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Implementing electronic portfolios

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Abstract

This literature review addresses the topic of assessing students with the use of electronic portfolios. The purpose of the review is to document for educators the advantages of electronic portfolios, the media selection options, as well as implementation procedures. Electronic portfolios are an alternative authentic assessment method that invites active student learning and provides an opportunity for instructors to design assessment strategies based on desired student-learning outcomes.

The review also found that many media options are available to meet the needs of the individual courses; however the web-based options are the easiest to use and modify. The review recommends that when implementing electronic portfolios into an educational setting; ample planning, organization, and training are required prior to putting the portfolios into practice with students.

IMPLEMENTING ELECTRONIC PORTFOLIOS

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Courtney Rogne

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ABSTRACT

This literature review addresses the topic of assessing students with the use of electronic portfolios. The purpose of the review is to document for educators the advantages of electronic portfolios, the media selection options, as well as implementation procedures. Electronic portfolios are an alternative authentic assessment method that invites active student learning and provides an opportunity for instructors to design assessment strategies based on desired student-learning outcomes. The review also found that many media options are available to meet the needs of the individual courses; however the web-based options are the easiest to use and modify. The review recommends that when implementing electronic portfolios into an educational setting; ample planning, organization, and training are required prior to putting the portfolios into practice with students.

TABLE OF CONTENTS

INTRODUCTION

Assessing students is commonplace in education, however determining the most effective form of assessment is difficult. Teachers use quizzes, tests, papers, projects, and other strategies to monitor students' comprehension and mastery of skills. School districts require students to take standardized tests to demonstrate growth year to year. Each of these options may demonstrate specific skill mastery by a student, but they do not accurately demonstrate the full potential of students (Ahn, 2004).

The field of education is looking to portfolios as a form of authentic assessment that can be successfully implemented. This literature review compiles research on portfolios and examines the factors that educators need to consider to determine instructional needs and to develop a plan for implementation. The review outlines media choices, types of portfolios, procedures for use in classroom settings, and assessment. This review is important because it provides an understanding of how electronic portfolios can fulfill the need for school districts to assess students in multiple ways including standardized tests and forms of authentic assessment. Many educational settings are looking to electronic portfolios to validate the comprehensive education that students are receiving (Williams, 2007). The results of the review can be used by educators to assist in deciding the type of electronic portfolio, the media choice, and the procedures to choose for a successful implementation.

Portfolios include examples of student work so that they can be used as a measure of authentic assessment that demonstrates student growth over time and in more than one area (Barrett, 2007). Portfolios are an alternative to standardized tests, which may not always align with classroom practices or accurately measure students' abilities. "A

portfolio is a purposeful collection of student work that exhibits the student's efforts, progress, and achievements in one or more areas" (p. 1).

The increase in the popularity of electronic portfolios is due to the "increased demands for accountability practices and the assessment of learning outcomes" (Chambers & Wickersham, 2007, p. 1). Some state boards of education are choosing to either enforce or encourage the use of electronic portfolios. In 2003, Rhode Island required that districts set "local HS graduation rules that include demonstrations of proficiency other than tests" through using electronic portfolios (Archer, 2007, p. 2). Archer noted that in 2007 more than half of the 39 districts in Rhode Island used electronic portfolios.

The purpose of electronic portfolios includes providing technology learning, professional assessment, measurement for standards, and opportunities to describe, narrate, and analyze individual learning (Hicks, Russo, Autrey, Gardner, Kobodian, & Edington, 2007). Electronic portfolios fulfill many different functions including development, presentation, and assessment (Mason, Pegler, & Weller, 2004).

Electronic portfolios serve multiple purposes. Barrett (2007) describes how these electronic tools can be used:

> They can be assessment tools to document the attainment of standards (a positivist model—the assessment portfolio), digital stories of deep learning (a constructivist model—the learning or process portfolio), and digital resumes to highlight competence (a showcase model—the best works/marketing/ employment portfolio). (p. 441)

Lankes (1998) also views electronic portfolios from an evaluative perspective:

…assessment that includes authentic and, performance-based measures. Such methods of assessment are not limited to multiple-choice and standardized tests, but include projects that require students to demonstrate their problem-solving skills as well as their skills in analyzing and synthesizing information. (p. 18)

Many educators are led to electronic portfolios because they believe "that the most powerful learning happens when it's supported by an entire community of learners …theories that suggest that social interaction is an essential context for learning" (Fahey, Lawrence, & Paratore, 2007, p. 460). Transitioning from the use of traditional assessment to the use of electronic portfolios is eased by the fact that much of what students are creating is in electronic formats, which can easily be organized. Courses that require electronic portfolios noticed increases in student participation, motivation for success, and growth in academic knowledge (Gibbs, 2004).

Given the requirement and importance of assessing students, the reviewer was interested in investigating the implementation process for using electronic portfolios to assess students. Three questions have driven the literature review:

- What constitutes a portfolio?

- What media options are available for electronic portfolios?

- What are the factors that must be considered when implementing electronic portfolios?

METHODOLOGY

The reviewer used three different methods for identifying and locating sources for this literature review. The first method used was searching through the World Wide Web. Search terms included: *electronic portfolios, electronic portfolio research,* and *electronic portfolio software*. The searches resulted in software websites, course description sites for schools, and a few research articles.

The second phase in searching was conducted using Google Scholar using the same search terms as previously identified. Numerous articles were found, however full text was not always available. The reviewer was only able to acquire a few additional research articles from this search method.

The third search method was the most effective. It involved using the Ebsco ERIC database through the Area Education Agency. The reviewer was provided with several research articles. The advanced search options allowed for the ability to refine the search and identify articles that met the needs of the literature review.

Upon reading the articles and materials, this author determined which sources were appropriate. Material was selected that was recently published (in the last ten years) and that was found in appropriate peer-reviewed journals. Authors selected were researchers of portfolios and individuals who had conducted studies on portfolio implementation. Material was chosen based upon its relevance to the topic.

ANALYSIS AND DISCUSSION

As educators decide to include electronic portfolios in their classrooms they need to have a clear understanding about electronic portfolios and be aware of the advantages of electronic portfolios (Ahn, 2004). They should also be informed of the media options available to determine those that would best meet their students' needs. Once they understand these portfolio basics, educators should be aware of the factors that must be considered when implementing electronic portfolios and then be prepared to assess the portfolio (Barrett, 2000). This literature review will explore these areas.

Definition of Portfolios

In education, portfolios have been used to organize and present student work, to allow students and teachers opportunities for discussion, to review, and for feedback. This tool also provides an arena for demonstrating progress and accomplishments over time (Gaide, 2006). Stansberry and Kymes (2007) stated that portfolios allowed students to "demonstrate best practices; showcase exemplary lessons and student products" (p. 488). They can also be used to demonstrate compliance with standard requirements and provide opportunities for self-reflection and personal growth.

Portfolios are collections of artifacts that demonstrate students' efforts, progress, and achievement with multiple courses and skills. Artifacts are collections of work created by the author and included in the portfolio (Kimball, 2003). Artifacts include "writing samples, solutions to mathematics problems, samples of art work, science projects, and multimedia presentations" in the form of text, graphics, sound and video (Tomlinson, 2008, p. 8). Portfolios are also measures of authentic assessment that demonstrate student growth over time (Heath, 2005).

Portfolios have increased in popularity with the addition of technology. Electronic portfolios are "easier to distribute, can be duplicated quickly and easily, and portray the dynamics of education more accurately than any traditional portfolio" (Heath, 2005, p. 66). White (2004) believes that electronic portfolios support the type of learning that best prepares students for the future. Lambert, DePaepe, Lambert and Anderson (2007) note that "using portfolios provides for authentic and meaningful collection and assessment of student work that demonstrates achievement or improvement" (p. 78).

Archer (2007) explained that often when graded paper assignments are returned to students; the assignments are thrown out or stuck somewhere just to be lost and neglected. With electronic portfolios, student work holds a long-term value because it is connected to standards, reflected upon, revised, and published. Tomlinson (2008) agrees because she noticed that when she allowed students freedom to display their learning in multiple ways they were more engaged when using traditional assessment measures. Archer argues that electronic portfolios are not just a fancy filing system, but they cause "students to think more critically about how their efforts meet expectations" (2007, p. 2).

Fahey et al. (2007) stated their research findings included students building a community with the use of good literacy. The process allowed students to generate and explore issues they felt were important. Lastly, students shared that during the electronic process it became generative; the more they did it the more they wanted to do it.

Advantages of Electronic Portfolios·

In the literature reviewed, the initial benefits of electronic portfolios address the comparison between electronic portfolios over traditional portfolios. Classroom peers can access electronic portfolios more easily along with coordinating teachers; therefore a

feedback process can be utilized. The portfolios can also be accessible to a wider audience outside of the school setting, such as family members and prospective employers. Reproducing and transporting an electronic portfolio can occur easily and inexpensively (Kilbane & Milman, 2003).

Students are provided the opportunity to display their creativity when they integrate multiple media types to demonstrate their knowledge and skills. This enables students to highlight their "thinking and learning, not just their ability to reproduce isolated facts and knowledge" (Montgomery & Wiley, 2008, p. 8).

Ahn (2004) points out many benefits of electronic portfolios. She notes that electronic portfolios encourage the school to set clear goals and expectations while teachers continually encourage students as well as provide detailed feedback on their progress. During the process, students are continually reflecting on their learning. Their artifacts can be stored efficiently, and organized with the ease of searching, accessing, and transporting. Ahn (2004) noted that:

the level of reflection and assessment is richer with electronic portfolios because student work is displayed with their reflections, data about the learning standard, and teacher feedback. This connection of elements allows all stakeholders to continually reflect on the learning process, which is the prime advantage of electronic portfolios as an assessment tool. (p. 4)

Students are provided the opportunity to build a community with their classmates as they review, comment, and assist each other in developing high-quality electronic portfolios. Time is provided for students to generate and explore new ideas and issues that are important to them. A strong connection is developed between the students and

their portfolios as they are continually motivated to build their portfolios (Fahey et al., 2007). They found this also provided the pre-service teachers a source of good ideas. Their data showed that every assignment in 2005 was downloaded at least once and some were downloaded several times (2007). Using electronic portfolios in teacher preparation classes provided a model for a learning-centered classroom with a personal collection of thoughts and completed work. The electronic portfolios improved instructional practices and showcased the future teachers' skills, knowledge, and experience for consideration by potential employers.

In the article, *Transformative Learning through 'Teaching with Technology'*, students completing electronic portfolios were able to "demonstrate best practices; showcase exemplary lessons and student products; show compliance with local, state, and national certification requirements and professional behaviors; and provide spaces for honest self-reflection and personal growth" (Stansberry & Kymes, 2007, p. 488).

Disadvantages of Electronic Portfolios

Students and teachers may need to be aware of and to overcome some of the disadvantages of using electronic portfolios. To implement portfolios, schools need to make a commitment to the expense of technology and training. "Technology companies are often changing or updating software which requires schools to spend money to maintain and update or the electronic portfolios won't be accessible" (Williams, 2007, p. 501). The expense increases the chance that only affluent schools can offer electronic portfolios for their students.

Time is needed to adequately train teachers on how to implement and maintain the portfolios as well as the time needed to work with students and provide continual

feedback. Teachers must plan for "long-term instruction that includes authentic tasks, rubrics, and self-assessment tools" (Montgomery & Wiley, 2008, p. 9). Advanced knowledge is required of the teacher about educational portfolios on top of the technology skills required to instruct and implement electronic portfolios.

School districts need to be aware of the security issues that can arise with electronic portfolios (Gibbs, 2004). Removing personal information or password protecting the student pages is a possible solution.

With the increase in popularity there is a possible chance of electronic portfolios becoming like a standardized or ranked form assessment, which would be problematic like the current standardized tests. It is also possible that electronic portfolios will constrain students by limiting their identities into a predefined, inflexible, digital system (Williams, 2007).

<div align="center">Types of Electronic Portfolios</div>

Hewett (2004) identifies three types of portfolios: documentation, process, and showcase:

Documentation Portfolio A documentation portfolio is designed to show growth toward a standard or perform a method of diagnostic assessment. This assessment can determine a student's level of mastery and then assist in developing a plan for further instruction. This collection of assignments, artifacts, and other evidence demonstrates how the student fulfills the identified competencies, standards, or outcomes established by the teacher (Burke, 1996).

Process Portfolio A process portfolio is used to document the phases of the learning process towards mastery. Reflections are emphasized where students describe

how they learned and met the standards. Process portfolios help students identify how they learn best and this metacognitive awareness fosters life-long learning. It is a reflection of knowledge, experiences, and feelings that provide a framework and process for the learner (Burke, 1996).

Showcase Portfolio A showcase portfolio displays the accomplishments and mastery of standards. Materials are selected because they reflect specific goals or a set of standards. The artifacts demonstrate the students' best work and the reflections provide the justification by students for those selections. The showcase portfolio represents an individual's accomplishments, learning, strengths, and expertise (Burke, 1996). Examples of a showcase portfolio include completed works or final products for a course (Kilbane & Milman, 2003).

Process and showcase portfolios correlate best with classroom use. Educators design portfolios for the students to complete by often combining the features of both process and showcase portfolios. The end result allows students to present their artifacts of top performance along with their description of learning and reflection. After the type of portfolio has been selected then educators need to analyze and select the form of media that best aligns with their goals and student ability levels (Burke, 1996).

Media Options

In addition to understanding the different types of electronic portfolios, educators must also consider the various forms of electronic portfolios, which depend upon the media used to author them. The media options offer students a range of freedoms to incorporate their technology skills and creativity. The first type of media, *Ready-Made Templates*, allows students to input their information into defined templates. The second

type of media, *Free-Form*, offers students with advanced technology skills the freedom to design and arrange their portfolios.

It is important for educators to assess their curricular needs and the levels of technological expertise they expect from their students before they decide the form of media to use. "In structuring its portfolio system, Rose-Hulman Institute of Technology began knowing what it hoped to accomplish and then built the technology to fit it, Ms. Priddy said. Too many other colleges are starting out using technology in search of a problem" (Basken, 2008, p. 31).

<center>Ready-Made Portfolio Templates</center>

A portfolio template is defined as just a page that includes the common elements that appear on every page within the portfolio. Elements that may be prearranged on each page include layout, colors, navigation elements, text elements, and graphics. A template is a generic model for users to input their information (Kimball, 2003). Waters (2007) identified a school district that used *Spotlight*, which is a web solution modeled after webmail clients such as Yahoo Mail or Hotmail. The features provided the users with the ease of entering information in the template forms. The procedures were clear to follow as they created and organized their electronic portfolios (2007). It was designed to be as easy to use as Yahoo Mail or Hotmail. Another school district used a web-based electronic portfolio software called *eduPortfolio.org*. It offered templates for instructors to modify to meet their classroom standards. Students found this to be easy to use (Ahn, 2004).

A relational database is a series of interlinked structured data files linked together by common fields. A relational database offers the user flexibility, cross-platform

options, ability to track and create reports, network and web capabilities, integration of multimedia, and security. However, databases can become very large, users need access to the software, and it requires a high level of skill to use effectively (Barrett, 2000).

A study Blair and Godsall (2006) conducted at Pine Crest High School used a course management system (CMS), which consisted of a software package that operated on the provider's server. This "provided the school with a user-friendly interface for copying items to the CMS server. Furthermore, teachers and students became enthusiastic about being able to easily create e-portfolios utilizing mixed media" (p. 147). The benefits of students using electronic portfolio software instead of websites are that students can easily follow instructions and there is no need to learn HTML.

Timilty Middle School used an open-source, bulletin-board technology. This type of technology allowed for every student learner to be visible to all instructors (Fahcy et al., 2007). Students were able to respond, reflect, and build on their knowledge. The bulletin-board technology allowed for students and teachers to focus on the creation of artifacts while reflecting, rather than learning new technology skills.

Hadley (2007) found that a template was beneficial for her students because they could focus on their reflections rather than on the creation of the electronic portfolio. Educators may select a free form portfolio option based on the ability of their students or based on the desired final product.

Free-Form Portfolio Option

When students and instructors choose to use a Free-Form media selection to create their electronic portfolios they will be incorporating their technology skills as well as demonstrating their mastery in the content areas (Barrett, 2000). This type of media

allows students the option of designing, organizing, and compiling their electronic portfolio according to their own vision. Multimedia authoring software, multimedia slideshow programs, and student-designed web pages are examples of Free-Form media options.

Multimedia Authoring Software programs allow students to develop presentations that don't require separate player software. They are ideal for CD-ROM publishing and incorporating multimedia elements. The software requires technology skills to master, linking artifacts to standards is challenging, and the security isn't ideal. This software is best designed for high school and college students (Barrett, 2000).

Web pages are a popular option for electronic portfolios due to the wide accessibility to the World Wide Web. They allow students to convert word processing documents into web pages and create hyperlinks between goals and the artifacts that demonstrate achievement. The advantages of creating Web-based portfolios center on its multimedia, cross-platform, and Web capabilities. Some users have found that "the learning curve is steep. Web pages require much more file-management skill than other types of portfolio development tools, and the security can be a problem" (Barrett, 2000, p.10). However, there are more ready-made hosting sites (i.e., Google Sites) that have made it easier for users to create web-based portfolios. These sites allow for freedom in creating electronic portfolios without the advanced skill level required of traditional web publication (Zeitz, 2008).

Multimedia slideshow programs (i.e., Microsoft PowerPoint) allow the user to create electronic slideshows with the option for sound, video, buttons, and hyper-links. Teachers and students appreciate the accessibility of the slideshow software and its

multimedia capabilities. Issues that are challenging with using multimedia slideshow are linking artifacts to standards, the large size of files, and if it's intended to be published on the Web, then it needs to be converted to HTML (Barrett, 2000).

Another media form for creating electronic portfolios is the Portable Document Format (PDF) document. PDF documents offer freedom so that users can incorporate them into their electronic portfolio. They are read by a variety of computer platforms using free Acrobat Reader software. The process of creating an Acrobat file can be easy.

PDF files are easy to access and read, can be created from multiple applications, include multimedia elements, are easily published to CD-ROM, have few size and resolution constraints, and are secure. Disadvantages include the large file size, the need for separate creation software, and the effort required to link artifacts to standards. (Barrett, 2000, p. 11)

PDF documents can also be incorporated into other types of electronic portfolios to view artifacts that students have created.

Video can be a powerful addition to many of the other portfolio development tools outlined here. Video allows the student to create a product without restrictions. Analog video involves inexpensive storage, suitable quality, and low-cost hardware. A disadvantage of analog video includes low interactivity, no Web accessibility, requires a lot of storage space, and is difficult to edit. "Digital video adds Web accessibility, high interactivity, random access, and easy editing, but also can be low quality, have huge file size and bandwidth requirements, and require expensive equipment to digitize and edit" (Barrett, 2000, p. 12).

The media option that should be selected is based on the grade level of the students as well as their technology skills. To assist in making an appropriate selection Barrett suggests that the "key criteria for software selection should be its capability to allow teachers and students to create hypertext links between goals, outcomes, and various student artifacts (products and projects) displayed in multimedia format" (2000, p. 9). She also encourages that the users investigate Web accessibility. It's important to find software that fits the audience, goals, technology skills, and available equipment.

Lankes (1998) encourages educators to look for learner-centered software that offers everyone access to a common platform and allows users to integrate existing files. He also believes that the portfolio should have the capacity to accommodate multiple forms of electronic multimedia: static text and graphic displays, databases, audio bites, video clips, panoramic files, 3D files, virtual reality, and more to provide students with a greater ownership in their portfolio and to allow for various ability levels. Diehm (2004) allowed his students to select the software they were the most comfortable with using.

<center>Implementing Electronic Portfolios</center>

Once educators have a clear understanding of portfolios, the benefits of electronic portfolios, and have determined which media options best suit their needs; they need to continue moving towards implementing electronic portfolios in the classroom setting. The implementation process includes identifying procedures, fulfilling standards, completing necessary training, and providing student feedback. In addition, the implementation process requires that instructors encourage student reflection, prepare for displaying the final presentation, and then assess the completed portfolio (Barrett, 2000).

Procedures

After determining that electronic portfolios meet the educational needs of a course

or district, steps need to be taken to introduce portfolios. Barrett (2000) offers steps for

educators to use before they begin implementing an electronic portfolio system in their

educational setting. The first step she suggests is *Assess/Decide*. Within this step

educators should determine the institution's needs in terms of content and presentation

goals, and then they need to decide upon appropriate tools and methods for creating the

final presentation. The second step, *Design/Plan,* is where the content, software, storage,

and presentation are determined. Within this step the content of the portfolio items is

determined which are aligned to the desired standards. The selection of software is

essential because it should match the portfolio content, vision, and style. Storage and

presentation issues should be addressed in this phase as well. Flow charts and storyboards

assist with this step. *Develop* is the next step in which materials are gathered and

organized. The learners will record their self-reflections and achievement of their goals.

Feedback from instructors will be carried out during this phase. Artifacts are selected,

added to the electronic portfolio, and then connected with reflective statements describing

why they were selected. The final two phases include *Implement* where the student

presents the portfolio to her or his audience and then *Evaluate* includes reflecting on

fulfilling the purpose and assessment. During *Implement*, students will organize the

chosen artifacts with links between goals, work samples, rubrics, and assessment. The

electronic portfolios will be presented to the appropriate audience. *Evaluate* requires the

instructors to evaluate the portfolios for effectiveness based on their purpose and form of

assessment. This is an on-going process (Barrett, 2000).

Once the educators have decided upon the system they will use for developing and using student portfolios, they need to provide their students with guidance in how to create a portfolio. Mason et al. (2004) discusses the four stages that they believe are necessary for implementing electronic portfolios. The first stage involves *collecting and selecting artifacts.* The artifacts in electronic portfolios can be easily held, organized, and reordered. An advantage of electronic portfolios is that the student can continually rework and arrange her or his artifacts as well as add artifacts. The second stage is *reflection*, which needs to occur over time and include the realization of their competencies. Building their portfolio over time increases the learners' ability to make sense of concrete experiences. *Projection* is the next stage where a student would compare reflections, standards, and performance indicators. The artifacts are shared with teachers and other students to allow for collaborative comments, revision, and discussion. This interactive process allows students to share their developing portfolio with peers and instructors. The fourth and last stage is *presentation* that includes all the various artifacts such as audio, video, graphics, references, photographs, and any other digital artifacts. Electronic portfolios are learner centered due to the opportunity for students to select their artifacts and presentation details (2004).

Having created the framework for the electronic portfolio system, there are still issues that need to be considered. Meyer and Latham (2008) stress the following points to be addressed when incorporating electronic portfolios:

a) E-folios must be mandatory in order to overcome resistance from students and faculty.

b) Students must be required to use the e-folio system even if they have weak computer skills.

c) Students should be able to choose their own materials to include in their e-folios, as long as the minimum content requirements are met.

d) Assignments should have due dates, and instructors must give students timely feedback.

e) Some faculty and students must work with the e-folio system to provide examples of the system's capability to others. (p. 2)

The points listed above will assist in developing a successful portfolio implementation plan (Meyer & Latham, 2008). By requiring participation, students and faculty will understand the value when they see the connections between progress and knowledge gained. Students will learn new technology skills and build on the skills they currently have while developing their electronic portfolio. Allowing the learners ownership in selecting their artifacts increases their motivation and develops a sense of pride in their work (Gibbs, 2004).

Educators will find success in including electronic portfolios in their classroom by following the procedural steps. Success can also be found when the requirements of the electronic portfolio are linked to educational standards (Ahn, 2004).

Standards

Standards are the qualitative criteria by which artifacts will be judged. An example of a defined standard is "essay must have a clear theses and strong evidence to back it up" (Kimball, 2003, p. 21). Connecting artifacts from electronic portfolios to performance standards is essential because they are shared views within the education

community that defines what constitutes learning (Montgomery & Wiley, 2008). An example would be a "unit standard selected by a teacher, defined by a school district, or mandated nationally for use with students in a classroom setting" (Montgomery & Wiley, 2008, p. 7).

Bresciani (2005) offers points for school districts to consider when implementing electronic portfolios. He feels that electronic portfolios must allow for student learning to be linked to the learning principles or standards. Evidence should be linked across multiple content areas as well as connect to the standards. Students should be evaluated based on their achievement in meeting the outcome standards.

During the electronic portfolio implementation process at Woonsocket Area Career & Technical Center (WACTC), educators initially spent time "creating school wide standards and portfolio templates for the students" (Ahn, 2004, p. 3). They felt this was necessary to develop a successful program because standards needed to be determined so that they could be used as the organizational structure for the portfolio.

Standards not only provided an organizational structure for the portfolio, but the explicit learning expectations aid the students in aligning their artifacts. Teachers benefit from the inclusion of standards because they will have a clear criterion for assessing and providing feedback (Ahn, 2004).

When schools design their portfolio goals to meet educational standards it will likely improve their teaching practice due to the time teachers spend reflecting and working to make improvements to meet district, state, or national standards (Kilbane & Milman, 2003). Teachers are the ones responsible for putting portfolios into practice in the classroom; therefore it is essential that they are provided quality training.

Training/Instruction

Blair and Godsall 2006) describes a K-12 school's Course Management System (CMS), which offers enrichment opportunities to prepare students for college. The first step in their implementation process was teacher training so that teachers were knowledgeable and confident in their skills prior to instructing students on new skills and concepts. The best method they found was "show, practice, run, do" (p. 148) which they noted appealed to all learner types. First they demonstrated (showed) the particular skills needed for portfolio implementation. Then the teachers were provided time to practice those skills with the support of the instructors to assist when needed. Time was allotted for the teacher to develop their plan for the students (run). They worked to incorporate their curriculum and standards. Teachers were then prepared to instruct (do) their students on creating their own portfolio. It was successful in building teacher enthusiasm and knowledge about the whole process, which allowed them to then guide and build students' enthusiasm. They also included faculty development because it helped teachers keep up with technology and theoretical changes (Blair & Godsall, 2006).

Feedback

Since electronic portfolios are published, students can gain feedback from peers as well as multiple instructors. The electronic portfolio initiative team at WACTC feels that teachers must be required to access and provide continual feedback to students. They designed their portfolio system so that multiple teachers could post feedback for students. They felt this "utilized the strength of an entire learning community, connecting its understandings; creating dialogue and reflection; thus, building a rigorous understanding of specific learning standards" (Ahn, 2004, p. 4). Fahey et al. (2007) documented

occasions where students are required to review other student work, give feedback, and build upon it which helps them become better writers and readers as well as increase comprehension and composition. Hadley found that her students posted honest and constructive criticisms to classmates' portfolios during the peer feedback requirements. In-class discussions helped students develop reflections on their artifacts. She required that student reflections answer the *what* and *so what* which identified the artifacts' instructional significance (Hadley, 2007). Bresciani (2005) believes in the importance of instructors having options for providing feedback to student work. He also notes the value in students having the option of responding to evaluators' feedback. Feedback can come in many levels. "Instructors and mentors might exchange comments privately with the student about work in progress, colleagues and classmates might discuss their work with each other, and the author might request feedback about specific issues and concerns" (Gaide, 2006, p. 4).

Reflection

Reflection is the activity of looking back on previous work and considering it with a careful and objective eye" (Kimball, 2003, p. 23). Reflection is a key piece in the creation of electronic portfolios and in guiding students to complete better quality work. Electronic portfolios are popular in education due to the "strategy of reflection in the selection of artifacts, the development of the portfolio, and in the statements of reflection imbedded with the artifacts" (Stansberry & Kymes, 2007, p. 488). Reflection offers students support for understanding their learning within a course as well as over time. The reflections include the learner's rationale for selecting artifacts and description of why the artifact demonstrates the student's achievement of the goals and standards.

Hewett's (2006) goal was for electronic portfolios to be a place "for reflection and growth not just for collecting artifacts and completing a checklist of standards" (p. 451). Hadley (2006-2007) was frustrated with the quality of student reflections because they were mostly shallow and rote. After working with some students, she developed a solution by having students address one standard at a time and for the reflections to be an ongoing process rather than just at the conclusion. She noted that the process that evolved from that point had a monumental impact on all students in the program (Hadley, 2006-2007). For the electronic portfolio implementation at WACTC, each artifact included student-written personal critiques, student descriptions of the learning standard, and explanations of how they met the standard in their work. During the process, students were continually reflecting on their learning and their artifacts. Ahn (2004) noted that:

> The level of reflection and assessment is richer with electronic portfolios because student work is displayed with their reflections, data about the learning standard, and teacher feedback. This connection of elements allows all stakeholders to continually reflect on the learning process, which is the prime advantage of electronic portfolios as an assessment tool. (p. 4)

Presentation

One bonus of electronic portfolios is that "all student work – homework, drafts, feedback questions and final products" can be shared with every member of the classroom (Fahey et al., 2007, p. 463). Students learn very well from each other. They tend to idolize their peers' opinion, which creates value in the feedback they hear. Fahey et al. (2007) stated that when students are "driven by the idea when everyone in a classroom makes public all of their work all the time and cares about everyone's learning,

all learning is likely to be deeper and more robust" (p. 466). Hadley found that timid students became more confident and camaraderie was developed when students presented their portfolios (2007).

Batson (2006) states that electronic portfolios should not be an add-on to an existing course or a simpler way to log student work. If that is the case then students will not see the true value in electronic portfolios. The electronic portfolio process is continual, reflective, and must become an embedded part of the school culture. Student progress data can also be used over several years to modify implementation procedures to develop the most successful plan for students.

Assessing Electronic Portfolios

"Assessment should be able to probe both collaborative processes and knowledge products" (Van Aalst & Chan, 2007, p. 180). Assessing an electronic portfolio comes in two forms: student self-assessment and teacher assessment. The holistic performance of students can then be identified by emphasizing the application and use of knowledge. Self-assessment rubrics can provide questions and statements that focus students on their behaviors and accomplishments. By allowing students the opportunity to assess their own work, which includes their rationale for their evaluation, instructors can then guide them towards realistic reflection. If self-assessment isn't included then the electronic portfolio becomes just a digital scrapbook (Montgomery & Wiley, 2008). During the planning phase, teachers identified the requirements and desired outcomes of the students' portfolios. To assess students they developed a rubric that clearly stated the expectations. The artifacts needed, the number of pages, navigation requirement, number of hyperlinks, design elements, reflections, and peer feedback were outlined on a rubric (Diehm, 2004).

Electronic portfolios are a form of alternative assessments therefore they are individually designed around the course, content area, and skills utilized. Instructors can determine the required artifacts, reflections, feedback, revisions and other items (Diehm, 2004).

Electronic portfolios offer the benefit for faculty "to provide a tool to better manage, review, reflect, and comment on student work" (Batson, 2006, p. 1). Instructors can also track student work over time while other students and faculty reflect on the product during the process. Batson notes the benefit of "aggregating many students' work in a particular course to see how the students as a whole are progressing toward learning goals" (Batson, 2006, p. 1). This provides the opportunity to assess an entire program of study in addition to an individual course.

Bresciani (2005) notes that values begin to emerge from students which include: writing and speaking, organizational skills, problem solving, analytical and critical thinking, and ethical reasoning.

> Bowling Green State University submitted a report to the coalition showing that, on average, undergraduates using electronic portfolios had higher grade-point averages, credit hours earned, and retention rates than a comparable set of students who did not use the system. … Also, LaGuardia Community College found that its students, about 70 percent of whom are immigrants, began writing their assignments with greater care and clarity, understanding that the electronic format meant family members in foreign countries might sometime be able to read them. 'That taps into an intrinsic motivation' for students to submit their best work. (Basken, 2008, p. 30)

Van Aalst and Chan (2007) share their strong beliefs about the requirements of using electronic portfolios as a form of assessment. They believe that assessment should capture both individual and collective facets of learning. It should be formative and embedded within the instruction so that the learning events align with the instruction. Instructors should evaluate both the process and the learning products. In addition, students should be given the opportunity to examine their own progress and the criteria for understanding the goals of learning as assessment.

Impact of Electronic Portfolios on Education

"Many educators and researchers feel that a portfolio assessment is a superior and more accurate indicator of student progress than the more conventional types of assessment" (Gibbs, 2004, p. 27). Electronic portfolios present students the opportunity to engage in knowledge building activities where they pose cutting edge questions, which helps other students advance their collective understanding (Van Aalst & Chan, 2007).

The detailed process of electronic portfolios may require students to review other student work and provide descriptive feedback to their peers. This methodology develops the students into high-quality readers and writers (Basken, 2008). Another educational benefit is students' level of comprehension and composition increases as they work through the procedures of developing their portfolios (Fahey et al., 2007).

Archer (2007) described how with the inclusion of electronic portfolios instructors' teaching style changed to engage more students in projects rather than lecturing to them. The responsibilities required of an electronic portfolio put more responsibility on students to perform. The students then become active learners and

assume ownership of their education, and the classroom becomes student centered. They are then "authors of their own academic success" (Gibbs, 2004, p. 27).

Electronic portfolios provide students the connections to educational standards while confirming the work done in the classroom. Students develop a better understanding of the grading process when they are involved. Teachers and students benefit from the clear method for measuring success (Basken, 2008). Expectations are outlined at the beginning of the process so students know what they are working towards and teachers can guide students to the desired goal.

The Stansberry & Kymes (2007) study focused on "the ability of the portfolio and the experience of its creation and maintenance to significantly and philosophically alter the teacher's notion of assessment practices in the classroom" (p. 488). Electronic portfolios allow teachers to monitor students' growth by looking at work rather than grades. The detailed training and planning process provides teachers the opportunity to learn and practice new technology skills. As teachers instruct and work with students on the creation of their portfolios, the learners' skills continually improve (Kilbane & Milman, 2003). As students continually enhance their portfolios with the addition of artifacts and reflections, they develop a sense of pride from seeing their work published and the progress they have made, which motivates them to continue to develop their portfolio (Chambers & Wickersham, 2007).

Using electronic portfolios in teacher preparation classes provided a model for a learning-centered classroom, with a personal collection of thoughts and work. The electronic portfolios improve instructional practices and showcase their skills, knowledge, and experience for potential employers (Gibbs, 2004). Graduate students

studying school administration benefit from completing electronic portfolios because in addition to growth and reflection, their portfolios can be used for licensure process and demonstrate participation in a professional community (Blair & Godsall, 2006).

The whole portfolio process combines learning in real-world contexts with meaningful activities that then produce an increased motivation for success, increased participation, and an overall growth of academic knowledge (Gibbs, 2004). The study conducted by Mason et al. (2004) found that students who completed electronic portfolios were "relatively sophisticated, self directed and confident learners" (p. 724).

Portfolios require extensive effort, but the "undertaking produces tangible results, a sense of accomplishment, and motivation for the student" (Gibbs, 2004, p. 29). Electronic portfolios offer a way for students to demonstrate mastery of knowledge and skills in an alternative way to standardized tests. With the inclusion of artifacts, reflections, peer feedback, revision, and publication of the electronic portfolios "all learning is likely to be deeper and more robust" (Fahey et al., 2007, p. 9).

CONCLUSIONS AND RECOMMENDATIONS

The purpose of this literature review was to determine the value of implementing electronic portfolios as a method for student assessment. The focus was on understanding electronic portfolios, effective media options, and strategies for successful implementation. According to the literature, electronic portfolios offer educators a measure for authentic assessments and connections to academic standards. Students are guided through the process of reflecting on their work and then provided opportunities to demonstrate growth. Teacher and peer feedback are valuable components of electronic portfolios. Instructors of courses that require electronic portfolios noticed an increase in student participation, motivation for success, and growth in academic knowledge.

A vast number of media options are available for students and teachers. There are benefits and drawbacks for each option. The literature reviewed concluded that when selecting the tools used to author the students' electronic portfolios it is essential for educators to consider the needs for each course/setting. Other factors to consider are the availability of current technology because it varies between districts as well as technological knowledge of the instructors and students. According to the literature, web-based electronic portfolio software offers students and teachers user-friendly implementation. It can be easily adapted to meet the needs of each course and content area.

Implementing electronic portfolios requires planning upfront. Educators need to complete the needs assessment, design the presentation, and develop materials all before having students begin working. In addition to planning, educators also need to take part

in training and practice with the technology prior to modeling and instructing the students.

Given the collection of information, the reviewer recommends implementing electronic portfolios into educational settings. The reviewer advises the reader to follow the strategies for successful implementation that were described. Ample planning and organization must take place before requiring students to create an electronic portfolio. The reviewer also suggests that the media options be examined closely to ensure that the choices fit the needs of the course, abilities of the students and teachers, and is compatible with the technology of the district. To gain further information the reader could conduct action research while using different media options and varied implementation procedures.

The inclusion of technology in the classroom is becoming a standard and the level of technology is advancing all the time. Performance-based assessment is revolutionizing the traditional classroom. These two factors are fueling the drive of electronic portfolios. The use of electronic portfolios will expand beyond the classroom. The skills and confidence that students develop while creating their electronic portfolios will support them as they transition beyond graduation. Electronic portfolios will also assist candidates competing for employment positions by presenting their qualities in an electronic portfolio.

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