White Paper

Researching Electronic Portfolios and Learner Engagement

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Researching **E**lectronic [port]**F**olios: **L**earning, **E**ngagement and **C**ollaboration through **T**echnology

Table of Contents

Major portions of this document were previously published on the author's website: http://electronicportfolios.org/

Abstract

This paper provides the theoretical background for a study of student learning, engagement and collaboration through the development of electronic portfolios. After covering an overview of the limited research on portfolios in education, definitions, multiple purposes of portfolios, and conflicting theoretical paradigms are discussed. Principles of student motivation and engagement are covered, along with philosophical and assessment issues and the importance of reflection in learning. The relationship between storytelling and reflection is elaborated. Finally, the paper describes several technology tools that engage learners in reflecting, including blogging and digital storytelling.

Introduction to the Research on Electronic Portfolios

There are many educators who advocate the use of portfolios in education, both with students and teachers. The empirical research, however, is very limited and focuses more on the development of teaching portfolios than on K-12 student portfolios in the classroom. The literature shows many accepted purposes for portfolios, which may make it difficult to research with any precision. Additionally, as used in the K12 classroom, portfolios are not so much an instructional strategy to be researched, but more of a means to an end: to support reflection that can help students understand their own learning and to provide a richer picture of student work that documents growth over time.

Artists have maintained portfolios for years, often using their collection for seeking further work, or for simply demonstrating their art; it is useful to note, however, that an artist's portfolio usually includes only their best work. Financial portfolios contain a comprehensive record of fiscal transactions and investment holdings that represent a person's monetary worth. This is often a summative record that paints a comprehensive picture of what is, rather than a plan of what might be in the future. By contrast, an educational portfolio contains work that a learner has collected, reflected, selected, and presented to show growth and change over time, representing an individual or organization's human capital. A critical component of an educational portfolio is the learner's reflection on the individual pieces of work (often called "artifacts") as well as an overall reflection on the story that the portfolio tells.

Also complicating research and literature regarding portfolios in education is the fact that there are many purposes for portfolios in education: there are portfolios that center around learning, assessment, employment, marketing, and showcase or best work. With so many purposes for portfolios it becomes clear that the term "portfolio" should always have a modifier or adjective that describes its purpose.

As we explore portfolios in education, it is natural to focus on uses and experiences of portfolios as a means of student assessment and portfolios that capture the learning process. The use of "portfolio assessment" in education emerged in the late 1980s, primarily in college writing classrooms (Belanoff, Elbow, 1991) to address the needs for accountability: the emphasis on portfolio ***assessment***. As portfolios began to be incorporated into K-12

classrooms, the emphasis was more on portfolios as a showcase for learning, as a counterpoint to traditional forms of assessment, or to illuminate capabilities not covered by standardized testing: the emphasis on ***portfolio*** assessment. According to Kathleen Blake Yancey and Irwin Weiser (1997), those purposes are becoming reversed, with post-secondary institutions exploring the wide varieties of purposes for portfolios (learning, advising, employment) and with state departments of education (Kentucky, Vermont, Connecticut) designing statewide models of student portfolios for statewide assessment.

In their synthesis of "Portfolio Research: A Slim Collection," Herman and Winters (1994) note the following:

> Well-designed portfolios represent important, contextualized learning that requires complex thinking and expressive skills. Traditional tests have been criticized as being insensitive to local curriculum and instruction, and assessing not only student achievement but aptitude. Portfolios are being heralded as vehicles that provide a more equitable and sensitive portrait of what students know and are able to do. Portfolios encourage teachers and schools to focus on important student outcomes, provide parents and the community with credible evidence of student achievement, and inform policy and practice at every level of the educational system. (Educational Leadership, October 1994, pp. 48-55)

These authors go on to discuss the lack of empirical evidence to support these claims. Joanne Carney (2001) noted in the literature review for her dissertation that the research literature on portfolios has not changed much in the seven years since Herman & Winters published their article.

> Collections of writing are considered here as a special case of a class of new performance assessments known as "portfolio assessments." Although models of portfolio assessment differ, it is common practice that students' classroom work and their reflections on that work are assembled as evidence of growth and achievement. The goal is to produce richer and more valid assessments of students' competencies than are possible from traditional testing… However, little is known regarding the capacity of portfolio assessments to support judgments that are valid for large-scale [assessment] purposes. (Novak, Herman & Gearhart, 1996)

Even so, the multiple purposes for which portfolios can be developed make the research task even more challenging. Adding to the multiple purposes, there are many different contexts that portfolios can be found: K-12 schools, higher education, professional portfolios, making comparison a further challenge.

In her presentation at the 2004 American Educational Research Association conference, Joanne Carney identified a framework for conducting electronic portfolio research, based on the work of Herman and Winters (1994): *technical quality*, *fairness*, *effects,* and *feasibility*, categories for documenting portfolio effectiveness intended primarily for *assessment* portfolios. Carney adapted these characteristics for use with *learning* portfolios, adding Zeichner and Wray's (2001) critical dimensions of variation:

1. Purpose(s) of the portfolio,
2. Control (who determines what goes into the portfolio and the degree to which this is specified beforehand),
3. Mode of presentation (portfolio organization and format—including the technology chosen for authoring),
4. Social Interaction (the nature and quality of the social interaction throughout the portfolio process),

5. Involvement (Zeichner & Wray identify degree of involvement by the cooperative teacher important for preservice portfolios; when considered more broadly, other important portfolio participants might include university teachers, p-12 students and parents, and others),
6. Use (can range from low-stakes celebration to high-stakes assessment).

For further review of the literature on researching electronic portfolios in education, consult Joanne Carney's excellent paper presented at the 2004 AERA Symposium on **Setting an Agenda for Electronic Portfolio Research:**
http://it.wce.wwu.edu/carney/Presentations/presentations.html

K-12 Student Portfolios

Following are excerpts from several documents published by ERIC that focuses on K-12 Student Portfolios. In a Consumer Guide on "Student Portfolios: Classroom Uses" the U.S. Department of Education (November 1993) noted the following:

> WHAT DOES THE RESEARCH SAY? Research shows that students at all levels see assessment as something that is done to them on their classwork by someone else. Beyond "percent correct," assigned letter grades, and grammatical or arithmetic errors, many students have little knowledge of what is involved in evaluating their classwork. Portfolios can provide structure for involving students in developing and understanding criteria for good efforts, in coming to see the criteria as their own, and in applying the criteria to their own and other students' work.
>
> Research also shows that students benefit from an awareness of the processes and strategies involved in writing, solving a problem, researching a topic, analyzing information, or describing their own observations. Without instruction focused on the processes and strategies that underlie effective performance of these types of work, most students will not learn them or will learn them only minimally. And without curriculum-specific experience in using these processes and strategies, even fewer students will carry them forward into new and appropriate contexts. Portfolios can serve as a vehicle for enhancing student awareness of these strategies for thinking about and producing work--both inside and beyond the classroom. (http://www.ed.gov/pubs/OR/ConsumerGuides/classuse.html)

In a follow-up Consumer Guide (December 1993), "Student Portfolios: Administrative Uses" the authors addressed the use of portfolios for administrative purposes and here is what they noted about the research:

> WHAT DOES THE RESEARCH SAY? Experience with classroom-level portfolio projects shows that many portfolios are currently highly individualized, if not intensely personal. Judged in light of available standards--some district and school policies, court decisions, and professional association standards--many of our existing student portfolios appear to contain too little information for "high-stakes" administrative uses.

Definitions

What is a portfolio? Rick Stiggins (1994) defines a portfolio as a collection of student work that demonstrates achievement or improvement. The material to be collected and the story to be told can vary greatly as a function of the assessment context. The Northwest Evaluation Association offers a similar definition:

> A purposeful collection of student work that illustrates efforts, progress, and achievement in one or more areas [over time]. The collection must include: student participation in selecting contents, the criteria for selection, the criteria for judging merit, and evidence of student self-reflection

Stiggins (1994) also adds that a portfolio is "a means of communicating about student growth and development" and "not a form of assessment" (p. 87).

What is an electronic portfolio? Here is a definition established by the National Learning Infrastructure Initiative (NLII, 2003): a collection of authentic and diverse evidence, drawn from a larger archive representing what a person or organization has learned over time on which the person or organization has reflected, and designed for presentation to one or more audiences for a particular rhetorical purpose.

In my definition, an electronic portfolio uses electronic technologies as the container, allowing students/teachers to collect and organize portfolio artifacts in many media types (audio, video, graphics, text); and using hypertext links to organize the material, connecting evidence to appropriate outcomes, goals or standards. Here is a chart that I developed that identifies the portfolio development processes identified in the portfolio literature, and the technological strategies that enhance the process.

Traditional Portfolio Processes include:	Adding Technology allows enhancement through:
• Collecting	• Archiving
• Selecting	• Linking/Thinking
• Reflecting	• Storytelling
• Projecting	• Collaborating
• Celebrating	• Publishing

Exploring the Multiple Purposes for Electronic Portfolios

There are a variety of purposes for developing electronic portfolios: as an assessment tool, for marketing or employment, and to document the learning process and growth for learners of all ages, from pre-school through graduate school and into the professions. The purposes and goals for the portfolio determine the content.

Learning/Process Portfolios involve the focus on Plato's directive, "know thyself" which can lead to a lifetime of investigation. Self-knowledge becomes an outcome of learning. In a portfolio study conducted with adult learners who were developing portfolios to document prior learning, Judith Brown (2002) found the following outcomes: increased students' understanding of what, why, and how they learned throughout their careers, and enhanced their communication and organization skills. The results of this study reinforces the importance of reflection in learning.

John Zubizaretta (2004), in his insightful book on Learning Portfolios in higher education, describes the primary motive of a learning portfolio: "to improve student learning by providing a structure for students to reflect systematically over time on the learning process and to develop the aptitudes, skills and habits that come from critical reflection." (p.15) He borrows from Peter Seldin's work on teaching portfolios, and identifies three fundamental components of learning portfolios, as shown in the following diagram.

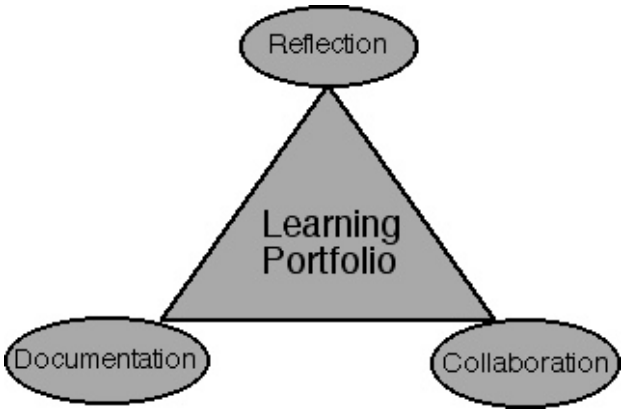


Figure 2.1 The Learning Portfolio (Zubizaretta, 2004, p.20)

Portfolios as implemented in K-12 education provide us with a model that favors finding a balance between using portfolios to support the learning process and using portfolios for accountability; under the No Child Left Behind legislation, K-12 schools have established other accountability measures. Below is a diagram that was developed by Evangeline Harris Stefanakis (2002) from her work with portfolios that demonstrate multiple intelligences. Her research is based on her work with the Massachusetts Project Zero Network. As she says,

> The drive toward standardized and state testing requires us, as researchers and practitioners, to find ways to learn from tests and portfolios in order to develop a comprehensive assessment system in which accountability would be demonstrated at many levels related to student achievement. …In a more generalized way, I offer a design for a comprehensive system which combines formal, informal, and classroom assessment, including portfolios, to inform the state, the district, the school, and the teacher. The goal for each district is to carefully construct a comprehensive assessment system, with a collection of assessments that allow many stakeholders to use these data to improve both student learning and teachers' teaching, Without portfolios to make visible what students do and what teachers teach, I am not sure this can be done. Figure 8-1 presents my representation for an assessment for learning continuum. (p. 137)

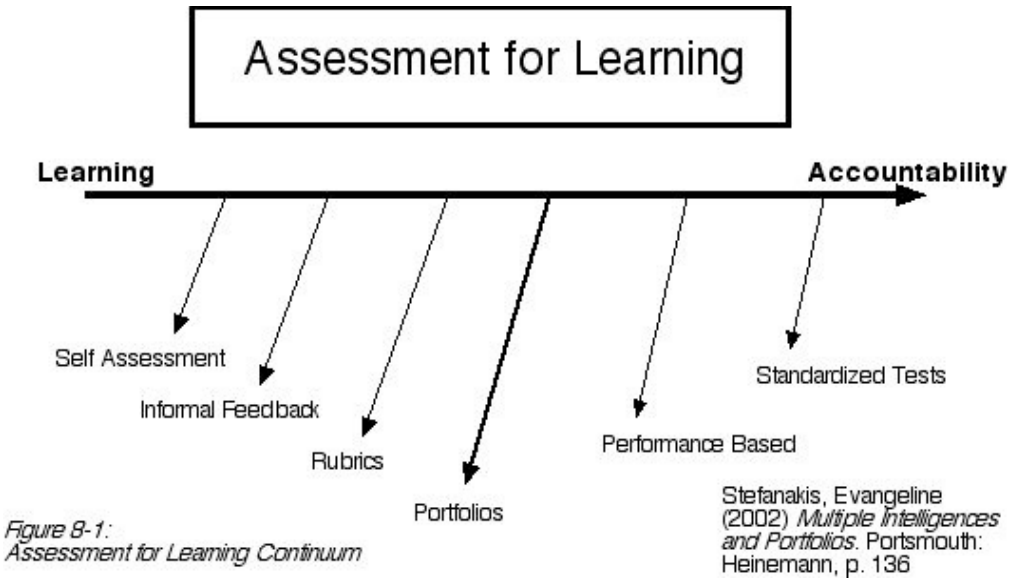


Figure 8-1:
Assessment for Learning Continuum

Stefanakis, Evangeline (2002) *Multiple Intelligences and Portfolios*. Portsmouth: Heinemann, p. 136

As portfolios move from traditional paper-based creations to electronic, web-based platforms, we must continue to focus on how the medium supports and influences the purpose of the portfolio. A portfolio that closely emulates a paper version and just happens to be stored in an electronic container is a very different document from online database systems and systems that focus on portfolios as a means to conduct high stakes evaluations. With so much focus on high stakes assessment in K12 education, it will be important for education programs to maintain their focus on the original purposes for which paper portfolios have been successful, and carefully assess the impact that the conversion to an electronic format will have on those original goals.

The real balancing act is how to meet the needs of the organization for an assessment management accountability system while not losing what might be valuable already in a paper-based reflective portfolio system. More research is needed on examples of implementation that clearly differentiate between student-owned electronic portfolios and the assessment systems used to record evidence of students' progress toward meeting standards. It is our hope that the REFLECT initiative will provide this type of data.

To effectively use portfolios for assessment, a learning organization needs to establish a culture of evidence. Evidence in an electronic portfolio is not only the artifacts that a learner places there, but also the accompanying rationale that the learner provides: their argument as to why these artifacts constitute evidence of achieving specific goals, outcomes or standards. Furthermore, just because a learner makes the claim that their artifacts are evidence of achievement, in "high stakes" environments, the evidence needs to be validated by a trained evaluator, using a well-developed rubric with identifiable and specific criteria. This process can be represented by a simple formula: Evidence = Artifacts + Reflection (Rationale) + Validation (Feedback) (Barrett, 2003).

Conflicting Paradigms

A growing number of commercial tools have come to market in the last three years that leverage Internet technologies to answer institutional needs to meet accreditation and assessment requirements. Many of these systems promise support for student portfolios AND aggregated assessment data to meet reporting requirements. There are challenges in meeting these two diverse needs with a single product. That is because these products are combining two different paradigms of portfolios, which by their very nature, are in conflict with each other. Pearl and Leon Paulson (1994) outlined these differences more than ten years ago:

> **Positivist Portfolios**
> "The purpose of the portfolio is to assess learning outcomes and those outcomes are, generally, defined externally. Positivism assumes that meaning is constant across users, contexts, and purposes… The portfolio is a receptacle for examples of student work used to infer what and how much learning has occurred." (p.36)
>
> **Constructivist Portfolios**
> "The portfolio is a learning environment in which the learner constructs meaning. It assumes that meaning varies across individuals, over time, and with purpose. The portfolio presents process, a record of the processes associated with learning itself; a summation of individual portfolios would be too complex for normative description." (p.36)

> **Tension between two approaches**
> "The two paradigms produce portfolio activities that are entirely different...
> "The positivist approach puts a premium on the selection of items that reflect outside standards and interests....
> "The constructivist approach puts a premium on the selection of items that reflect learning from the student's perspective." (p.36)

How do we match the needs of the institution for valid and reliable data for accreditation and accountability while still meeting the needs of learners for formative assessment to enhance and support the learning process? In order to approach a balanced solution, we must envision a solution that makes it easy for students to maintain their own digital archive of work, where they can capture a large number of examples and add their reflections and notes in an ongoing way. Students can then draw from the same collection of evidence as they respond to and create multiple portfolios.

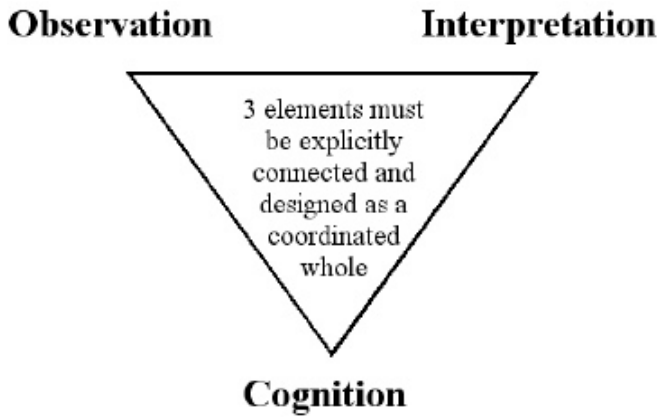
These issues of balance and struggle between purposes are currently being addressed by many experts in the educational community. In 2001, the National Research Council published a guidebook on educational assessment: *Knowing what Students Know: The Science and Design of Educational Assessment*. As stated therein, here is the purpose of educational assessment:

> Educational Assessment seeks to determine how well students are learning and is an integrated part of the quest for improved education. It provides feedback to students, educators, parents, policy makers, and the public about the effectiveness of educational services." (p.1)

There are several factors that are improving assessment: advances in cognitive sciences, a broadened concept of what is important to assess, advances in measurement sciences, and expanded capability to interpret more complex forms of evidence. It is important to emphasize the importance of **multiple measures** in assessment: one type of assessment does not fit all situations. A single assessment is often used for multiple purposes, which is a problem: "…the more purposes a single assessment aims to serve, the more each purpose will be compromised." (p.2) Assessment is always a process of reasoning from evidence and is imprecise to some degree. Results are only estimates of what a person knows and can do. Therefore, we need a richer and more coherent set of assessment practices.

Every Assessment Rests on Three Pillars

- A model of how students represent knowledge and develop competence in a content domain
- Tasks or situations that allow one to observe students' performance
- An interpretation method for drawing inferences from performance evidence



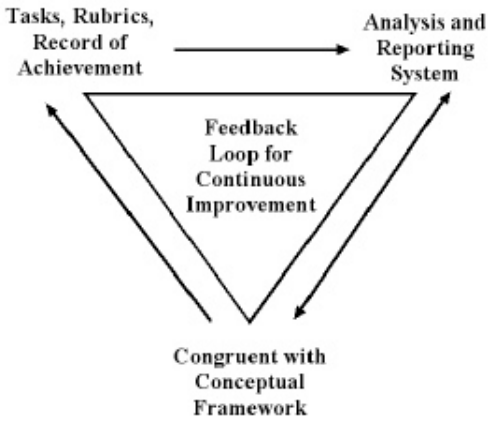
The Assessment Triangle
National Research Council (2001) Knowing What Students Know. (p.44)

The Challenge and the Solution

The challenge for us is to find electronic portfolio strategies that meet the needs of both the students, to support this deep learning, and to give the institution the information they need for assessment and reporting purposes. State agencies must be confident that graduates collectively meet the state's requirements. The review process, therefore, requires the aggregation of data for use in determining student quality, school effectiveness, and continuous improvement. Since the fundamental principle of a student-centered portfolio is to allow choice by the student in the collection of artifacts, aggregation of data becomes virtually impossible.

These conflicting paradigms require a multi-faceted system, one that allows a learner to build a meta-tagged digital archive of artifacts, one that helps teacher candidates build learner-centered constructivist portfolios using those artifacts, and another that lets an institution collect the assessment data that meets their accreditation requirements.

How do we create an Institution-Centered Assessment and Accountability System without losing the power of the portfolio as a student-centered tool for lifelong learning and professional development? How do we teach them to use sound assessment based on established performance expectations? How do we maintain the authenticity of the portfolio process? Here is a design of an accountability system that is based on the Assessment Triangle:



Assessment Management System based on Assessment Triangle

Congruence with Conceptual Framework: Create a system that is congruent with your underlying learning philosophy or conceptual framework while still also aligned with state and national standards. There are many often contradictory or complementary paradigms in educational philosophy: behaviorism vs. constructivism; positivism vs. hermeneutics; portfolio as test vs. portfolio as story. What is the underlying philosophical base of your program? How does the strategy you choose fit into this model?

Tasks, Rubric, Record of Achievement: Identify tasks or situations that allow one to assess students' knowledge and skills through both products and performance. Create rubrics that clearly differentiate levels of proficiency. Create a recordkeeping system to keep track of the rubric/evaluation data based on multiple measures/methods. Provide opportunities for students to learn and resubmit, maximizing diagnosis and remediation. Model the power of assessment as learning.

Reporting System and Feedback Loop: Create a reporting process to aggregate and analyze assessment data, to be able to draw inferences from performance evidence, and to use for program improvement

Why keep the learner portfolio separate from the assessment management system?

- **Learner Ownership and Engagement with Portfolio** - The tools should allow the learner to feel in control of the process, including the "look and feel" of the portfolio. Kathleen Blake Yancey has stated her belief that learners should be the "information architects" of their own portfolios.

- **Emotional Connection** - There is an affective component of the portfolio development process that supports deep learning.

- **Learner's Authentic Voice** -As learners create their own electronic portfolios, their unique "voice" should be evident from navigating the portfolios and reading the reflections on the screen. In an electronic portfolio, the ability to add multimedia elements expands the definition of "voice" within that rhetorical construct. The

Northwest Regional Education Lab defines Voice (within its 6+1 Trait® Writing Model) as:

> "...the personality of the writer coming through on the page. It is what gives the writing a sense of flavor, a uniqueness, and gives the reader the feeling that the writer is talking directly to her. A strong sense of voice demands that the writer make a commitment to the writing and write honestly with conviction. In a paper with strong voice, the reader will get a sense that someone real is there on the page, whether the reader knows the writer or not."

- **Portfolio as Story** - Leon and Pearl Paulson have stated, "Portfolios tell a story...put in anything that helps to tell that story." A learner's portfolio should help them tell a story about their growth and development over time.

- **Portfolio as Lifelong Learning/ Professional Development Tool** - The tools used to develop the portfolio should be accessible to a learner throughout their chosen career. The electronic portfolio development process should help students build the skills necessary to maintain their e-portfolio as a lifelong professional development tool.

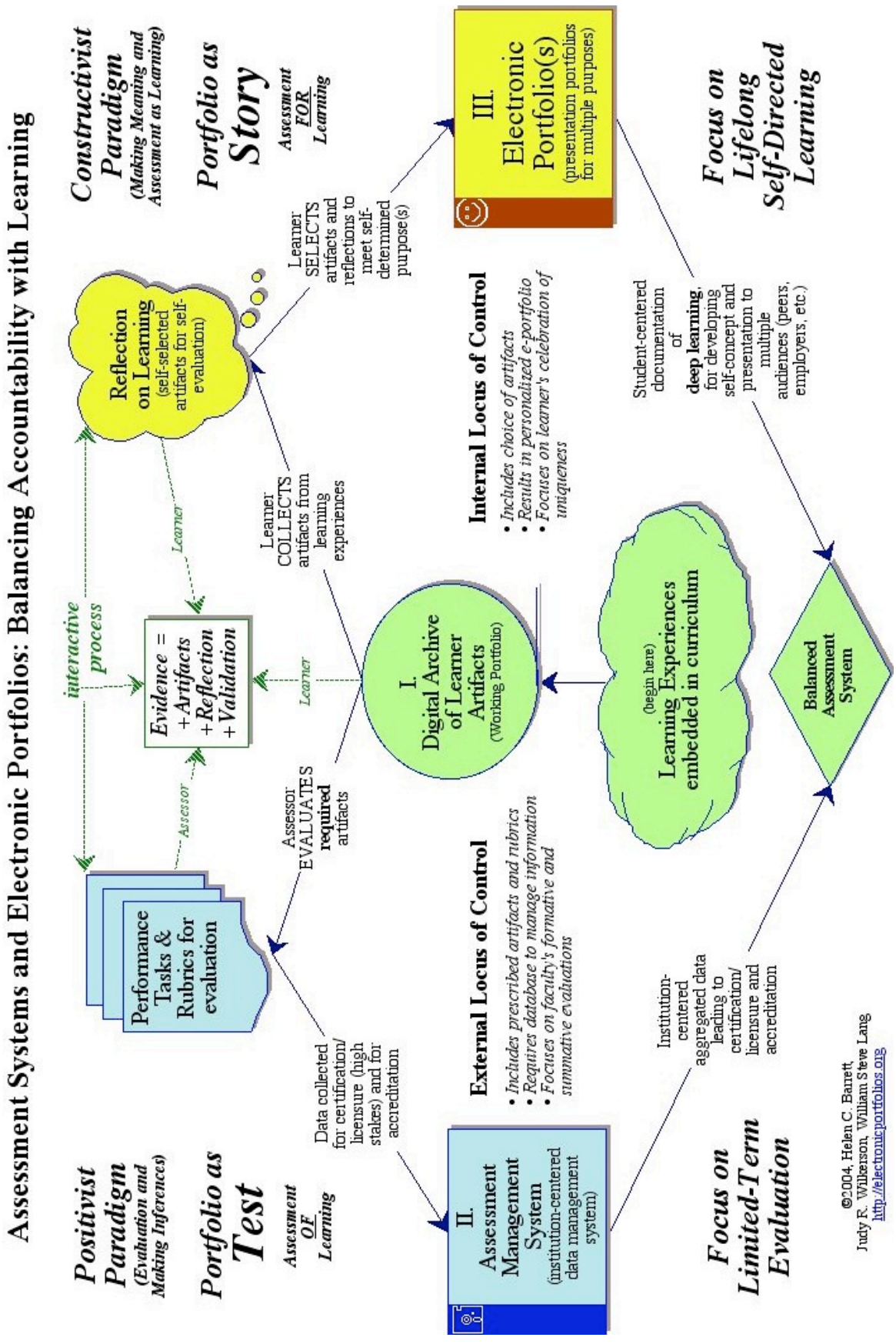
- **Constructivist model supports deep learning** - As Portland State University has found, hyperlinking leads to metacognition, which leads to deeper learning. Whenever possible, learners should have the opportunity to plan and assess their own learning.

How can we address both types of needs for assessment and learning?

After much study of the literature and discussion with other colleagues, I have come up with a new taxonomy that balances the needs of the institution for an assessment management system while meeting the needs of learners for a reflective portfolio that supports deep learning. The conceptual framework outlined in the diagram on the next page describes an electronic portfolio system that uses three different systems that electronically talk to each other:

- A digital archive of learners' work
- A learner-centered electronic portfolio "using the learner's authentic voice"
- An institution-centered database to collect faculty-generated assessment data based on tasks and rubrics

Looking at this concept map, at the bottom center of the graphic we begin with learning experiences that are embedded in the curriculum. Those learning experiences should produce work that can be stored in a digital archive of learner artifacts that is often called a working portfolio. There are two ways that these artifacts can be used as evidence of learning: in the educational institution's assessment system and in the learner's portfolio. This process is interactive and reflective, connecting the artifacts with the learner's reflection, which is the rationale or justification for using the artifact as evidence of learning. An assessor looks at the artifact and the learner's reflection, and decides if the artifact meets the guidelines of the performance task as outlined in the associated rubric.


Assessment Systems and Electronic Portfolios: Balancing Accountability with Learning
Positivist Paradigm (Evaluation and Making Inferences)
Portfolio as Test
Assessment OF Learning
Constructivist Paradigm (Making Meaning and Assessment as Learning)
Portfolio as Story
Assessment FOR Learning
Performance Tasks & Rubrics for evaluation
Assessor
interactive process
Learner
Evidence = +Artifacts +Reflection +Validation
Reflection on Learning (self-selected artifacts for self-evaluation)
Assessor EVALUATES required artifacts
Learner COLLECTS artifacts from learning experiences
Learner SELECTS artifacts and reflections to meet self-determined purpose(s)
I. Digital Archive of Learner Artifacts (Working Portfolio)
III. Electronic Portfolio(s) (presentation portfolios for multiple purposes)
External Locus of Control
• Includes prescribed artifacts and rubrics
• Requires database to manage information
• Focuses on faculty's formative and summative evaluations
Internal Locus of Control
• Includes choice of artifacts
• Results in personalized e-portfolio
• Focuses on learner's celebration of uniqueness
(begin here) Learning Experiences embedded in curriculum
Balanced Assessment System
Data collected for certification/ licensure (high stakes) and for accreditation
Institution-centered aggregated data leading to certification/ licensure and accreditation
Student-centered documentation of deep learning, for developing self-concept and presentation to multiple audiences (peers, employers, etc.)
II. Assessment Management System (institution-centered data management system)
Focus on Limited-Term Evaluation
Focus on Lifelong Self-Directed Learning
©2004, Helen C. Barrett, Judy R. Wilkerson, William Steve Lang
http://electronicportfolios.org

Let's first focus on the left side of the graphic, which describes the positivist paradigm of evaluation and making inferences, or the "Portfolio as Test" (as described by Wilkerson and Lang). The artifacts in the learner's archive (the required tasks in the assessment system) are evaluated by an assessor, based on the performance tasks and rubrics. This data is collected for high stakes assessment purposes. The results are stored in the institution's assessment management system, which is an institution-centered data management system. Since this example focuses on teacher education programs, this process results in institution-centered aggregated data leading to certification or licensure for the individual teacher candidate, and supports the institution's program assessment. The same model would hold for K12 student assessment in schools and districts across the country. The focus of this process is on more limited-term evaluation, with an external locus of control which:

- Includes prescribed artifacts and rubrics
- Requires database to manage information
- Focuses on faculty's formative and summative evaluations

Now, let's focus on the right side of the graphic, which describes a constructivist paradigm of making meaning and assessment as learning, or the "Portfolio as Story" (as described by Paulson & Paulson). The artifacts in the learners' archive are collected from the learning experiences. Through the process of reflecting on her own learning, the learner selects artifacts and reflection for self-evaluation based on her self-determined purposes. A learner may create several presentation portfolios, based on multiple purposes and audiences. The process hopefully results in student-centered documentation of deep learning, for developing self-concept and presentation to multiple audiences (peers, employers, etc.). The focus of this process is on lifelong, self-directed learning, with an internal locus of control which:

- Includes choice of artifacts
- Results in personalized e-portfolio
- Focuses on learner's celebration of uniqueness

Paying equal attention to both approaches will result in a more balanced assessment system that supports deep learning.

Defining a Purpose for the Portfolio

To reiterate, the literature suggests that portfolios can have multiple purposes (Wolf, 1999): as assessment tools to document the attainment of standards (a positivist model--the assessment portfolio); as digital stories of deep learning (a constructivist model--the learning or process portfolio); and as digital resumes to highlight competence (a showcase model-- the best works/marketing/employment portfolio). These models are often at odds, philosophically, with each other. While administrators often implement electronic portfolios for the assessment purpose, the students usually view this type of portfolio as something "done to them" rather than something they WANT to maintain as a lifelong learning tool. A portfolio that is truly a story of learning is OWNED by the learner, structured by the learner, and told in the learner's own VOICE (literally and rhetorically).

Barton and Collins (1993) stated, “the first and most significant act of portfolio preparation is the decision of the purposes for the portfolio” (p. 203). What are your purposes in creating an electronic portfolio? To support ongoing learning/professional development? To support formative and summative assessment? To support marketing and employment? These are three major purposes for electronic portfolios... and they are all different and require different types of technology tools. A learning portfolio can be supported very nicely with a web log environment ("blogs"), whereas an assessment portfolio that ties artifacts to a set of standards, with feedback or validation, is best implemented through a relational database structure. A marketing or employment portfolio only needs an authoring environment that supports formatting and hyperlinking on a web-based server.

Many of the assessment portfolio solutions that have been put in place focus primarily on the administrators' needs for assessment data and around the positivist model. I am concerned that in the name of accountability, we are losing a powerful tool to support deep learning. I am concerned that that we are losing the "stories" in e-portfolios in favor of the skills checklists. Portfolios should support an environment of reflection and collaboration. It is a rare system that supports those multiple needs. That is why I often advocate for three interconnected systems: an archive of student work, an assessment management system to document achievement of standards, and an authoring environment where students can construct their own electronic portfolios and reflective, digital stories of learning (see earlier discussion about this balanced model). I believe the use of technology can be a motivating factor for portfolios, especially if we can make it engaging for the learners, and give them an opportunity to express their own voice in their portfolios.

There is a rich legacy in the K-12 portfolio literature and much can be learned from the literature on paper-based portfolios. As adult learners, we have much to learn from how children approach portfolios. In her book, *The Power of Portfolios*, Elizabeth Hebert, principal at Crow Island School in Winnetka, Illinois, tells a story about the growth of portfolios in her school over the last decade. Their approach to portfolios focuses on student ownership of the portfolio: (read from the bottom to the top in order of maturity)

> Child-organized portfolio
> Teacher-and-child-organized portfolio
> Progress portfolio
> Showcase portfolio or achievement portfolio
> Teacher-organized portfolio or curriculum portfolio
> Collection of child’s work
> Folder of child’s work

Hebert discussed the purpose of the portfolio: “If we can begin to consider that the primary purpose for the portfolio is to provide a vehicle for each child to grow metacognitively and to demonstrate competence in telling the story of learning, the door is open for the child to assume ownership.” Hebert's portfolios are learner-centered. The perspective really showcases the differences between using the portfolio as assessment ***of*** learning (a high stakes assessment model) and using portfolios as assessment ***for*** learning (as a tool to bring about self-awareness and met-cognition).

Motivation and Student Engagement

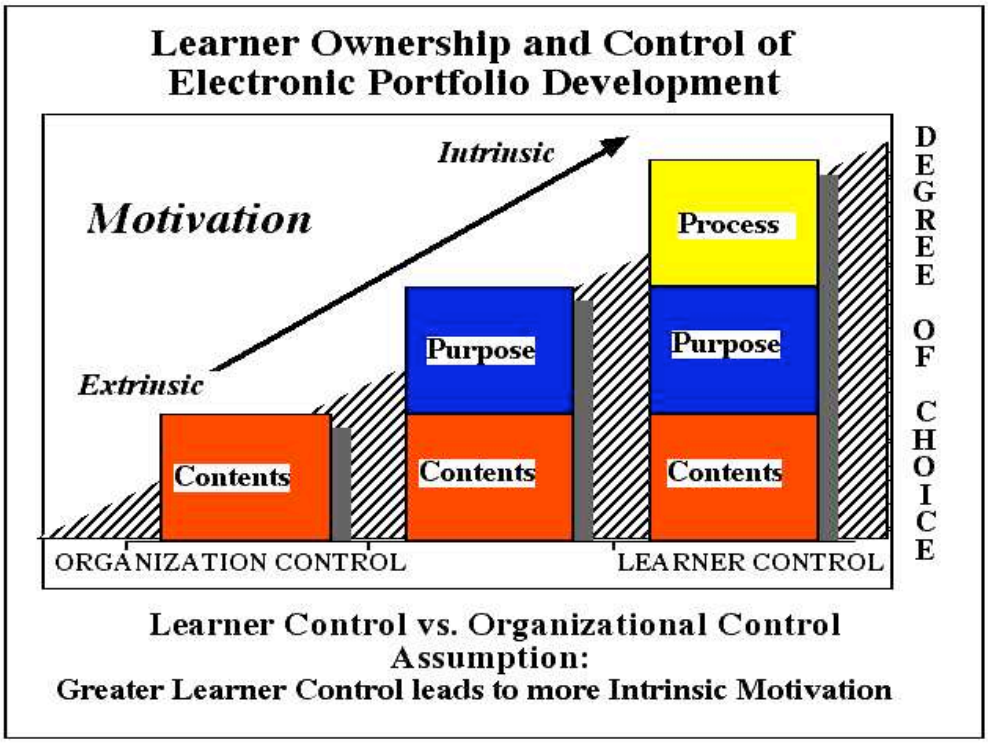
So far we have been discussing assessment of learning and portfolios that support learning, but what about learner motivation? Some preliminary research on student attitudes toward portfolios in general, and electronic portfolios indicate that when focus is only on rigid assessment portfolios, students do not have engagement in or pride of the resulting portfolios. Research in Teacher Education programs shows that teacher candidates usually view these types of assessment or credential portfolios as something they have to produce to get out of the program, and many indicated that they would not continue the process after they leave the program (McCoy & Barrett, 2004). Are we graduating a cohort of students that does not value the portfolio as a lifelong learning strategy? Are we doing a disservice to our teacher candidates by having them experience the portfolio only as a high-stakes assessment tool? How can we encourage their intrinsic motivation and engagement in the portfolio process?

There are three general components of the portfolio development process: content, purpose, and process. The content includes the evidence (the learner's artifacts and reflections). The purpose includes the reason for creating the portfolio, including learning, or professional development, assessment and employment. The process includes the tools used, the sequence of activities, the rules established by the educational institution, the reflections that a learner constructs as they develop the portfolio, the evaluation criteria (rubrics), and the collaboration or conversations about the portfolio.

I propose that there are developmental levels of portfolio implementation in terms of motivation:

- Extrinsic Motivation –institutional directed content, purpose & process – external locus of control
- Mixed Motivation –learner ownership over one or two of the components
- Intrinsic Motivation —learner ownership of content, purpose and process

When a learner starts developing their portfolio, they need direction and scaffolding, so the institution provides direction over the content, purpose and process, resulting in an external locus of control. If the goal is to move toward learner's intrinsic motivation to develop and maintain their portfolios, then there needs to be learner ownership of the content, purpose and process. This diagram illustrates the assumption that greater learner control over each of these components will lead to more intrinsic motivation… but this is a hypothesis that begs to be supported by empirical research. Again, it is our hope that the REFLECT initiative will begin to collect data in these areas.



Barrett (2004c)

A major challenge today with electronic portfolios is to maintain learner intrinsic motivation to willingly engage in the portfolio process. The use of multimedia tools is one strategy that involves and engages learners; another technology that is engaging young people today is the web log or "blogs" and "wikis."

Assessment of Learning or Assessment for Learning?

This distinction in types of assessment is elaborated by Rick Stiggins (2002) in an outstanding article about the current assessment crisis. It is important to make this distinction when considering the role of portfolios in assessment. As noted earlier, there is a great deal of difference between the use of portfolios in high stakes assessment ***of*** learning, and the powerful, robust uses of portfolios in formative assessment (for instruction) and assessment ***for*** learning.

The research being conducted in Britain (Black & Wiliam, 1998) on Assessment FOR Learning provides firm evidence that "formative assessment is an essential component of classroom work and that its development can raise standards of achievement" more effectively than any other strategy. Current research is adding further evidence in support of this claim and the empirical evidence is underpinned by theory from the psychology of learning and studies of learning motivation. The Assessment Reform Group provides this definition:

> Assessment for Learning is the process of seeking and interpreting evidence for use by learners and their teachers to decide where the learners are in their learning, where they need to go and how best to get there.

Here are their ten research-based principles of Assessment for Learning (AFL) to guide classroom practice:

- AFL should be part of effective planning of teaching and learning
- AFL should focus on how students learn
- AFL should be recognized as central to classroom practice
- AFL should be regarded as a key professional skill for teachers
- AFL should be sensitive and constructive because any assessment has an emotional impact
- AFL should take account of the importance of (and foster) learner motivation
- AFL should promote commitment to learning goals and a shared understanding of the criteria by which they are assessed
- AFL develops learners' capacity for self-assessment so that they can become reflective and self-managing
- AFL should recognize the full range of achievements of all learners
- Learners should receive constructive guidance about how to improve

Here is a comparison of these two key assessment purposes, based on work done in Britain (see http://www.assessment-reform-group.org.uk):

Assessment of Learning	**Assessment for Learning**
Checks what has been learned to date	Checks learning to decide what to do next
Is designed for those not directly involved in daily learning and teaching	Is designed to assist teachers and students.
Is presented in a formal report	Is used in conversation about learning
Usually gathers information into easily digestible numbers, scores and grades	Usually detailed, specific and descriptive feedback in words (instead of numbers, scores and grades)
Usually compares the student's learning with either other students or the 'standard' for a grade level	Usually focused on improvement, compared with the student's 'previous best' and progress toward a standard
Does not need to involve the student	Needs to involve the student -- the person most able to improve learning

According to Anne Davies (2000), "Assessment for learning is ongoing, and requires deep involvement on the part of the learner in clarifying outcomes, monitoring on-going learning, collecting evidence and presenting evidence of learning to others." She further points out, Assessment that directly supports learning has five key characteristics:

- learners are involved so a shared language and understanding of learning is developed,
- learners self-assess and receive specific, descriptive feedback about the learning during the learning,
- learners collect, organize, and communicate evidence of their learning with others,
- instruction is adjusted in response to ongoing assessment information, and

- a safe learning environment invites risk taking, encourages learning from mistakes, enables focused goal setting, and supports thoughtful learning.

How does Assessment for Learning relate to electronic portfolios? The issues of using portfolios for high stakes assessment have already been discussed by Wilkerson and Lang (2003) and earlier in this paper. To be effectively used to support assessment for learning, electronic portfolios need to support the learner's ongoing learning. Here is my comparison of electronic portfolios used as assessment of learning with those that support assessment for learning:

Portfolios used for Assessment of Learning	**Portfolios that support Assessment for Learning**
Purpose of portfolio prescribed by institution	Purpose of portfolio agreed upon with learner
Artifacts mandated by institution to determine outcomes of instruction	Artifacts selected by learner to tell the story of their learning
Portfolio usually developed at the end of a class, term or program - time limited	Portfolio maintained on an ongoing basis throughout the class, term or program - time flexible
Portfolio and/or artifacts usually "scored" based on a rubric and quantitative data is collected for external audiences	Portfolio and artifacts reviewed with learner and used to provide feedback to improve learning
Portfolio is usually structured around a set of outcomes, goals or standards	Portfolio organization is determined by learner or negotiated with mentor/advisor/teacher
Sometimes used to make high stakes decisions	Rarely used for high stakes decisions
Summative - what has been learned to date? (Past to present)	Formative - what are the learning needs in the future? (Present to future)
Requires Extrinsic motivation	Fosters Intrinsic motivation - engages the learner
Audience: external - little choice	Audience: learner, family, friends - learner can choose

Two anecdotes about high school portfolios

The issues of learner engagement and motivation seem to be most critical in high schools today. With the federal government and the Gates Foundation both focusing their efforts on restructuring high schools, the following anecdotes provide insight into what might be termed opposite extremes of high school student attitudes toward their portfolios.

> A school district in the Pacific Northwest described a situation that they heard happen in another nearby district. After their high school graduation, the seniors built a bonfire and threw in their paper-based portfolios. Whether this is truth or urban legend, the lack of ownership in their portfolios by some students can be seen in the trash cans in the halls at the end of each school year.
>
> Jim Mahoney (2002), in his wonderful book on high school portfolios, tells the story of a high school freshman who developed such a wonderful writing portfolio in her 9th grade English class that is was used by her teachers as an exemplar in professional development classes. When the portfolio disappeared, the student was heartbroken and offered a $50 reward for its return. It was never found, but the student was able to reconstruct components from files on her home computer.

What is the difference between these two anecdotes? Is it just the attitudes of the students? Or could it be the purpose of the portfolios and how they are used in the high school curriculum and instruction? Could the portfolios that end up in the trash or on the bonfire be the type of portfolios mandated by schools as another form of summative assessment OF learning? Could the portfolios that are so valued by students that they would offer a reward be the type of portfolios that support assessment FOR learning? What are the variables that produce these extremes in attitudes toward ownership of portfolios?

The Importance of Reflection in Learning

If we are to help learners create portfolios that truly support assessment for learning and follow the ten AFL principles, then we need to look at strategies that help the learner tell a story of their own learning... strategies that foster learner self-motivation. Ann Davies states, "Research is indicating that closing in on a goal triggers a part of the brain linked to motivation (e.g. Csikszentmihalyi, 1990; Pert, 1997; Pinker, 1997). Setting goals is a powerful way to focus students' learning."

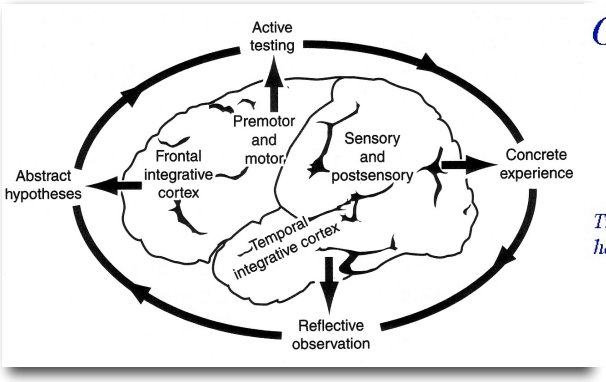
Portfolio as Reflective Story

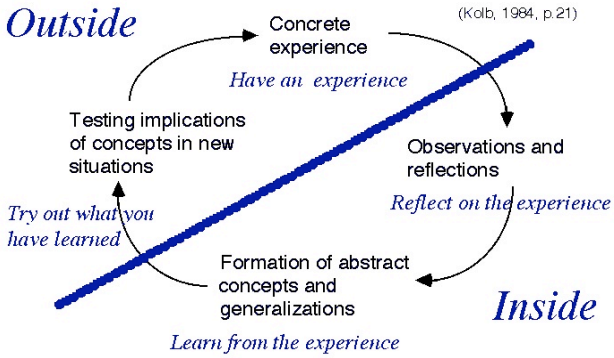
In the early 1990s, Pearl and Leon Paulson created a metaphor for portfolios as a tool to construct meaning. They stated, "The portfolio is a laboratory where students construct meaning from their accumulated experience." (Paulson & Paulson, 1991, p.5) They also pointed out that portfolio tell a story:

> A portfolio tells a story. It is the story of knowing. Knowing about things... Knowing oneself... Knowing an audience... Portfolios are students' own stories of what they know, why they believe they know it, and why others should be of the same opinion. A portfolio is opinion backed by fact... Students prove what they know with samples of their work." (Paulson & Paulson, 1991, p.2)

The metaphor of "portfolio as story" emphasizes the richness of this tool to support reflection as an essential component of learning. The major theoretical roots of reflection can be found in John Dewey, Jürgen Habermas, David Kolb, and Donald Schön. John Dewey has stated, "We do not learn from experience…we learn from reflecting on experience." The Learning Cycle, developed by David Kolb, based Dewey, Piaget, and Lewin, is based on the belief that deep learning (learning for real comprehension) comes from a sequence of experience, reflection,

abstraction, and active testing. James Zull" (2002) fascinating book on the biology of learning, points out evidence that the learning cycle arises naturally from the structure of the brain (p.19)





Zull's overlay of Kolb's Experiential Learning Model over the structure of the brain (p.18, shown on the left above), and Jennifer Moon's further elaboration (shown on the right above), provide further support for the importance of reflection in supporting deep learning. Zull points out, "Even if we experience something that has happened to us before, it is hard to make meaning of it unless it engages our emotions." (p.166) He also points out that reflection is a search for connections (p. 167) and suggests that we have to seriously consider the role of emotion if we want to foster deep learning (p. 169).

> Even if we were able to decrease our emphasis on speed and information and increase the possibilities for reflection, we still would have to give our students the kind of experience that would produce dreams--**experiences that engage their emotions**. (p.168)

Roger Schank (1991) points out the importance of stories in learning, that recalling and creating stories are part of learning. In fact, stories engage all parts of the brain; Zull points out that learning is deepest when it engages the most parts of the brain. Jennifer Moon, the most recent researcher on reflective practice, provides the following definition:

> Reflection is a form of mental processing – like a form of thinking – that we use to fulfill a purpose or to achieve some anticipated outcome. It is applied to relatively complicated or unstructured ideas for which there is not an obvious solution and is largely based on the further processing of knowledge and understanding and possibly emotions that we already possess (based on Moon 1999)

Moon points out that one of the defining characteristics of surface learning is that it does not involve reflection (p.123). She points out the conditions for reflection: time and space, a good facilitator, a supportive curricular or institutional environment, and an emotionally supportive environment. Moon further points out the qualities of tasks that encourage reflection:

- Ill-structured, 'messy' or real-life situations
- Asking the 'right' kinds of questions – there are no clear-cut answers
- Setting challenges can promote reflection
- Tasks that challenge learners to integrate new learning into previous learning
- Tasks that demand the ordering of thoughts
- Tasks that require evaluation

Portfolios provide a powerful environment in which students can collect and organize the artifacts that result from engaging in these challenging, real-life tasks, and write the reflections through which students draw meaning. Part of the reflective process is to have students tell stories about their experiences which brain research shows can help students embed these experiences into their long term memory.

Donald Schön (1988) discussed storytelling as a mode of reflection:

> "…for storytelling is the mode of description best suited to transformation in new situations of action.... Stories are products of reflection, but we do not usually hold onto them long enough to make them objects of reflection in their own right.... When we get into the habit of recording our stories, we can look at them again, attending to the meanings we have build into them and attending, as well, to our strategies of narrative description."

For those who consider the term "storytelling" to be too informal, Mattingly (1991) recommends using the term "narrative inquiry." He points out Aristotle's use of narrative as the natural framework for representing the world of action. Mattingly also elaborates on the "everyday sense-making role of storytelling," that stories reveal the way ideas look in action. Narrative provides explanation. Our motivation for telling stories is to wrest meaning from experiences.

Clandinin & Connelly in Schön (1991) call stories "unpretentious narrative." Stories are a fundamental method of personal growth through *reflection*, which is preparation for the future, and *deliberation*, of past considerations. Reflection does not always have to be in written form. For some students, reflections can be oral, shared with peers or teachers. However, as Schön notes, we need to capture those stories in our portfolios to make them objects of reflection. With the addition of multimedia technologies, these stories can be captured, in either audio or video formats.

Janice McDrury and Maxine Alterio (2002), two educators from New Zealand have written a book called *Learning through Storytelling* in which they outline their theory of storytelling as an effective learning tool. They have linked the art of storytelling with reflective learning processes supported by the literature on both reflection and learning as well as making meaning through storytelling. The authors propose storytelling as a theory of learning within a socio-cultural framework and introduce a Storytelling Pathways Model and their Reflective Learning through Storytelling Model. Compared with Moon's (1999) Map of Learning, they outline five stages of Learning through Storytelling (p. 47):

Map of Learning (Moon, 1999)	Learning through Storytelling
• Noticing • Making sense • Making meaning • Working with meaning • Transformative learning	• Story finding • Story telling • Story expanding • Story processing • Story reconstructing

As individuals and institutions approach the portfolio as a story of learning, it is important to consider the theoretical underpinnings of this process. McDrury and Alterio provide the theoretical support for adding storytelling into the e-portfolio process, as they lay out their theory:

> ...when we tell our own practice stories and listen to those of others, then work together to process them deeply and critically, we connect in ways which enrich self, relationship and practice, Through these connections we construct new knowledge and advance our understanding of the relationships we construct and are constructed by. For these reasons we end our journey convinced that storytelling can, and should, be viewed as a theory of learning. (p.175)

McDrury and Alterio identify links between learning and storytelling and between reflective process and storytelling. Here are three simple stages of reflection tied to storytelling:

- First stage: inner discomfort or surprise – "something" makes the experience memorable
- Second stage: events examined in detail – stories are shared, dialogue is formed
- Third stage: relates to outcomes – decision to change or gain knowledge through reflection

Technology Tools that Engage Learners in Reflection

The following technologies can support Learning or Process Portfolios: web logs ('blogs'), reflective journals, online discussions, self-report surveys, and digital storytelling. The portfolio development process could be linked to the digital storytelling process. What is Digital Storytelling? The Digital Storytelling Association provides the following definition:

> Digital Storytelling is the modern expression of the ancient art of storytelling. Digital stories derive their power by weaving images, music, narrative and voice together, thereby giving deep dimension and vivid color to characters, situations, experiences, and insights.

In this context, learners create a 2-4 minute digital video clip that is told in first person narrative, in their own voice, illustrated by (mostly) still images, with the addition of a music sound track to add emotional tone. . For further information, see http://electronicportfolios.org/digistory/.

Another technology that has potential to make electronic portfolios more engaging is the web log or "blog" as known by those who read and write them. As the Stanford Learning Technologies group has evolved the technology to support its research project on "folio thinking," researcher Helen Chen reports that they are beginning to use blog or "wiki" software to support students' reflections. David Tosh and Ben Werdmuller of the University of Edinburgh have published a paper online (PDF) entitled, "ePortfolios and weblogs: one vision for ePortfolio development."

A weblog is defined as any web page with content organized according to date. Originally, these were pages keeping track of a user's discoveries on the newly emerging World Wide Web; later the definition expanded to encompass personal diaries, work-related progress reports and even summaries of current events on newspaper websites. (Tosh & Wedmuller, pp. 3-4)

> In the context of an ePortfolio, course tutors, lecturers, clubs and societies could all have their own weblogs which users could view on their "friends" page. Students can share information they've found or ideas they have on a particular subject, as well as the more social messages which may form a compelling reason for them to use the technology to begin with. (p.4)

Since one of the main goals of a portfolio is reflection on learning, perhaps a blog is a good option, since it can be used as an online reflective journal and an environment that invites collaboration. In the elearningpost blog, graduate student Dan Saffer discussed, "Why I Blog my Postgrad Course." His remarks about what he got out of the process would make many teachers smile, since his insights are consistent with our goals for our student reflections in their portfolios:

> Lately, a lot of the things I'm learning in different classes have all started to come together; they all seem to be talking about similar things or things are starting to fit into patterns. Some of this is intentional, some probably not. But I doubt I would have been able to see those patterns as clearly without the blog. There's something about putting your entire coursework together in one place that allows you to more easily make that kind of analysis.

Wikis are online documents that can be edited by anyone with access to the page. The tool could be useful for collaborative writing. For further information about using blogs and wikis in electronic portfolios, follow links on the following page: http://electronicportfolios.org/blogs.html.

Conclusions

The time is right to study the potential of electronic portfolios to engage students in active participation in assessing and managing their own learning. In 2005, the level of available technologies makes possible an international study about the role of electronic portfolios to support student learning, engagement and collaboration.

We have the technology. We have the vision. We need to better understand what works, especially with adolescent learners and their teachers. "If not now, when? If not us, who?"

Recommended Additional Readings online:

Bergman, T. (2000) "Feasible Electronic Portfolios: Global Networking for the Self-Directed Learner in the Digital Age" Available online [http://www.mehs.educ.state.ak.us/portfolios/why_digital_portfolios.html]

Recommended Books

Davies, A. (2000) *Making Classroom Assessment Work*. Merville, BC: Connections Publishing
Hebert, E. (2001) *The Power of Portfolios*. Jossey-Bass
Mahoney, J. (2002) *Power and Portfolios: Best Practices for High School Classrooms*. Portsmouth: Heinemann
Stefanakis, E. (2002) *Multiple Intelligences and Portfolios*. Portsmouth: Heinemann
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