method of collecting and accessing student materials", suggests Rogers and Williams (1999). The faculty identified several criteria for the primary design, they included:

...ease of use, ability to archive student material in multimedia format, allow searching by multiple criteria, permit students to update and replace materials, user access online anytime, faculty ratings automatically logged and aggregated, provide students with feedback online, and student submissions focused on institute-defined learning outcomes. (p. 30)

The use of an Oracle database met design specifications for the RosE-Portfolios. The pilot project yielded positive results. Students noted ease of use in the system and clear student learning outcomes were easy to understand. Faculty found

the system reliable and easy to use, but thought the performance criteria required editing because of complexity and ambiguity. Advantages to the RosE-Portfolio system include the student-driven aspect and individual academic advising. The system is capable of sending reports advising faculty of student deficiencies in work. Overall, the reason for the use of portfolios at Rose-Hulman Institute of Technology was for the purpose of documenting the growth of the student over a period of time and assessing the attainment of program or institutional outcomes.

A final case study (Tuttle, 1997) takes place in Ithaca City School District, in Ithaca, New York. The Ithaca School District "evaluated the approaches to electronic portfolios: simple word processing portfolios, videotapes, web pages, and multimedia software applications" (p. 34). Through the investigation, software, specifically designed for electronic portfolios and general multimedia, was examined for soundness. Tuttle notes, "Good portfolio software should include or facilitate: an introduction to the portfolio, an introduction to the student, district goals and competencies, various ways to show student work, evaluation of student work (a rubric), student reflection, teacher feedback, and a summary of the student's achievement" (p. 35). The Ithaca School District insisted on the student work exhibiting specific district goals or competencies. The district clearly planned the criteria for their portfolios by identifying the need for descriptions of the work, rubrics, student's self-reflection, and teacher's reflection. The Ithaca School District choose an easy to use multimedia program, HyperStudio by Knowledge Adventure Publishing. Before deciding this, the district looked at Scholastic's Electronic Portfolio and the Grady Profile program. The programs did not meet the expectations set by the district. The teachers of the district established goals and competencies for the contents of the portfolio. Staff discussions related to issues of the competencies to include, what grade levels to start with, where should the portfolio be completed, how often should

work be done, and how will they results be presented. Overall, Tuttle believes “electronic portfolio should be part of the learning experience, not an add-on” (p. 36).

These case studies implement electronic portfolios using select portfolio and multimedia software; Table 1, Electronic Portfolio Software and Multimedia Software , outlines additional software for creating digital portfolios. Software includes different features and functions. The choice of software is a personal choice, and it is important for the features and functions to be evaluated before purchasing the software. Software can be evaluated in terms of ease of use, content, tools, accessibility, managing information, flexibility, data recorded, recording format, and assessability. Tuttle (1997) claims, “The Scholastic program works chronologically and is not based on competencies,.....The Grady program includes competencies, but does not allow flexibility in rearranging the screens,...” (p. 36). Overall, the software supports the production of the portfolio and since it will be the tool along with the computer and peripherals to construct the portfolio, great concern should be taken in deciding the software. The first step is to critically decide the competencies the portfolio will address and see which software meets those needs.

The combination of hardware, software, input devices and peripherals allow the portfolio product to become a realistic representation of student work. The hardware, the computer, is the central focus in producing the portfolio. While the platform, Macintosh or Windows, is a personal choice, a multimedia computer is required to perform the various components of a digital portfolio. Tuttle (1997) suggests, “A multimedia computer accepts sound and images from external sources and can digitize sounds and images as well” (p. 37).The computer should contain a great deal of storage space to accommodate the large size of graphics, videos, and audio. Many computers today come with a minimum of six gigabytes of space and are expandable.

Table 1

Electronic Portfolio Software and Multimedia Software

Electronic Software	Multimedia Software
Learner Profile, Sunburst Communications, Pleasantville, NY	Asymetrix Multimedia Toolbook Asymetrix, Bellevue, WA
Multi-Media Assessments Tools Student Portfolio, Touch Media, Boca Raton, FL	ClarisWorks Claris Corporation, Santa Clara, CA
Portfolio Assessment Toolkit, Designing Software for Learning, Aurora, Colorado	Digital Chisel Pierian Spring Software, Portland, OR
Gradebook Portfolio Macro Educational Systems, Laguna Hills, CA	FileMaker Pro Claris Corporation, Santa Clara, CA
Electronic Portfolio Scholastic Inc., Jefferson City, MO	HyperStudio Roger Wagner Productions, El Cajon, CA
Grady Portfolio Assessment Aurbach and Associates, St. Louis, MO	Kid Pix Studio Broderbund Software, Inc., Novato, CA

Note: From "Electronic Portfolios Tell a Personal Story," by H. G. Tuttle, 1997, Multimedia Schools, 4(1), p. 35.

Storage space is a problem. Large document size increases problems for storage multiple documents for a class. There are alternatives-peripherals (Moersch and Fisher III, 1995). A peripheral is any device outside the central computer unit (Robyler and Edwards, 2000). Peripherals can be for storage, such as zip drives and jazz drives. Compact-Disk-Recordable Drive (also called a burner) allows the storage on a compact disc-read only memory (CD-ROM).

Input devices are helpful ways to get the student work into the computer when it is not created on a computer. These devices such as digital cameras, video cameras, microphones, and scanners are a vital key to placing the selected work in the computer, when not originally computer generated. Table 2, Peripherals and Input Devices, outlines some peripherals and input devices and their usage. With the union of all components, hardware, software, and peripherals, and input devices the portfolio can be created in a digital format.

Table 2

Peripherals and Input Devices

Type	Description
Scanner	A device, similar to a photocopier, which turns paper into digital format to be read by a computer.
Digital camera	A camera that takes pictures and puts into digital format for use and editing in the computer.
Zip drive	A portable drive, which uses magnetic disks in many sizes, to store information.
Jazz drive	A portable drive, similar to a zip drive.
Compact-Disk-Recordable Drives(burner)	A portable drive capable of saving data to a compact disk (CD).
Digital Video cameras	A camera which takes live video and puts into digital format. Traditional video can be digitized with a digital editor.
Digital Tape Drives	A drive which stores data on a 4mm or 8mm Digital Audio Tape (DAT).

Note: From "Electronic Portfolios--Some Pivotal Questions," by C. Moersch and L. Fisher III, 1995, Learning and Leading with Technology 23(2), p. 11-13.

In this final section, the planning process and tools for evaluation of student skill proficiency will be presented to demonstrate how the theories presented represent a tangible method of integrating technology within the art curriculum for the purpose of assessing student achievement and growth and creating a tangible product for use in graduation requirements or work related interviews, all while using technology.

Niguidula (1997) states that developmental steps should be utilized for developing a digital portfolio to be used in any classroom. Niguidula suggests the analysis of the systems within the school community as the developmental steps. The five steps of the developmental analysis of the systems include 1)vision; 2) assessment; 3)technology; 4)logistics; and 5)culture. These steps represent the stages of discussion to be explored for analyzing the use of a digital portfolio in the classroom.

The first stage, forming a vision, addresses the need to answer the question of what skills do the students need to demonstrate or master. Table 3, Vision Stage, outlines the decisions made by the art committee for this system. This vision is adapted from the Central Clinton Community School District, DeWitt, Iowa, Visual Art standards & benchmarks. These goals are the vision of the art committee for the graduates of the Central School District. These goals represent skills, knowledge, and application. The vision reflects the need for students to be responsible for understanding the many facets of art. Art is more than production, there are historical, cultural, and aesthetic components which are desirable attributes of a quality art education. Through a digital portfolio, students would be expected to demonstrate work which proficiently covers the six areas identified with the standards, but makes effective use of technology for presentation to the public, potential employers, and college admission boards.



Table 3

Vision Stage

Questions	Decision
What should a student know and be able to do?	<p>The students will demonstrate proficient knowledge, application, and skill in the areas of visual art production, criticism, history, technology and aesthetics.</p> <p>More specifically, students will understand and apply media, techniques, and processes in visual arts, use functions and structures to communicate, understand a variety of subject matter, symbols, and ideas are necessary to solve problems in the creation of artwork, understand and apply connections between visual arts, other disciplines, and the real world, understand and apply connections of visual art to history and culture, and reflect, evaluate, and respond to the characteristics and merits of their artwork and the artwork of others. Technology will be utilized within the entire scope of the curriculum.</p>

The next stage of development is the Assessment stage. This stage is important because it addresses how the portfolio shows the range of student skills for the audience (Niguidula, 1997). Table 4, Assessment, addresses this system of forming evaluation standards and techniques. This stage includes areas concerning the audience, the collection of work, and judging the work. This stage does not produce rubrics or assessment tools, but the standards by which the tools will be made later.

The collection of work is used to evaluate student skills and knowledge in both art and technology. This evaluation will assist the teacher in meeting student needs. The work in the portfolio will be judged on rubrics based on the benchmarks. The portfolios will be shared with parents at conferences and serve as a method of presenting skills to future employers and colleges as part of a portfolio entrance requirement. These comments will suggest possible areas of improvement and areas of strength. This system of review allows the student an opportunity to present their learning in relation to the standards. A sample of the rubric is visible in Appendix F. This rubric includes a hierarchy to produce quality comments.

Table 4  
Assessment Stage

Questions	Decision
How can students demonstrate the vision?	Students will select work to be placed in the portfolio. The purpose of the portfolio is as an assessment tool, to document the student's proficiency of the standards, and reveal to the students a better understanding of their strengths and weaknesses.
Why do we collect student work?	The audience who will review the portfolio is a roundtable of teachers from the teacher, visual art committee, parents, other teachers, administrators, peers and community members. The most important audience will be the student and the teacher. The judging of the portfolio will be based on benchmarks established by the visual art committee.
What audiences are most important to us?	
How do we know what's good?	

The technology system is the next stage of development. In this stage, the technology needs will be addressed and reviewed, Table 5, Technology. The purpose is to analyze and review the current status of equipment, accessibility, and technical support.

Table 5

Technology Stage

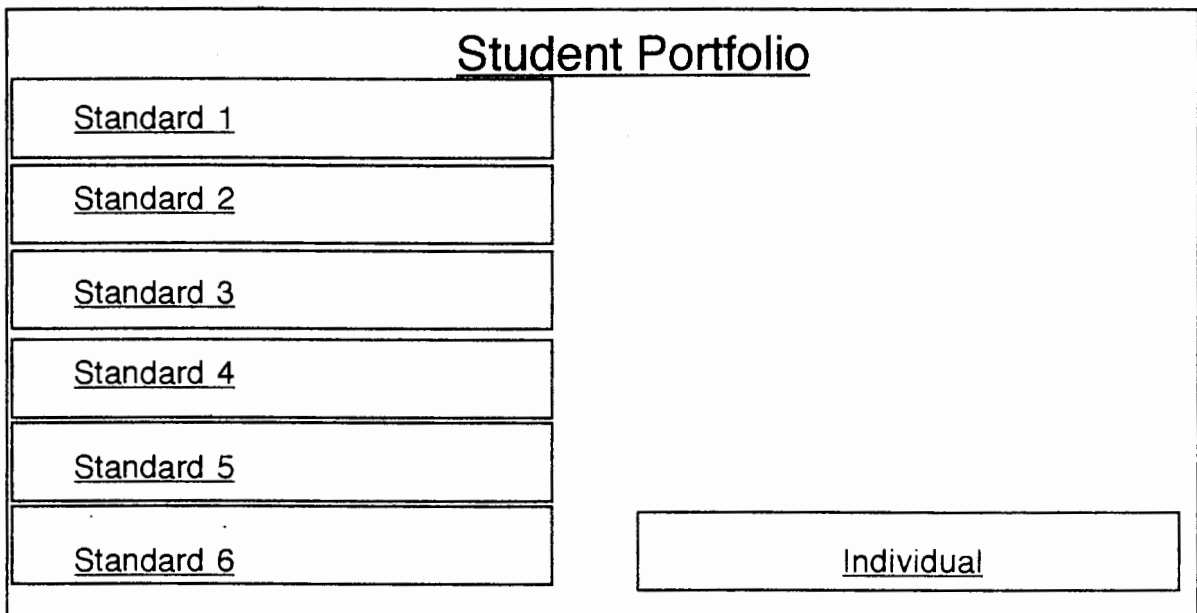
Questions	Decision
What hardware, software, and networking do we have?	The art classrooms already contain one computer. This pilot project will begin with a group of high school students in the Intro to Art class. There is an accessible lab for the class; it contains 20 multimedia computers.
What will we need?	ClarisWorks and HyperStudio software are available for use. Zip drives can be used for storage; individual student files on the wide area network servers will also serve as a method of data storage. The hard drive of the computer is for short term data storage. Scanners, digital cameras, and video cameras are available for check out to students and teachers. Students will be responsible for digitizing work and placing work in his/her portfolio. Students, teacher, and technology coordinator will provide the support for software, peripherals, and hardware.

The work the students create will be both paper and computerized. Eventually, the work in the portfolio must be converted to computer format for placement in the portfolio. The student will have freedom of choice in using HyperStudio or ClarisWorks

for the portfolio. The overall layout of the opening screen should consist of seven buttons, see Figure 1, Portfolio Layout, one for each of the required standards and the other for individual introduction. Students will be in charge of designing a layout which is accessible and clear. The student will be expected to submit a minimum of three entries per standard, and a maximum of five. The selections will be made by the student mainly, but the teacher will provide advising when necessary. For storage, students will save data to network folders or on zip disks.

Figure 1

Portfolio Layout



Logistics for the portfolio are part of the system describing when and who will assemble the portfolios, who will select the work, and who will reflect on the work. The time needed for assembling will be incurred within the normal class time as well as after school and before school. The teacher will reserve the computer lab and input devices and peripherals for use in this stage of production. In the study, Niguidula (1997) noted, "Portfolios were considered the responsibility of the students" (Niguidula, 1997, chap. Introduction and Observations, p. 3). Students are in charge of digitizing work and selecting work. Informal teacher-student conferences will be

held during classes to allow the students opportunities to discuss the works to be included in the individual portfolios. Class time is generally a work time and freedom to discuss work is a common practice for the scheduled ninety-minute class period. The block scheduling within the high school provides a length of time to accomplish work without interruption. The first year will be concerned with mainly assembling the portfolios and developing a system for review. In the future, the "roundtable" idea is a great method for review which gives feedback to the teacher and student.

The culture of the system concerns discussing student work. Already in place is a traditional practice of portfolio review including teacher review, peer review, and self reflection. The most important part is that of self reflection by the student. The intended purpose of the portfolio project was to provide student feedback in terms of strengths and weaknesses. The curriculum director is in support of implementing the standards in compliance with the Comprehensive School Improvement Plan. This plan requires the plan for reviewing standards including assessment. This type of assessment, portfolio review, is the method the visual art committee suggests best meets this requirement. The formal testing procedures are difficult to measure skill, and usually test the comprehension of vocabulary. The synthesis of skills is not registered in a paper and pencil test. Niguidula (1997) notes,

"The key elements of a school's culture that makes a digital portfolio system work are the relationships within the school, regular discussions of student work, and an openness to discuss the school's work and its vision with others outside the school" (Niguidula, 1997, chap. Introduction and Observations, p. 5).

These steps represent the planning and evaluation procedures to be utilized for implementing a digital portfolio pilot program in the Intro to Art class at Central High School, in DeWitt, Iowa. Planning has paved the vision, standards, goals, evaluation tools (rubrics), technology organization, and reasons for this alternative assessment.

## Conclusion

Electronic portfolios support student growth and achievement using technology for the purpose of presenting achievement through the products students create in the classroom. This paper has summarized the traditional definition of portfolios and how a teacher can design and structure a portfolio project in the classroom. The electronic portfolio was presented as an extension of the traditional portfolio, just created in a digital format. Subsequent research showed how several types of software were used in varying scenarios for the purpose of electronic portfolios. Through the transparent use of technology, the students were able to reflect upon their skills. The software and hardware considerations have been discussed with special consideration. It is important to remember to evaluate software for flexibility and content. The final component of this paper reflects the implementation of the theories for developing a portfolio project for the art classroom. The vision, assessment, technology, logistics, and culture systems of the Central Clinton Community School District were examined for the implementation of a pilot project in the Central High School, Intro to Art class. This plan represents the thoughts and ideas needed to begin the process of using technology as an integral part of the art classroom. It is important to remember, the successfulness of any portfolio depends on planning, development, and design. The electronic portfolio serves as a visible method for students to communicate learning to the teacher, which in turns allows teachers to effectively judge instruction and make decisions based on factual findings which are difficult to measure in traditional paper and pencil tests.

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Appendix A  
Comparison of Types and Purposes

LankesDanielson and AbrutynJohnson and Rose

<p><u>Developmental:</u> Contains samples of student work to keep a developmental or history of progress.</p> <p><u>Teacher planning:</u> Used to receive information about future classes for ability level.</p> <p><u>Proficiency:</u> Used to determine graduation eligibility.</p> <p><u>Showcase:</u> Used to document a student's best work.</p> <p><u>Employment skills:</u> Used to demonstrate skills to prospective employers.</p> <p><u>College admission:</u> Using showcase portfolios to address eligibility requirements for admission.</p>	<p><u>Working:</u> Contains work in progress as well as finished works. An intentional collection of work guided by objectives. A holding tank before being moved to a display or assessment portfolio.</p> <p><u>Display, Showcase, or Best Works:</u> Used to demonstrate achievement by the student. Shows work makes the student proud. Is most often used by educators.</p> <p><u>Assessment:</u> Used to document what a student has learned and is based on curriculum outcomes</p> <p>Types: <u>Community Service Interdisciplinary Unit Subject Area</u> <u>College Admission</u> <u>Employment</u> <u>Skill Area</u></p>	<p><u>Class:</u> similar to a scrapbook but has an intended purpose or goal.</p> <p><u>Master Subject Area:</u> Contains work from one main subject area.</p> <p><u>Learning:</u> Also called process portfolio and are used for judging the learning process and self-reflection.</p> <p><u>Growth:</u> Used to demonstrate growth over time.</p> <p><u>Documentation:</u> Contains complete and incomplete work.</p> <p><u>Showcase:</u> Contains a student's best work</p> <p><u>Employability:</u> Demonstrates employability skills</p> <p><u>Cumulative School:</u> Used to satisfy assessment goals.</p>
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Information for this comparison was taken from Lankes (1995) p. 3 , Danielson and Abrutyn (1997) p. 1-9, and Johnson and Rose (1997) p. 157-160.

Appendix B  
Johnson and Rose Specific Purposes and Functions

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- Celebrating growth over time
- Exhibiting a student's best work
- Developing a sense of process
- Reflecting risk taking and experimentation
- Creating a means for self-evaluation
- Determining and setting individual goals
- Empowering students to develop a sense of ownership
- Nurturing students
- Fostering a positive self-concept
- Improving instruction
- Providing real-world learning opportunities
- Sharing information with families and other teachers
- Measuring school accountability
- Making curricular decisions
- Evaluating programs
- Comparing students' portfolio results across classrooms
- Observing growth in minority culture populations
- Measuring student progress against standards created beyond the classroom
- Facilitating faculty discussion about goals and means of reaching them
- Empowering teachers

Information taken from Johnson and Rose (1997) p. 157.

## Appendix C

Case study of Annenberg Institute for School Reform, Brown University, (Niguidula, 1997).

Carrie E. Thompkins Elementary School:

*About the school:* This elementary school is located in New York state, approximately 32 miles north of New York City. This school serves grades K-5. The district has a long history of financial and political support from the community. The district has embarked on several innovations aimed to improve education for the students of the district. In 1993, the district was approached for inclusion in the Digital Portfolio project, and they accepted. This acceptance was discussed among the stakeholders, such as principals, faculty, school board members, and community groups. The next stage required the schools to develop goals for guiding teacher and student work with portfolios, they included the following: "to help students become more reflective about themselves as learners, to demonstrate evidence of student growth and achievement, to inform instruction, influence practice, and set goal, to extend children's learning, and to support and explain the grading system" (About the School, p. 1). A major intention of the portfolios were to better understand each child as a learner.

*Process:* The school had to evaluate the vision, assessment, technology, logistical, and culture systems with the school. This required asking some valuable questions. Under vision, "What should a student know and be able to do?" was a question which addressed the areas of portfolio development, Carrie E. Thompkins (CET) decided to base the portfolios on a set of "set of four 'selves', the social self, problem-solving self, artistic self, and academic self" (Vision, p. 1).

Under assessment, "How can students demonstrate this vision, why do we collect student work, what audiences are most important to us, and how do we know

what's good?" (Assessment, p. 1) are questions which addressed areas of the contents and the specific skills which would be evaluated in the assessment process. For each level, specific content and criteria were decided upon, such as writing samples, reasoning and problem solving skills, and special choices. A reflective writing, "Dear Reader letter" was required of most levels to give a personal perspective on his or her work.

Under technology, "What hardware, software, and networking will we need, who are the primary users of the equipment, and who will support the system?" (Technology p. 1) are questions asked of this system area. The school made decisions for the purpose of multimedia computer equipment, eighteen of which were funded by the grant from IBM. The computers were placed in the classrooms and a lab so the students could work from both areas, depending on age level. ClarisWorks software supported the word processing needs. The Digital Portfolio software was utilized as the main support system of the portfolio documents. Each portfolio contained word processing and graphics.

Under logistics, question raised included, "When will information digitized, who will do it, who will select the work, who will reflect on the work?" (Logistics, p. 1). The pilot year of this program was established with the 5th grade classrooms. Regularly scheduled times in the computer lab were part of the implementation. Students quickly learned the process of inserting work into their portfolios. A collaborative buddy system was utilized when producing the portfolio, basically because the number of students outnumbered the computers. Each student concentrated on one student's portfolio, then the other's. The student selected the work, mainly, and was based on a criteria established by the class earlier. In total, around fifteen pieces of work were added to the portfolio, gradually spaced through the year.

Under culture, “Is the school used to discussing work and is the school open to tuning standards, with whom?” (Culture, p. 1) are questions addressed by this system. A portfolio review system was created where changes were made over the summer and introduced at the beginning of the new year. Staff readily discussed the use of portfolios for several years, and the process of examining student work was becoming a center of focus for the school. When CET was introduced to the New Standards Project and the Coalition of Essential Schools, a sense of sharing with others began to put the portfolio work at CET into context. The professional development regularly became a discussion arena about the use of portfolios, from research to individual sharing. This summarizes the work on Digital Portfolios at Carrie E. Thompkins Elementary School.

## Appendix D

Case study of Annenberg Institute for School Reform, Brown University, (Niguidula, 1997).

Pierre van Cortlandt Middle School:

*About the school:* This middle school is located in New York state. This school serves grades 6-8. The district has a long history of financial and political support from the community. The district has embarked on several innovations aimed to improve education for the students of the district. In 1993, the district was approached for inclusion in the Digital Portfolio project, and they accepted. This acceptance was discussed among the stakeholders, such as principals, faculty, school board members, and community groups. The staff and faculty of the middle school developed a philosophy defining the specific outcomes, including: academic skills, technology abilities, habits of mind, attitudes toward learning, respect for others, physical health and citizenship. The final draft statement stated, " we defined our future school as: a community of active learners, a center for meaningful research and inquiry, a school of integrated instruction in the arts, sciences, and humanities, a facilitator of enthusiastic, self-reliant and lifelong learners, a community of caring and involved citizens, and a training ground for the future" (About the School, p. 1). Along with defining this vision of the ideal student and school, the school designed a program to reach its goals. Of these efforts was the continued efforts of teaming, which support collaborative working units among grade levels for common goals. Assessment and technology were at the leading front of the focus in the school's energy. Different from the elementary, Pierre van Cortlandt (PVC) focused on interdisciplinary exhibitions of work based on themes. Each unit usually concluded with a project. The 'arts' teachers of the school worked to develop a technology-based interdisciplinary curriculum. Technology was deliberately integrated into student projects, rather than an independent 'computer class'. Projects

using *HyperStudio* were developed demonstrating the students' multimedia abilities. The Digital Portfolio was part of the student's cumulative record used for a final exhibition in eighth grade. Significant discussion was held on whether the units and Digital Portfolio would become two separate entities, but after many thoughts, the decision was to tie the two portfolios together in a single effort.

*Process:* The school evaluated the vision, assessment, technology, logistical, and culture systems with the school. This required asking some valuable questions. Under vision, "What should a student know and be able to do?" was a question which addressed the areas of portfolio development, Pierre van Cortlandt (PVC) considered to ways to organize student work, content or skills. In the list of skills, the committee identified, "problem solving, written expression, to take and support a position, research a topic, observational skills, a response to a printed text, and artistic/kinesthetic performance" (Vision, p. 1). The committee also decided on using Ernest Boyer's eight "human commonalities", these included the following, " the life cycle, symbols, aesthetics, time and space (perspective), the social web, producing, consuming, and conserving, nature, and a larger purpose: convictions and commitments" (Vision, p. 1-2). This committee wanted to assess on "big ideas" and also major skills. This list would help articulate and focus the work to define the expectations and standards for the students. This vision brought new expectations and new thinking for faculty and community.

Under assessment, "How can students demonstrate this vision, why do we collect student work, what audiences are most important to us, and how do we know what's good?" (Assessment, p. 1) are questions which addressed areas of the contents and the specific skills which would be evaluated in the assessment process. Boyer's commonalities allowed the interdisciplinary structure of the school to map a

curriculum with themes across the subject areas. Performance assessments were completed by the students to demonstrate the skills and knowledge deemed important by the faculty. Students completed portfolios for themselves, and also a public document to show friends and parents. The digital portfolios were based on teacher guidelines, the guidelines as stated by Niguidula (1997)

“The digital portfolio is a container that stores and presents your work. The focus of your digital portfolio should be your work. A weak piece that is presented beautifully is still a weak piece of work. Once viewers are no longer impressed with the technology of digital portfolios, they will be concentrating on the work. Be sure your portfolio shows your best work” (Assessment, p. 2).

The teaming faculty work to approve and assess the entries for any student, regardless of the subject. The students prepare the portfolio for presentation to peers, faculty, and family.

In the technology system, “who are the primary users of the equipment, and who will support the system?” (Technology p. 1) are questions addressed of this system area. The school made decisions for the purpose of a dual platform environment. The school was primarily Macintosh prior to the project. The school had 20 Macintosh in a lab and then installed an “Unified Arts” room with 5 Macintosh and 5 IBM machines. A grant from Continental Cablevision yielded video equipment and editors to produce video productions. In the lab, word processing, graphics, and hypermedia documents were created, but the multimedia lab permitted the digitizing and then eventual placement in their portfolio on the local area network. The installation of a wide area network was aided by a bond issue. This Ethernet connection allows a minimum of one connection per classroom. The students were intended to be the primary users of



the machines. The total faculty contributed to the success of the system, however two lead teachers, led the coordination of portfolios using technology in the building.

Under logistics, question raised included, "When will information digitized, who will do it, who will select the work, who will reflect on the work?" (Logistics, p. 1). The pilot year of this program was established with the 8th grade classrooms. Students volunteered to produce the portfolios during the "project period" and some academic time. The student was responsible for selecting the individual work, but was guided on the selections. A process of review became customary; this reflective process required students to assess if the work met established guidelines for the pieces. A storyboard with information to be included in the portfolio helped to organize the student work. The portfolio became a culminating experience reflecting their years in the building. Open houses were held to allow the students to present to parents their portfolio and presentation skills, as well as see the growth and development over the years.

The questions raised under culture included, "Is the school used to discussing student work and Is the school open to tuning standards, with whom" (Culture, p. 1). The teaming effort has focused the integration of curriculum and the use of alternative assessments. Staff development is centered around interdisciplinary units, alternative assessments, and rubrics. As a whole, the faculty examines the expectations of the students in each grade. Regular discussions with students, parents, and community members help develop the portfolio plan and provide feedback along the process. The school district held a culminating opportunity to reveal their progress. While listening to the other levels respond to their work, each school was then given an opportunity to modify the portfolio by incorporate research staff ideas for the Digital Portfolio software. This summarizes the work at Pierre van Cortlandt Middle School.

## Appendix E

Case study of Annenberg Institute for School Reform, Brown University, (Niguidula, 1997).

University Heights High School:

*About the school:* This high school, located in the Bronx, New York, is a small high school supporting grades 7-12. This school focuses on a team effort; the team is responsible for designing curriculum and assessments for their team. So, teachers are not overloaded with planning for large amounts of students. Because of this, students are held to high standards of achievement. Niguidula (1997) states, "The school's academic focus is communicated through a set of "domains of learning" (About the School, p. 1). Students demonstrate habits, skills, and knowledge in the domain areas to move through the school. A portfolio is assembled that collectively shows the abilities and achievements in a certain domain which is then presented to a "roundtable" of teachers, peers and guests. This process requires much preparation, such as writing cover letters and describing the work for mastery. A student leads a presentation about the portfolio of work and learning, then defends through a question and answer session. This step, approximately 45 minutes, is followed by a discussion of the review team in private. The student leaves the room. When the student returns, the review team informs the student of areas of strength and weakness, followed by the comment of passing or need to prepare for another roundtable. "This atmosphere of rigorous, yet personalized, work has helped students first receive their high school diploma (only 2.8% leave high school before graduation)...." (p. 2) stated Niguidula. Either way, the involvement in the Digital Portfolio project, offered a great opportunity to add technology to a system in which the assessment process was clearly in place.

*Process:* The school had to evaluate the vision, assessment, technology, logistical, and culture systems within the school. This required asking some valuable

questions. Under vision, "What should a student know and be able to do?" was a question addressed annually by the school (Vision, p. 1). The standards followed the "domains of learning". These domains encompass all areas of the curriculum including, the core subjects, arts, and humanities. These domains of learning (Niguidula, 1997) include the following: "Communicating, crafting, and reflecting, knowing and respecting myself and others, connecting the past, present, and future, thinking critically and questioning, valuing and ethical decision making, taking responsibility for myself and my community, and working together and resolving conflicts" ( Vision, p. 1-3).

Under assessment, "How can students demonstrate this vision, why do we collect student work, what audiences are most important to us, and how do we know what's good?" (Assessment, p. 1) are questions which addressed in the design issues of the project. The curriculum relied heavily on "projects" based on real life problems and situations. "Essential questions" focused the projects allowing students to demonstrate knowledge and skills gained in the investigation of the questions. The projects culminated with exhibitions. This school moved graduation by portfolio in 1993, this requires students to collect work and demonstrate their knowledge and skills in order to move through the building and eventually graduate. Niguidula (1997) suggests, "Student work is about demonstrating who a student is and what he or she can do; the collection of work is a form of self-expression and reflection" (Assessment, p. 2). The audience, in this case, is basically internal, teachers, students, administrators, staff, and parents. The roundtables provide both "warm" and "cool" (Niguidula, 1997) feedback. Warm feedback is characterized by taking into account the circumstances of the student at the time of the work. Cool feedback is

characterized as being more objective. Overall, the combination of feedback give a sense of growth and the current level of achievement.

Under technology, "What hardware, software, and networking will we need, who are the primary users of the equipment, and who will support the system?" (Technology p. 1) are questions asked of this system area. The setup of the computers was a direct reflection of the teaming. Clusters of computers, consisting of five multimedia computers and a printer were placed in the team's areas. A server, scanner, and zip drive were also readily accessible. The grant rewarded the school with 18 computers which aided in setting up the team areas. The use of computers was open to all, students and teachers. "Whoever needs the computer at a given moment uses it and then returns to other work," noted Niguidula (1997). The school faced difficulty with a lack of personnel, technical support; students began to provide some of the extra support needed for the project.

Under logistics, question raised included, "When will information digitized, who will do it, who will select the work, who will reflect on the work?" (Logistics, p. 1). Students became local experts with the project. The work initially was digitized all at once, but later became a process of inputting the information during the daily routine. The work was selected by the student because of the nature of the portfolio. Teachers preassessed the work which became part of the portfolio, and discussions were frequently held to identify improvement areas. The reflection of work was evident in three components, student reflection through cover letters, teacher reflection with students on portfolio entries, and thirdly, the roundtables. These roundtables were the opportunity for students to share with everyone their portfolio demonstrating learning achievement.

Under culture, "Is the school used to discussing work and is the school open to tuning standards, with whom?" (Culture, p. 1) are questions addressed by this system. Student work is central to the school curriculum and assessment practices. Weekly roundtables are held to discuss student work, so a great amount of communication is visible in this school. The conversations are explicit, clear, and inclusive, meaning any standard or expectation could be explained and the parents and students were partners in the conversation. The roundtable sessions were seen as ways to tune the standards. The school annually held a review day to discuss achievement factors. This summarizes the work on Digital Portfolios at University Heights High School.

## Appendix F

## Rubric for Evaluating Student Portfolios

Student will be evaluated on a scale of high, medium, and low.

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High:	creative idea, exceptional uses of elements & principles, clearly exceeds standard, presentable, communicates an idea clearly,
Medium:	appropriate ideas, effective uses of elements & principles, meet standard, ok craftsmanship, ok presentation, idea somewhat unclear
Low:	unrelated idea, ineffective use of elements, does not meet standard, poor craftsmanship, poor presentation, idea unclear

---

Student:

Comments before presentation:

Standard 1: Understands and applies media, techniques, and processes in visual arts.

Understands & applies two/three dimensional media, techniques, and processes.

Uses materials responsibly

Develops and creates art that communicates ideas

Solves visual art problems using higher order thinking skills

\_\_\_\_\_ Score: Comments

Standard 2: Uses functions and structures to communicate.

Demonstrates effective use of the elements & principles

Demonstrates effective decisions on structures

\_\_\_\_\_ Score: Comments

Standard 3: Understands a variety of subject matter, symbols, and ideas are necessary to solve problems in the creation of artwork.

Defends the content, subject matter, symbols, and artistic decisions

Develops personal imagery and style

\_\_\_\_\_ Score: Comments

Standard 4: Understands and applies connections between visual arts, other disciplines,

and the real world.

Demonstrates the use of skills within other disciplines

Demonstrates knowledge of skills used by artists in art professions

\_\_\_\_\_Score: Comments

Standard 5: Understands and applies connections of visual arts to history and culture.

Demonstrates knowledge of art history

Applies historical records to own work through subject matter, style, or expression

Communicates the meaning of art works

\_\_\_\_\_Score: Comments

Standard 6: Reflects, evaluates, and responds to the characteristics and merits of their art-

work and the artwork of others.

Demonstrates critical skills in judging artwork

Defends personal artwork for function, structure, and merit

\_\_\_\_\_Score: Comments

Teacher:Comments

Student: Comments (After Review):

\_\_\_\_\_On task

\_\_\_\_\_Responsibility

\_\_\_\_\_Respect