

Researching electronic portfolios and learner engagement: The REFLECT Initiative

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A rationale for the application of electronic portfolios in classrooms can strengthen arguments for their use.

There are many educators who advocate the use of portfolios in education, for students as well as teachers. The empirical research, however, is very limited and focuses more on the development of teaching portfolios than on K–12 student portfolios. The literature shows many accepted purposes for portfolios, which may make research with any precision difficult. Additionally, as used in K–12 classrooms, portfolios are less an instruction strategy to be researched and more a means to an end. Portfolios support reflection that can help students understand their own learning and provide a richer picture of student work to document growth over time.

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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 upon, selected, and presented to show growth and change over time, work that represents an individual's or an 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 about the learner.

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

Some background on portfolios

Artists have maintained portfolios for years, often using their collection to seek further work or simply to demonstrate 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, most often a summative record

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 to address the needs for accountability: the emphasis was on the *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 as illumination of capabilities not covered by standardized testing: The emphasis was on the *portfolio*. According to Yancey and Weiser (1997), those purposes are becoming reversed, with postsecondary institutions now exploring the wide varieties of purposes for portfolios (learning, advising, employment) and with state departments of education designing models of student portfolios for assessment.

When looking at the research on portfolios in education, and specifically electronic portfolios, it is clear that Herman and Winters (1994) were right when they called their synthesis “A Slim Collection”:

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. (p. 48)

Herman and Winters (1994) went on to discuss the lack of empirical evidence to support these claims. Carney (2001) noted in the literature review for her dissertation that the research literature on portfolios had not changed much in the seven years since Herman and Winters published their article. According to Novak, Herman, and Gearhart (1996),

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. (pp 1–2)

In her presentation at the American Educational Research Association conference, Carney (2004) identified a framework for conducting electronic portfolio research, based on the work of Herman and Winters (1994) and using the elements of 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 and Wray identified degree of involvement by the cooperative teacher as important for preservice portfolios; when considered more broadly, other important portfolio participants might include university teachers, K–12 students and parents, and others),
6. Use (can range from low-stakes celebration to high-stakes assessment).

What is a portfolio?

Stiggins (1994) defined 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 (as quoted in Paulson, Paulson, & Meyer, 1991) offered 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. (p. 60)

Stiggins added 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?

An early definition established by the National Learning Infrastructure Initiative (EDUCAUSE; Cambridge, 2004) called an electronic portfolio 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 that is designed for presentation to one or more audiences for a particular rhetorical purpose.

An electronic portfolio uses technologies as the container, allowing students or teachers to collect and organize portfolio artifacts in many media types (audio, video, graphics, text). Hypertext links organize the material, connecting evidence to appropriate outcomes, goals, or standards (Barrett, 2001). Table 1 is a chart that identifies the development processes identified in the portfolio literature, and the technological strategies that enhance those processes. (Barrett, 2003, 2004b)

Exploring the multiple purposes for electronic portfolios

There are a variety of purposes for developing electronic portfolios, such as the following: as an assessment tool; for marketing or employment; or to document the learning process and growth

for learners of all ages, from preschool through graduate school and beyond. The purposes and goals for the portfolio determine the content.

Learning or process portfolios involve a focus on the directive inscribed on Apollo’s Oracle of Delphi temple, “know thyself,” which can lead to a lifetime of investigation. Self-knowledge becomes an outcome of learning. In a study conducted with adult learners who developed portfolios to document prior learning, Brown (2002) found the following outcomes: increased understanding of what, why, and how students learned throughout their careers, and enhanced communication and organization skills. The results of her study reinforce the importance of reflection in learning.

Zubizarreta (2004), in his insightful book on learning portfolios in higher education, described the primary motive of a learning portfolio as being “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 cited Peter Seldin’s (1997) work on teaching portfolios, and identified three fundamental components of learning portfolios: reflection, documentation, and collaboration. A learning portfolio exists where these three processes intersect.

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 them for accountability; under the No Child Left Behind legislation, K–12 schools have established other accountability measures. Stefanakis (2002), in her work with portfolios that demonstrate multiple intelligences, discussed the role of portfolios in accountability:

In a more generalized way, I offer a design for a comprehensive [assessment] 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 careful-

Table 1
Portfolio processes and value-added benefit of technology

Traditional portfolio processes include	Adding technology allows enhancement through
<ul style="list-style-type: none"> • Collecting • Selecting • Reflecting • Projecting • Celebrating 	<ul style="list-style-type: none"> • Archiving • Linking/Thinking • Storytelling • Collaborating • Publishing

ly 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. (p. 137)

As portfolios move from traditional paper-based collections 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 methods that focus on portfolios as a means to conduct high-stakes evaluations. With so much attention on high-stakes assessment in K–12 education, it will be important for education programs to remember the purposes for which paper portfolios were successful, and carefully assess the impact that 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 process (Barrett, 2004a). 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.

To effectively use portfolios for assessment, a learning organization needs to establish a culture of evidence. Evidence in an electronic portfolio is not only measured by the artifacts that a learner places there, but also by 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 claims that their artifacts are evidence of achievement does not substantiate that claim. In high-stakes environments the evidence needs to be validated by a trained reviewer, 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, p. 6, slide 32).

Conflicting paradigms

A growing number of commercial tools have come to market recently that use Internet technologies to answer institutional 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 because these products are combining two different paradigms of portfolios, which by their very nature are in conflict with each other.

Leon and Pearl Paulson (1994) outlined these differences more than 10 years ago:

The purpose of the [positivist] 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. 8)

The [constructivist] 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. (pp. 8–9)

On the tension between the two approaches, Paulson and Paulson explained,

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. 9)

How do we match the needs of the institution for valid and reliable data while still meeting the learner's need for formative assessment to enhance and support the learning process? In order to approach a balanced solution, we must envision a system that makes it easy for students to maintain their own digital archive of work, where they can display a large number of examples and add reflections and notes in an ongoing way, perhaps in a learning journal. Students can then draw from the same collection of evidence as they respond to and create showcase portfolios or respond to a more structured assessment management system implemented by their school or district to measure their growth and progress against a set of learning standards.

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 (personal communication, January 27, 2003) 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.
- Learners' authentic voices—As learners create their own electronic portfolios, their unique “voices” 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 Educational Laboratory (2001) defined *Voice* (in its 6+1 Trait Writing Model) as follows:

The Voice is the writer coming through the words, the sense that a real person is speaking to us and cares about the message. It is the heart and soul of the writing, the magic, the wit, the feeling, the life and breath. When the writer is engaged personally with the topic, he/she imparts a personal tone and flavor to the piece that is unmistakably his/hers alone. And it is that individual something—different from the mark of all other writers—that we call voice.

- Portfolio as story—Pearl and Leon Paulson (1991) have stated, “Portfolios tell a story. Put in anything that helps to tell the story” (p. 1). Learners' portfolios 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 life. The electronic portfolio development process should help students build the skills necessary to maintain their e-portfolio as a life-long professional development tool.
- Constructivist model supports deep learning—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, Barrett and Wilkerson (2004) proposed a new taxonomy that balances the need of the institution for an assessment management system with the need of learners for a reflective portfolio that supports deep learning. The conceptual framework describes an electronic portfolio system that uses three different elements that are linked.

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

Paying equal attention to both approaches to portfolios will result in a more balanced assessment system that supports deep learning. Thus, if using a single product to support portfolio implementation in a school, that product must provide unique tools for each of the three types of portfolios.

Defining a purpose for the portfolio

To reiterate, the literature suggests that portfolios can have multiple purposes (Wolf, 1999). 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). These models are often at odds, philosophically, with each other. Although administrators often implement electronic portfolios for an assessment purpose, the students usually view this type of portfolio as something “done to them,” rather than as something they want to maintain as a life-long 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 (both 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? Are they to support ongoing learning/professional development, to support formative and summative assessment, or to support marketing and employment? These are three major purposes for electronic portfolios, and they are each different and require different types of technology tools. A learning portfolio can be supported very nicely with a web log environment (“blog”), 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.

There is a rich legacy in the K–12 portfolio literature and much can be learned from the studies of paper-based portfolios. As adult learners, we have much to learn from how children ap-

proach portfolios. In her book *The Power of Portfolios* Hebert (2001) told a story about the growth of portfolios in her school over a decade. The school's 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 (p. 44)

Hebert suggested that "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" (p. 48). Hebert's portfolios are learner centered. Such a perspective showcases the differences between using the portfolio as an assessment *of* learning (a high-stakes assessment model) and using portfolios as assessment *for* learning (as a tool to bring about self-awareness and metacognition).

Two anecdotes about high school portfolios

The issues of learner engagement and motivation seem to be most critical in high schools today. With the United States government (www.ed.gov/about/offices/list/ovae/pi/hsinit/index.html) and the Gates Foundation (www.gatesfoundation.org/UnitedStates/Education/TransformingHighSchools/) both focusing their efforts on restructuring high schools, portfolios can serve as a catalyst for increased student ownership of the learning process; however, this can only happen if the portfolio project is implemented in such a way as to encourage student engagement. The fol-

lowing two anecdotes provide insight on 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 (M. Ryerse, personal communication, August, 2004), where the students were required to set up a three-ring notebook, put in specific sections and assignments. 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.

Mahoney (2002), in his book *Power and Portfolios: Best Practices in High School Classrooms*, told the story of a high school student who developed such a wonderful writing portfolio in her ninth-grade English class that it was used by her teachers as an exemplar in professional development classes. When the portfolio was lost, the student was heartbroken and offered a US\$50 reward for its return. It was never found, but the student was able to reconstruct components from files on her home computer. (pp. 20–21)

What is the difference between these two anecdotes? Is it just in the attitudes of the students? Or could it be in the purposes 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?

Assessment of learning or assessment for learning?

The distinction between types of assessment was elaborated by 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.

Research conducted in the United Kingdom (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” (p. 139) 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 (2002) provided 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” (p. 2). The following are 10 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 (Assessment Reform Group, 2002, p. 2)

According to Davies, Arbuckle, and Bonneau (2004), “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” (p. 1). They further pointed out that assessment directly supporting 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. (p. 1)

How does assessment *for* learning relate to electronic portfolios? To be effectively used to support assessment *for* learning, electronic portfolios need to support the learner’s ongoing learning. Table 2 shows my comparison of electronic portfolios used as an assessment *of* learning and those that support assessment *for* learning.

Many of the assessment portfolio solutions that have been put in place focus primarily on assessment *of* learning because they are being driven by the administrators’ needs for assessment

Table 2
Portfolio differences between assessment types

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

data. There is some concern that in the name of accountability, we are losing a powerful tool to support deep learning. There is concern that that we are losing the “stories” in e-portfolios in favor of the skills checklists. Although they can serve as good examples of a student’s capabilities at a given moment in time, portfolios should be used simultaneously to support an environment of reflection and collaboration. Supporting these multiple needs should be the goal of any implementation system. That is why there should be 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 (Barrett,

2005). 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 (Barrett, 2004b).

The REFLECT Initiative

In the fall of 2004, the leadership of TaskStream, a provider of electronic portfolio services and assessment management systems to higher education, noticed the lack of recent literature on electronic portfolio implementation in K–12 schools and realized that there was a need for a research project that would help to fill this void. With my assistance, the REFLECT Initiative was born.

Taking into consideration the existing literature on paper portfolios, learning, motivation, and engagement (as detailed earlier in this paper), the REFLECT Initiative was designed as a two-year action research study with the overarching goals of collecting data and drawing conclusions about the impact electronic portfolios have on secondary student learning, motivation, and engagement; and better understanding how teaching practices and strategies change with electronic portfolio integration.

REFLECT is both an acronym and the real purpose behind this research project. REFLECT stands for “Researching Electronic portFolios: Learning, Engaging, and Collaboration through Technology,” and the REFLECT Initiative was created to study issues related to portfolio learning and reflection. The research will seek to identify what conditions facilitate and encourage students to care about their work and be proud of it. Can the project identify the conditions necessary to motivate students to maintain portfolios as a record of their growth over time and as a story of their learning? The research draws upon the established literature and theoretical constructs with validated research instruments and data collection protocols. Themes of the research include: Reflection; Motivation; Student engagement; Project-based learning; Effective integration of technology; Portfolio development; and Assessment *for* learning.

Some of the key research questions guiding the study include the following:

- How do e-portfolios provide evidence of deep learning?
- Under what conditions can e-portfolios be successfully used to demonstrate assessment *for* learning and assessment *of* learning?
- Under what conditions do students take ownership of their e-portfolios?
- What are the benefits of developing e-portfolios as perceived by students, teachers, administrators, or parents?
- What are perceived obstacles to implementing e-portfolios with secondary school students and how can they be overcome?
- How do paper portfolios differ from e-portfolios?

In May 2005, more than 20 sites (schools, districts, and states) were accepted to participate in this mixed-methods study. Representatives from each group gathered for an inaugural meeting in Philadelphia in June 2005, and then core teams from each project participated in regional workshops throughout the late summer and early fall of 2005. Implementation of the portfolio projects took place throughout the fall of 2005 and winter 2006, and I conducted site visits with each participating project. The project will engage up to 6,000 secondary school students from across the United States in the use of Web-based electronic student portfolio tools that are being provided at no cost to the students for two years.

The existence of an accessible archive of authentic student work can provide valuable data for school improvement. For the students themselves, the effect of maintaining a reflective portfolio has the potential to support deep learning and ownership of the learning process. The use of technology-based productivity tools has become widespread; most of the work of students now passes through or is finalized in electronic form or can be converted easily into digital artifacts.

The project includes a significant professional development component and TaskStream includes direct technical support to aid in design and execution of a school’s portfolio program. The size of the study affords all of us the opportunity to transcend anecdotal evidence and amass significant experiential data relating to the impact on student achievement. The Web-based interactive environment supplied by TaskStream offers all participating educational institutions the opportunity to share results and experiences at local levels and in the overall study.

This is the first international research project on electronic portfolios in secondary schools, from California, Arizona, New York, New Jersey, Michigan, Tennessee, Florida, and Maryland plus a cohort in an English language school in Brazil. Two projects are sponsored by state departments of education (Arizona and New Jersey). In the Arizona project, future teachers begin developing their professional teaching e-portfolios while still in high school, easily transferring them to any teacher education program in that state.

Preliminary findings

In the winter/spring of 2005/2006, site visits were completed to 20 schools (19 high schools and one intermediate school) actively participating in the project. I visited each school for approximately one to one-and-a-half days, talked with the teachers implementing the program, observed students using the software, and wrote up a detailed report on each site visit. At the end of the process, a meta-analysis of all of the site visits was written, with recommendations for the next year. There were other data collection strategies, including online surveys completed by teachers and students, and professional portfolios and reflective journals kept by the teachers, which will be reported on in a later article.

The site visit findings can be summarized as follows. Four of the schools are in urban areas, four are in rural areas (at least 50 miles from a major metropolitan area) and the rest of the schools (14) were in suburban communities. There is a diversity of the number of teachers in a school implementing the project, classified for the data analysis as “One-sies” (a single teacher in a school = 9); “Two-sies” (a pair of teachers in a school = 4); “Leader-Led” (a Teacher/Leader or Technology Coordinator supporting more than two teachers = 6); and “Level-wide” (some teachers & all students in a grade level = 2).

In an effort to categorize the sites for our research data analysis, after the site visits were completed, the 20 sites were confidentially classified as

to their level of implementation, borrowing from the recent electronic portfolio research of Strudler and Wetzel (2006), as Low, Medium, or High. In the six sites classified as Low the students were using TaskStream primarily as online storage of their digital work with little or no interactive feedback between teacher and student. Those seven sites classified as Medium showed promising, emerging use of various TaskStream tools, were using a DRF (Directed Response Folio—a structured assessment portfolio), and were using the system to facilitate some interactive feedback (primarily teacher to student). Those seven sites classified as High demonstrated creative use of TaskStream and/or other technologies, including a DRF or multimedia, with relatively high levels of interactive feedback (including student to student). Finally, there were five different curriculum content areas being documented in the student portfolios in these sites: English/Language Arts or Foreign Language (6); Career & Technical Education (4); Technology (3); Social Studies (2); and multidisciplinary (5).

When analyzing different factors related to either the number of teachers implementing at a school, or the curriculum area, the following preliminary conclusions can be drawn from the early implementation of this project. There are unique problems facing the “one-sies”—the single teachers in a school site. Some of these “one-sies” have found other teachers to support them in their buildings, but that is not the norm. When there is no support in the building, there is no one to talk to, no community of practice. When there are two teachers in a school, there is an opportunity to share the development time, and to share ideas for technology integration. A pair of teachers can be a small community of practice, and support each other. “Two-sies” do not provide a systemic experience for students, since the experience with the electronic portfolios is usually in only one content area. The best examples of “two-sies” in this study were in English/Language Arts.

In the sites that had a strong teacher leader, or an active technology coordinator, there was

stronger support for the teachers implementing electronic portfolios. Here we have an opportunity to build a real community of practice. Also, there is more support for the technology components of the implementation, especially scanning and sizing images, adding video to the portfolios, etc.

The school-wide, cross-curricular approach seems to offer the most exciting potential to support teaching, learning, and change. Not only can teachers share ideas with each other, but the students can also learn from each other. In the next year, we will be validating the assumption that when students see the use of electronic portfolios across the curriculum, they will see more importance and relevance to the process. The goal would be to build toward a comprehensive high school graduation portfolio, as implemented in one of the research sites.

The highest level of implementation was in the sites implementing level-wide (2 out of 2) and in Language Arts (4 out of 6). Perhaps this finding indicates that Language Arts teachers understand reflection and are experienced at using portfolios for formative assessment. The lowest level of implementation was in the sites where a single teacher was leading the project with a few students in a school or the primary implementation was in a technology course. This finding validates the assumption that content and reflection on learning is more important than technology in implementing electronic portfolios. The focus should not be on the technology, but on the learning.

Realizing the potential of e-portfolios

After the first year of implementation of the REFLECT initiative, we find that the teacher's role is critical to success. For many teachers in this study, there was a dual learning curve: learning the TaskStream technology tools and learning to use portfolios with students. Those teacher who had prior experience using the TaskStream tool in their Teacher Education programs, or those with

prior paper-based portfolio experience, were able to quickly start implementing the program with their students. Those teachers who understood reflection and metacognition and used assessment *for* learning strategies to provide quality feedback to their students were most often in the High group. Having mature technology integration strategies, a higher level of technology skills, and a support system or close collaborators were also indicators of High levels of e-portfolio use.

Access to technology is also important, but less critical than the teacher's role. Some sites were using the TaskStream system to extend the school day, requiring students to post work after school hours. We collected information from students about their computer and Internet access from home. Accommodations were always made for students who did not have home access. Many sites had laptops available for students to use in the classroom on a regular basis, while some sites found challenges with computer lab scheduling affecting in-school use.

This study comes at the right time to study the potential of electronic portfolios to engage students in active participation in assessing and managing their own learning. In 2006, the level of available technologies makes possible a study about the role of electronic portfolios to support student learning, engagement, and collaboration. The REFLECT Initiative is such a study, as it seeks to gather data on the impact that electronic portfolio development has on student learning, motivation, and engagement in secondary schools. Using a common toolset (TaskStream) that provides a unique tool for the three basic types of portfolio, the participants of the REFLECT Initiative are personalizing their implementations for their own teaching and learning needs. Thus, the data is beginning to highlight the multiple factors, strategies, and purposes, helping us gain insight on the effect each has on the learning process.

Schools interested in implementing electronic portfolios are encouraged to conduct a similar systematic study so that we can all learn "what works and why" to more broadly answer

some of the key research questions posed by the REFLECT Initiative. We hope that through more formative research on the use of electronic portfolios that support assessment *for* learning we can realize the true potential of using technology to both improve and showcase student achievement across the curriculum.

Note. This article is an adaptation of a white paper that appeared first on the author's website www.helenbarrett.com.

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→ [AQ: The bold section of this reference was missing from our files, but I found this information through ERIC. This work, however, is not cited in the manuscript. Was this reference meant to be removed but only partially deleted?]

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