

The REFLECT Initiative:



A research project to assess the impact of electronic portfolios on student learning, motivation and engagement in secondary schools

Project Underwritten by:

[TaskStream, Inc.](#), provider of electronic portfolio systems to academic institutions

Final Research Report presented to
National Educational Computing Conference
July 1, 2008

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REFLECT Initiative, 2005-2007

The REFLECT Initiative Research Project Final Report

Abstract

In 2005, this research project was launched to study the impact of electronic portfolios in secondary schools. This paper will review the research design and data gathered from the teachers and students involved in the project, providing information on high school students' attitudes toward portfolios and assessment, reflection on learning, and the specific technologies and tool being used. The paper will summarize the data from all students participating in this research project at the end of the two-year study, and will provide recommendations for new research on electronic portfolios in K12 schools.

Objectives or Purposes;

The overarching goal of The REFLECT Initiative was to collect data and draw conclusions about the impact that developing and maintaining electronic portfolios have on secondary student learning, motivation and engagement; and how teaching practices and strategies change with electronic portfolio integration.

REFLECT is both an acronym and the overarching purpose behind this research project: the REFLECT Initiative studied issues related to portfolio learning and reflection. The data collected provides research-based evidence on the effect that developing and maintaining electronic portfolios have on student learning, motivation, and engagement. To that end we sought 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 their portfolios as a record of their growth over time and as a story of their learning? Some of the key research questions that will guide the study include:

- 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, and/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?

Perspective(s) or Theoretical Framework – the Literature Review

A more comprehensive literature review was published by TaskStream in 2005, called the White Paper: Researching Electronic Portfolios and Learner Engagement. An updated version of that paper was subsequently published by the International Reading Association as an article in the Electronic Portfolio issue of the Journal of Adolescent and Adult Literacy (March 2007) entitled, "Researching Electronic Portfolios and Learner Engagement: The REFLECT Initiative." In that article also appeared a summary of the findings from the first year site visit reports, which are also summarized in this report.

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The research draws upon the established literature and theoretical constructs with validated research instruments and data collection protocols. These resources will include: (see the reference list for the details of these resources)

- **Reflection:** Jennifer Moon, Maxine Alterio & Janice McDrury
- **Motivation:** Self-Determination Theory, Intrinsic Motivation (Deci & Ryan): <http://www.psych.rochester.edu/SDT/>
- **Theory of Student Engagement and Qualities of Engaging Schoolwork** (Schlechty Center): <http://schlechtycenter.org>,
- **Project-Based Learning:** Buck Institute, George Lucas Education Foundation
- **Technology Competency:** ISTE NETS-T and NETS-S plus Essential Conditions
- **Portfolio Development:** Teachers (Nona Lyons, Lee Shulman), K-12 Students (Elizabeth Hebert, Anne Davies, Jim Mahoney, Evangeline Harris Stefanakis), Post-Secondary (Kathleen Blake Yancey, Barbara Cambridge, David Tosh)
- **Assessment FOR Learning:** Rick Stiggins, Anne Davies, QCA: <http://www.qca.org.uk/afl/>

Educational or Scientific Importance of the Study.

The REFLECT Initiative was a 24-month action research study of the impact of electronic portfolios on student learning, motivation, and engagement in secondary schools. In May 2005 more than 25 schools or districts were accepted to participate in this mixed-methods study. The project engaged more than 3,000 secondary school students from across the country in the use of web-based electronic student portfolio tools that Taskstream 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, it was thought that 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 documents. This development and the availability of web-accessible portfolio tools and secure web-based storage of data, create the dual opportunities inherent in the design of the REFLECT Initiative.

The central question of the overall study is, “What is the impact of electronic portfolios on student learning, motivation, and engagement in secondary schools?” But the study also worked with sites to design how they would study the use of portfolios with their students. Thus, each participating institution could incorporate its own questions regarding the organization of work or student products over time, assessment, presentation, portfolio design, roles of various faculty members, or simply, “How can we explore and make use of this resource with our students?” Several of the site project directors gave input into the questions asked in the student questionnaire developed at the mid-point of the study.

The project included a significant professional development component and TaskStream provided direct technical support to aid in design and execution of a school’s portfolio program.

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The size of the study afforded us the opportunity to transcend anecdotal evidence and amass significant experiential data relating to the impact on student learning and engagement. The web-based interactive environment offered all participating educational institutions the opportunity to share results and experiences at local levels and in the overall study.

This study came at an appropriate time 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 made possible a study about the role of electronic portfolios to support student learning, engagement and collaboration. Using a common toolset (TaskStream) that provides a unique tool for the three basic types of portfolio (working/process portfolio, assessment portfolio, showcase portfolio), the participants of the REFLECT Initiative personalized their implementations for their own teaching and/or learning needs. Thus, the data began to highlight the multiple factors, strategies, and purposes, helping us gain insight into the effect each have on the learning process.

This is the first national research project on electronic portfolios in secondary schools, from California, Arizona, New York, New Jersey, Michigan, Tennessee, Ohio, 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 portfolios while still in high school, easily transferring them to any Teacher Education program in that state. Four schools in New Jersey were supported to implement the Taskstream portfolios with a small number of classes, focusing on the Career Education and Consumer and Family Life Standards of the NJ CCCS.

Methods, Techniques, or modes of inquiry; and Data Sources or Evidence

Research data has been generated through such vehicles as surveys, on-site observations, online discussions, and journals, and the aggregation of student focus group data. Data was collected at several points along the way:

- Early in the process (Fall 2005 – beginning of first school year) – “Pre”
- Half-way through the process (Spring 2006 – end of first school year) – “Mid”
- End of the process (Spring 2007 – after first half of second school year) – “Post”

The next two pages contain the detail, in table form, of the research design, including the research questions, research methods, data collection instruments, and summary of the data collection timeline.

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Modified Research Design

This study included data from three sources:

1. **Student Voices** - based on the online surveys and student focus groups.
2. **Teacher Voices** - based on the online surveys that the teachers completed and the journals that the teachers kept, giving several very comprehensive case studies of implementation
3. **The Researcher's Voice** - based on the Site Visit Reports, including the data analysis of the quantitative data collected.

	DESIRED OUTCOMES (HYPOTHESES)	RESEARCH QUESTIONS	RESEARCH METHOD	DATA COLLECTION INSTRUMENTS	
1.	E-Portfolios enhance student learning.	1. How do e-portfolios provide evidence of deep learning?	Student reflections in portfolios Student attitude toward school & learning	NJ Student questions CAQ Student Focus Group Responses	
		2. Under what conditions can e-portfolios be successfully used to demonstrate assessment for learning and assessment of learning?	Teacher Journal Reflections on implementation process Observations in schools Conversations with teachers and administrators	Teacher journals Site visit reports C-BAM Assessment Practices	
2.	E-Portfolios enhance student motivation and engagement.	3. Under what conditions do students take ownership of their learning and work?	Questionnaire about Motivation and Learning (students)	CAQ	
			Student Focus Groups	Student Focus Group Responses	
3.	E-Portfolios are more effective than paper-based portfolios.	4. What are the benefits of developing e-portfolios as perceived by students, teachers, administrators, and/or parents?	Teacher Journal Reflections & Interviews Student Questionnaire Student Focus Groups	Student Focus Group Responses Teacher Journals Site Visit Reports	
			5. What are perceived obstacles to implementing e-portfolios with secondary school students and how can they be overcome?	Teacher Journal Reflections and Interviews Student Focus Groups	Teacher Journals Teacher Questionnaire Student Focus Group Responses Site Visit reports
				6. How do paper portfolios differ from e-portfolios?	Teacher Journal Reflections
4.	Developing e-portfolios builds technology skills.	7. What are the skills necessary to effectively implement e-portfolios?	Technology Skills Assessment - Teachers - Students	TAC & CAQ	
			Portfolio Facilitation Skills – Teachers	Assessment skills (Davies)	
5.	E-Portfolio development benefits all learners and all schools	8. What are the characteristics of the study participants?	Demographic Questionnaire – teachers & students	Teacher Surveys Student Surveys	
		And what are characteristics of school sites?	NETS Essential Conditions plus local school site information	Inaugural Meeting + Site Visit Reports	

Table 1. Research Design

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Revised Summary of Research Protocols

	Source: S=Student T=Teachers	Data type: T= qualitative #=quantitative	Data collection method
Initial: Early in the process (Fall/Winter 2005-6 – beginning of first school year)			
Demographic Questionnaire - Prior experience with paper portfolios Prior Experience with tech integration	S & T	T & #	Survey
Questionnaire about Student Engagement (HSSSE)	S	#	Survey
Technology Skills Pre-Assessment – (UNT: TAC 6.1 & CAQ 5.27)	S & T	#	Survey
NETS Essential Conditions plus local school site information (ISTE)	Site Leader	T& #	Survey
CBAM Instrument – (UNT)	T	#	Survey
Checklist of Student Involvement in Assessment (Davies)	T	T & #	Survey
Technology Proficiency Self-Assessment - TPSA (UNT)	T	#	Survey
Professional Development Needs Assessment	T	#	Survey
Ongoing through Online Professional Development			
Teacher Reflections (journals) on implementation process, including: - Benefits of e-portfolios	T	T	Journal, Site Visit
- Obstacles to implementation, and how they can be overcome	T	T	Journal
- How the portfolio is introduced to students (lesson plan)	T	T	Journal
Onsite observations and conversations – Fall 2005 – Spring 2006			
Observation checklist	Director	T & #	Site Visit Report
Mid: process (Spring 2006 – end of first school year)			
Portfolios, Assessment, and Reflection Survey*	S & T	T & #	Survey
Technology & TaskStream Tools Survey*	S & T	T & #	Survey
Onsite observations and conversations – Fall 2006 – Spring 2007			
Observation checklist	Director	T & #	Site Visit Report
Student Focus Groups - Questions in Appendix		T	Audio
Post: End of the process (Spring 2007 – end of second school year)			
Questionnaire about Portfolios and Learning (Hartnell-Young)	S & T	#	Survey

Table 2. Summary of Research Protocols

Versions of the Surveys are linked from the following website:

<http://electronicportfolios.org/reflect/research.html>

Source of Instruments:

HSSSE: questions extracted from High School Survey of Student Engagement: <http://ceep.indiana.edu/hssse/>

UNT: Knezek, G.; Christiansen, R.; Miyashita, K. (2000) Instruments for Assessing Attitudes Toward Information Technology (2nd Edition). Institute for the Integration of Technology into Teaching and Learning, University of North Texas. <http://www.iittl.unt.edu/> Computer Attitudes Questionnaire v.5.27 (Students) and Teachers Attitudes toward Computers v.6.1, TPSA, CBAM

ISTE: National Educational Technology Standards Project <http://cnet.iste.org>

Davies, A. (2005) Data collection instrument on Checklist of Student Involvement in Assessment. (Personal correspondence)

Hartnell-Young, E. (2007) Data collection instruments for teachers and students. (Personal correspondence)

Focus Group Questions: adapted from Vandersal (personal correspondence) and Strudler & Wetzel (2005)

*Mid-point surveys adapted from sources documented in <http://electronicportfolios.org/reflect/AERAPaper2006.pdf>

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Site Visits

Almost every school received a site visit from the Research Director during the first year of the project. Site visit reports were completed for all of the visits, along with a meta-analysis of the site visits during the first year. A decision was made in the fall of 2006 to visit only those sites that appeared to be active and fully participating in the research project, although site visits were completed for all of the New Jersey DOE-sponsored project during the second year. The Arizona DOE-sponsored project staff selected two schools to visit for the primary purpose of conducting student focus groups in preparation for a presentation at a conference in January 2007. Conducting student focus groups was the primary activity of the second year site visits; a second purpose was to collect data on any changes in the project in the second year of the project. Addendum reports were prepared for each of the schools visited during the second year of the project.

State	School	Level of Implementation	Community Type	Year 1 Site Visit	Year 2 Site Visit
AZ	Cactus Shadows	Leader-Led	Suburban	March 14, 2006	December 6-7, 2006
	Buena HS	Single Teacher	Rural	April 3, 2006	
	Dobson HS	Single Teacher	Suburban	March 27, 2006	December 4, 2006
	Cactus HS	Single Teacher	Suburban	March 30, 2006	
	Sunrise Mt. HS	Single Teacher	Suburban	March 28, 2006	
	Ironwood HS	Single Teacher	Suburban	March 31, 2006	December 5, 2006
CA	LAHS	Single Teacher	Urban	December 16, 2005	
	McGarvin Intermediate	Two Teachers	Suburban	December 15, 2005	December 19-20, 2006
	John O'Connell HS	Leader-Led	Urban	January 12, 2006	January 12, 2007
	Rio Linda HS	Single Teacher	Suburban	April 6, 2006	
	Vallejo HS	Leader-Led	Suburban	April 7, 2006	
	Analy HS	Single Teacher	Rural	April 10, 2006	
FL	Miami CDS	Leader-Led	Urban	February 22-23, 2006	
MD	John Carroll HS	Level-Wide	Suburban	March 17, 2006	September 19-20, 2006
MI	New Buffalo HS	Single Teacher	Rural	April 18, 2006	
NJ	Eastside HS	Two Teachers	Urban	February 16, 2006	February 28, 2007
	Keansburg HS	Leader-Led	Suburban	February 14, 2006	February 22, 2007
	Lower Cape May HS	Two Teachers	Rural	February 15, 2006	February 20, 2007
	Old Bridge HS	Two Teachers	Suburban	March 16, 2006	February 27, 2007
TN	Mt. Juliet	Level-Wide	Suburban	February 7-8, 2006	November 14-16, 2006

Table 3. Research Sites, Characteristics, and Site Visits

Findings from the Site Visits (as reported in the JAAL Article)

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. The project director 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, professional portfolios and reflective journals kept by the teachers, which will be reported in a later in this report.

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Here is a summary of the site visit findings. 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).

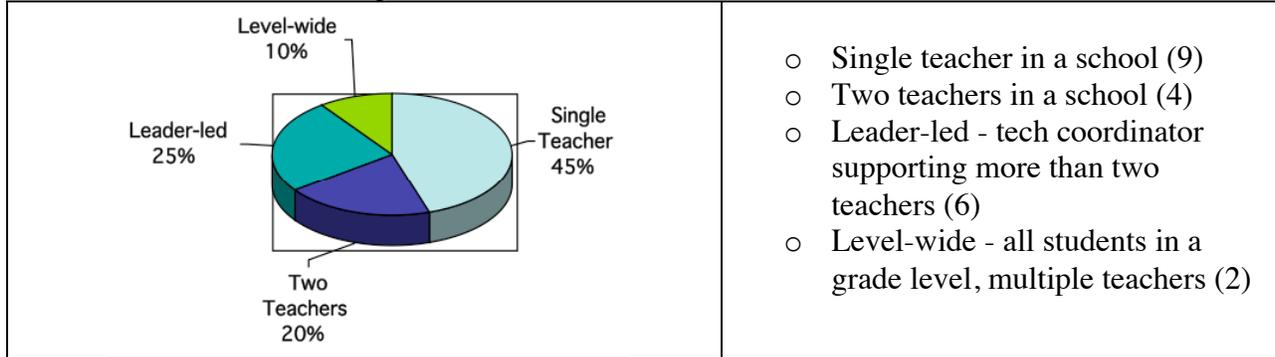


Figure 1. How the project was implemented by number of teachers

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 & Wetzel (2006): Low, Medium and 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 (CTE) (4); Technology (3); Social Studies (2); and multi-disciplinary (5).

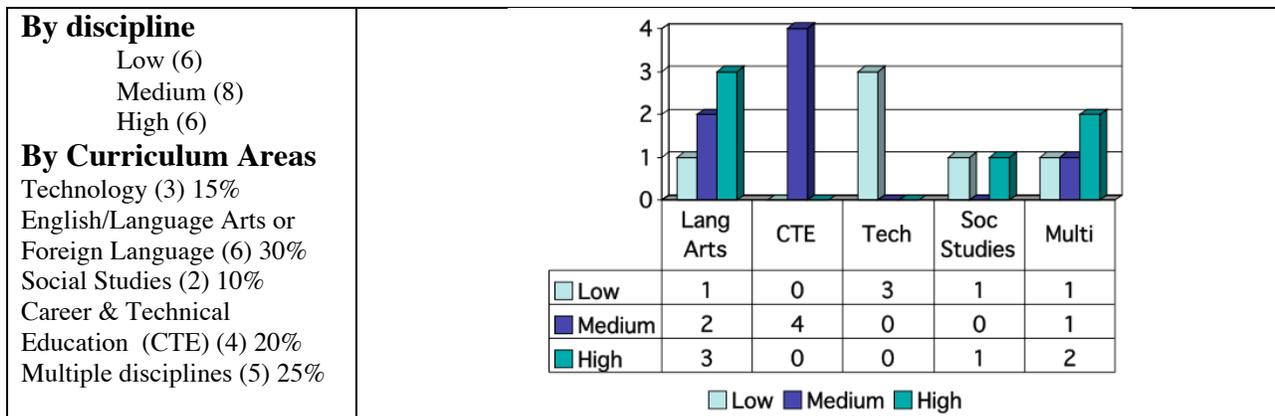


Figure 2. Curriculum Areas and Level of Implementation of Projects

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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” are in English/Language Arts.

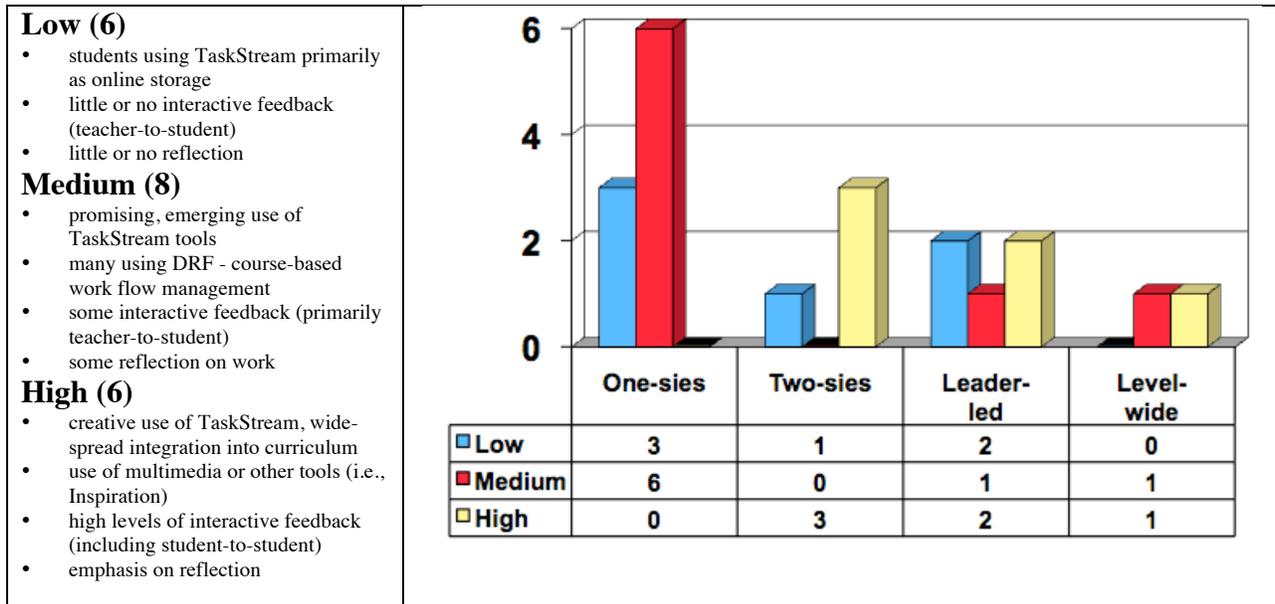


Figure 3. Level of Implementation by Number of Teachers Implementing in a School

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

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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 is not on the technology, but on the learning!

How was TaskStream used?

Most of the sites used TaskStream as an instructional management system (assignments graded in a DRF). A few sites provided a template for student-centered portfolios. None of the sites used TaskStream for high stakes assessment and only a few students used the Standards Manager.

Here is how an analysis of the three levels of implementation with how the tools were used:

	Low	Medium	High
Student-centered/student choice (2)	0	0	2
Instructional support (9)	1	5	2
Storage of student work (2)	2	0	0
Mixed of unknown (7)	3	2	2
High School Graduation Requirement (2)	0	1	1

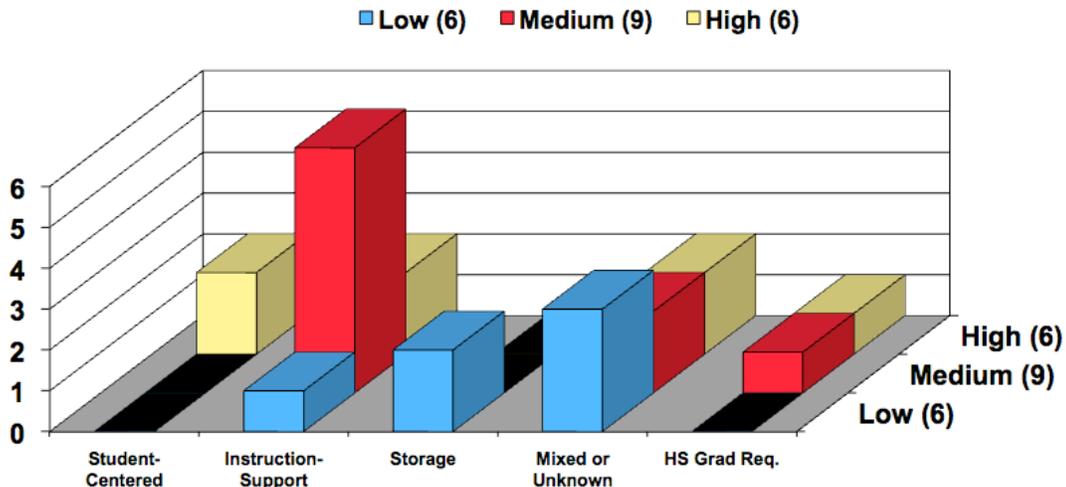


Figure 4. Level of Implementation by the purpose for using Taskstream

Year One Summary

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

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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 ePortfolio 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. One piece of data that we collected from students was 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 impacting on in-school use.

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 that we can realize the true potential of using technology to both improve and showcase student achievement across the curriculum.

Data Collected from Online Surveys – Year 1

A series of survey instruments were administered through the surveys developed using the TaskStream Forms Builder and posted on a Directed Response Folio (DRF) within the TaskStream system. Therein came the first problem with data collection: the process of completing and then submitting these surveys, which is not as simple as completing a survey in one of the online survey programs such as SurveyMonkey or Zoomerang. In the TaskStream program, there are several mouse clicks/pages to access the survey, and once the survey is completed, the individual must submit the survey for it to be included in the data for analysis. That is because the project used the same DRF process to submit and evaluate portfolio products. However, as several of the sites noted (in particular the manager of the Arizona project), the process was not as straightforward as the other Internet-based survey tools, which may account for the lower percentage of survey completion.

Notification of the survey availability was sent by email to the site project contact. In the last month of the project (May 2007) when the final surveys were available online, several of the project contact people said that they did not receive the email notice, and so several active sites did not complete the final survey.

The surveys used in the Initial Data Collection were provided by the Institute for the Integration of Technology into Teaching and Learning (IITTL), University of North Texas, Denton, Texas, USA. These surveys were developed and validated by Gerald Knezek and Rhonda Christiansen, and were used in several other technology implementation projects, including the Maine Laptop Initiative. Items were also selected from the High School Survey of Student Engagement developed by the University of Indiana. The Initial Surveys for students included:

- IITTL’s CAQ 5.27 Parts 1-2, 4-6, 7, 8-9, Demographic Information
- Excerpts from the HSSSE Questions 18-19 and 20-23

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The Initial Surveys for teachers included:

- IITTL's TAC 6.1 Teacher Attitudes Toward Computers
- Teacher Checklist on Student Involvement in Assessment
- Teacher Concerns-Based Adoption Model [CBAM] - Levels of Use of an Innovation
- Teacher Stages of Adoption
- Teacher Technology Proficiency Self-Assessment
- Needs Assessment for Professional Development

At the end of the first year, in the spring of 2006, two surveys were developed to address two different components of the REFLECT Initiative, and versions of these two surveys were completed by both teachers and students:

- Portfolios, Assessment, and Reflection
- Technology and the TaskStream Tools

Final Online Survey Data Collection

At the end of the second year of the project, a much simpler survey (24 questions) was adapted from an instrument developed in the U.K. by a team of researchers from the Learning Sciences Research Institute at The University of Nottingham led by Elizabeth Hartnell-Young. They developed different versions for students and teachers, with comparable questions.

Dr. Elizabeth Hartnell-Young developed two parallel questionnaires (one for teachers, one for students) to gather information about attitudes toward e-portfolios, as part of a student she conducted for Becta (2007). The following are the results of the survey responses by all students who were actively using the portfolio tools at the end of the project. The complete responses to this student survey are included later in this report.

Findings from Year 2 Student Focus Groups

During the second year of the project, focus groups were conducted in ten of the high schools involved in the study. In sessions lasting between 15 and 40 minutes (average 18 minutes), groups of five to ten students were asked a series of questions about their use of portfolios, technology, reflection and TaskStream. The conversations were audio recorded and provide some interesting insights into high school students' use of technology, both in and out of school. An analysis of the relevant themes will also be incorporated in the discussion of the Research Questions that follow. A list of the possible questions is included in Appendix A, although not all questions were asked of all groups.

As a summary of all of the students focus groups, they generally...

- liked using the TaskStream system
- felt that the program helped them stay organized - a major theme that came up over and over was the word "organized" or "organization"
- liked access from home – for most schools, there is no access to school networks from home
- said it helped them do their assignments (especially those sites using a DRF)
- said that they planned to use portfolios after they graduate
- compared their portfolios to MySpace (a few called it their "academic MySpace") – Most of the student mentioned that they participated in social networks and saw different purpose for the two systems, with about the same ease-of-use
- wanted more individuality and creativity in the portfolio system as they could do in MySpace

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- perceived the following purposes for developing their portfolios: college applications, keeping work organized, seeing growth over time
- thought that both reflection and feedback in the portfolio helped their learning
- wanted to be able to review the work of their peers, and have the opportunity to provide feedback

Teacher Journals and Portfolios

In addition to the online surveys, teachers were asked to keep journals about the implementation of the project. For the most part, few teachers maintained more than a few entries throughout the two years. However, at one site, there is a comprehensive record of implementation through the teacher leader in that school, Mt. Juliet. An analysis of the relevant themes will be incorporated in the discussion of the Research Questions that follows on the next pages.

Limitations of the Study

One problem with this study was timing, both in terms of its duration and in terms of the particular development of the Internet as it was emerging during the period of this research (2005-2007). The project only lasted two years, which prior research on school change shows is much too short to show any lasting change. A majority of the students in the study used this particular system for one year or less. Furthermore, the changes in the Internet (moving from Web 1.0 to Web 2.0) and the emergence and popularity of social networking sites had an impact on student attitudes toward the specific tool used to develop these portfolios. It should be noted that the use of social networking sites, such as MySpace, and video sharing sites such as YouTube, may help students build the technology skills necessary to construct their own electronic portfolios with Web 2.0 tools, as discussed by teachers in Australia at the 2007 ePortfolio conference in Melbourne.

If this research had been conducted two years earlier, the students would not have had the type of experiences with Web 2.0 tools (primarily outside of school) that influenced their current attitudes toward their highly structured e-portfolios. It was obvious in both focus group data and in the surveys that some of the students completed during the project, that their use of Web-based tools outside of school was influencing their attitudes toward the use of this particular e-portfolio tool (they wanted more personalization and creativity). That was not the case for most of the teachers. In many cases, the teachers were much less sophisticated with the use of Web-based tools than many of their students

It is also difficult to do this type of research without support at the school level. A supportive administrator is essential to the success of any major change initiative, and administrative support was lacking in most of the schools. In the most successful school in the project, the principal was a real champion of the use of e-portfolios in his school. A final limitation of the study was the attrition of the students (and teachers) and the limited amount of time that a majority of the students spent working with the tools. While more than 2000 students completed the pre-surveys, less than 1500 completed the mid-point surveys, and less than 700 completed the final surveys (most of them in a single school). The active cohort also changed between the two years, so that the students participating in the first year were not necessarily those participating in the second year.

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Findings

This discussion of the findings will be organized around the Hypotheses and the Research Questions outlined earlier. The Discussion and Conclusions will be summarized after all of the relevant data has been presented.

DESIRED OUTCOMES (HYPOTHESIS #1): E-Portfolios enhance student learning.

RESEARCH QUESTION #1: How do e-portfolios provide evidence of deep learning?

Deep learning involves reflection, is developmental, is integrative, is self-directive, and is lifelong (Cambridge, 2003).

Based on that definition, it would be impossible to answer that question based on two years of data, from schools that, for the most part, went through the motions of implementing this project at a very surface level. This is not to criticize the teachers or the students involved in this project. For most of them, portfolio development was a brand new experience. The issue raised is simply too complex to address in a short period of time. The emphasis of the initial selection of the schools participating in this study was for *breadth*, involving as many schools as possible, and not *depth*, following a smaller group of students and teachers for a longer period of time. As a result of that collaborative decision by the team planning this study, the project could not explore deep learning, but instead addressed the challenges of implementing a complex change within a time frame known to be too short to see any major results, which the school change literature indicates is three-to-five years. Therefore, rather than addressing this question from empirical experience, the discussion will address this question on a theoretical basis. Drawing on comments made by students in the online surveys and in the focus groups, we have some indicators that this evidence would be forthcoming, given enough time and appropriate implementation.

Let's consider each of the elements of deep learning, and the role of portfolios to support that proposition, and look at some of the qualitative data that was collected as part of this study that provide indicators supporting the assertion.

A portfolio that includes, at its core, an emphasis on reflection should provide evidence of deep learning.

To reflect is to look back over what has been done so as to extract the next meanings which are the capital stock for intelligent dealing with further experiences. It is the heart of the intellectual organization and of the disciplined mind. – John Dewey, *Experience and Education*, 1938.

Two students from the New Jersey project, learned about themselves as they worked on their portfolios:

I have learned that I should be proud of the work that I have done, and also that I am more technologically advanced than I thought that I was.

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I learned that I am a creative person but that I need help in organizing my work. Taskstream helped me with that.

A portfolio that is developmental allows a learner to show growth and change over time, should provide evidence of deep learning.

As one New Jersey student in the final survey said:

I have learned how to creatively present my school work while also being able to track my progress and work on my weaknesses. Task Stream has, in the end, made my work ethic much more efficient.

A portfolio that is integrative pulls together content from across disciplines and learning from extra-curricular activities.

This student from one of the schools in New Jersey expressed a positive outcome of developing a portfolio:

“Taskstream has allowed me to express myself. I never thought I would be able to show some of the works that I provided on TaskStream. It has showed me that I can do work well.”

From another student from New Jersey:

“What I like about TaskStream is that it mainly focuses on how you have learned and how your experiences have taught you how to better yourself in the world.”

A portfolio that is self-directed allows the students to include self-selected pieces, which should provide evidence of deep learning.

In a few sites, a few of the students took advantage of the WebFolio and Web Page Building tools in Taskstream, and created pages that were not requirements or teacher-directed assignments. Unfortunately, that was not the case for most of the students in the project. A few student comments in the Mid-Point Survey illustrate these issues:

“When we used Taskstream we could not do what we wanted to do to be organized, the teachers decided how it would be outlined.”

“Taskstream has different things but mostly I think that Taskstream is more of a student thing and not more so your own thing.” [This remark was in response to a question comparing Taskstream to social software such as MySpace.]

“Task stream would be better if there were ways to make it more fun. But it is a learning based program so there is not really room for fun.”

A portfolio that is lifelong should provide evidence of deep learning.

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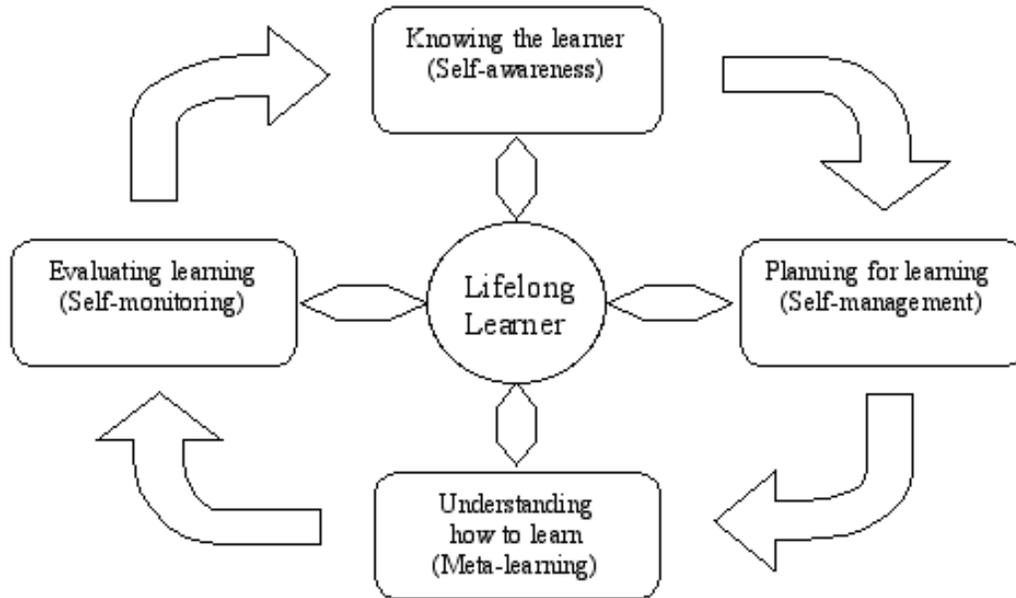


Figure 5. Pillars of Lifelong Learning (Stäuble, 2005)

According to Barbara Stäuble, Curtin University of Technology, Australia (2005), "Lifelong learning is understood as a cyclic process with four key pillars" [shown in her diagram above]. E-portfolios can support them all.

"Knowing the learner (Self awareness)" focuses on understanding the learner's prior knowledge, motivation for and attitudes towards learning. A portfolio can serve as a mirror, helping learners understand themselves and see their growth over time.

"Planning for learning (Self management)" refers to the setting of goals and the development of a plan to achieve these goals. A portfolio can serve as a map for future learning.

"Understanding how to learn (Meta-learning)" describes the awareness that a learner has developed with respect to different approaches to learning (deep versus surface learning; rote versus meaningful learning) and different learning styles. Portfolios can contain different artifacts that can help learners recognize their successful learning strategies and become more aware of how to accommodate those learning approaches that are not as successful.

"Evaluating learning (Self monitoring)" refers to a systematic analysis of all aspects of the learner's performance. "Self monitoring is synonymous with responsibility to construct meaning ... [and] is very much associated with the ability to be reflective and think critically." Portfolios can include reflective journals where learners construct meaning, monitor their own learning, and evaluate their own outcomes. Some more advanced portfolio management systems, such as Taskstream, allow learners to align artifacts to outcomes, goals or standards on a systematic basis, which could help find gaps in performance.

While the above pillars are of importance in any effective teaching and learning process, the main characteristic of lifelong learning is the reflective nature of the entire cycle. A portfolio provides the best environment for that reflection.

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RESEARCH QUESTION #2: Under what conditions can e-portfolios be successfully used to demonstrate assessment for learning and assessment of learning?

The White Paper produced at the beginning of this study outlined the differences between assessment for learning (formative, classroom-based assessment) and assessment of learning (summative assessment for accountability purposes).

RESEARCH METHOD

Teacher Journal Reflections on implementation process
 Observations in schools & Onsite observation checklist
 Conversations with teachers and administrators
 Postings in online discussion & journal
 C-BAM

Findings

The teachers responded to several questionnaire items that indicated their awareness of the different types of assessment, and their concerns about four different innovations:

- A. Implementation of Information Technology in Education
- B. Implementation of Portfolios in the Classroom
- C. Implementation of Reflection on Learning
- D. Implementation of Collaboration using Technology

Here is how 68 of those teachers responded when asked these questions about their concerns about each of these innovations, based of the Concerns-Based Adoption Model Stages of Change instrument provided by IITTL:

	A	B	C	D
Stage 1: Awareness - I am aware that _____ exists but have not used it. - perhaps I'm even avoiding it. I am anxious about the prospect of using _____.	1 1.5%	2 2.9%	4 5.9%	3 4.4%
Stage 2: Learning the process - I am currently trying to learn the basics. I am sometimes frustrated using _____. I lack confidence when using _____.	4 5.9%	15 22.1%	14 20.6%	11 16.2%
Stage 3: Understanding and application of the process - I am beginning to understand the process of using _____ and can think of specific tasks in which it might be useful.	8 11.8%	17 25.0%	16 23.5%	16 23.5%
Stage 4: Familiarity and confidence - I am gaining a sense of confidence in using _____ for specific tasks. I am starting to feel comfortable using _____.	13 19.1%	21 30.9%	14 20.6%	12 17.7%
Stage 5: Adaptation to other contexts - I think about _____ as a tool to help me and my students and am no longer concerned about it as _____. I can use it in many applications and as an instructional aid.	13 19.1%	6 8.8%	11 16.2%	11 16.2%
Stage 6: Creative applications in new contexts - I can apply what I know about _____. I am able to use it as an instructional tool and integrate it into the curriculum.	29 42.7%	7 10.3%	9 13.2%	15 22.1%

Table 4. Teachers Stages of Concern

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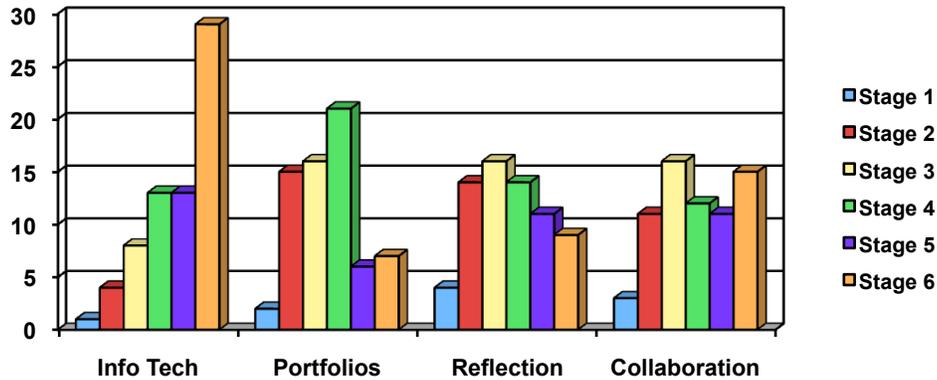


Figure 6. Teachers Stages of Concern

This graph clearly shows that the teachers felt that their stage of implementing Information Technology in the Classroom (A) was at a higher level (Median at Stage 5) than the other innovations: Portfolios in the Classroom (B) Median at Stage 3; Reflection on Learning (C) Median at Stage 3; and Collaboration through Technology (D) Median at Stage 4.

The teachers also responded to several questionnaire items that indicated their awareness of the different types of assessment, and their concerns about four different innovations:

- A. Implementation of Information Technology in Education
- B. Implementation of Portfolios in the Classroom
- C. Implementation of Reflection on Learning
- D. Implementation of Collaboration using Technology

Here is how 68 of those teachers responded when asked these questions about their concerns about each of these innovations, based of the Concerns-Based Adoption Model Levels of Use of an Innovation instrument provided by IITTL:

	A	B	C	D
Level 0: Non-Use - I have little or no knowledge of _____, no involvement with it, and I am doing nothing toward becoming involved.	0 0%	0 0%	0 0%	0 0%
Level 1: Orientation - I am seeking or acquiring information about _____.	4 6%	6 9%	6 9%	8 12%
Level 2: Preparation - I am preparing for the first use of _____	3 4%	18 26%	13 19%	10 15%
Level 3: Mechanical Use - I focus most effort on the short-term, day-to-day use of _____ with little time for reflection. My effort is primarily directed toward mastering tasks required to use _____.	8 12%	10 14%	6 9%	4 6%
Level 4 A: Routine - I feel comfortable using _____. However, I am putting forth little effort or thought to improve _____ or its consequences.	7 10%	9 13%	10 15%	10 15%
Level 4 B: Refinement - I vary the use of _____ to increase the expected benefits within the classroom. I am working on using _____ to maximize the effects with my students.	17 25%	9 13%	19 28%	15 22%
Level 5: Integration - I am combining my own efforts with related activities of other teachers and colleagues to achieve impact in the classroom.	16 23%	11 16%	8 12%	14 20%
Level 6: Renewal - I reevaluate the quality of use of _____, seek major modifications of, or alternatives to, present innovation to achieve increased impact, examine new developments in the field, and explore new goals for myself and my school district.	14 20%	6 9%	7 10%	8 12%

Table 5. Teachers Levels of Use

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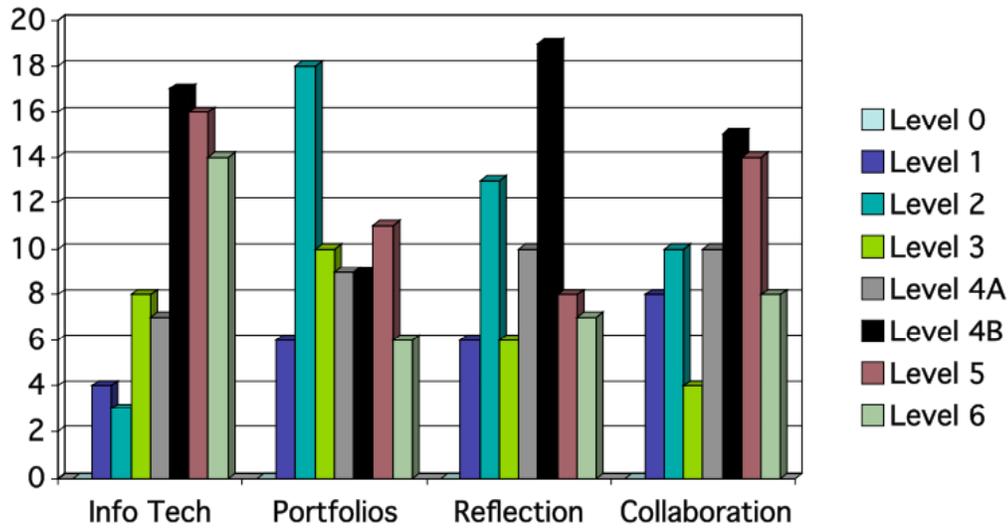


Figure 7. Teachers Levels of Use

This graph shows that the teachers felt that their level of implementing Information Technology in the Classroom (A) was at a higher level (Median at Level 4B) than the other innovations: Portfolios in the Classroom (B) Median at Level 3; Reflection on Learning (C) Median at Level 4A; and Collaboration through Technology (D) Median at Level 4A.

Teachers were also asked about their Classroom-Based Assessment Strategies, based on an instrument provided by Dr. Anne Davies, Classroom Connections, Intl. Teachers, for the most part, rated themselves as just beginning or “on the way” to implementing assessment for learning strategies, which can be more easily implemented when portfolios are used in the classroom to support formative assessment and learning. In addition to their self-rating, at least 20% of the teachers also described the evidence that supported their self assessment, which also provided an opportunity for these teachers to reflect on their practice and model the portfolio process as they completed the survey. Many of the teachers completed this survey during the spring of the first year of the project, so there was not enough elapsed time to see if the implementation of an electronic portfolio would make a change in their assessment practices. As a follow-up to this study, it would be interesting to see if the teachers who implemented portfolios at a high level actually changed their assessment practices.

One of the teacher-leaders in the project facilitated a book study on Dan Pink’s book, *A Whole New Mind*, introduced in the beginning REFLECT workshop. As she said,

...this book is powerful in supporting a new way to reach students. It specifically mentions that portfolios are a vehicle for self-expression and self-exploration (drawing connections, finding the big picture). It also mentions portfolios piece together experiences with many disciplines to create a tapestry for discovery. That is exactly my vision for the purpose of this project, REFLECT, as reflecting upon the past helps us to mold the future.

Here is a quote from one teacher’s journal, illustrating her use of technology tools to support reflection:

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I'm very excited today. After my kids finished their Create-a-person project, I had them create a video in Windows Moviemaker that was similar to an oral reflection. The kids really seemed to like it and I think some of them will turn out really good. The only problem we have is a lack of microphones for everyone to use... it was a bit difficult for everyone to finish in one block because of the lack of resources.

I believe the movie reflection has helped me to see how this project (REFLECT) can be really.... really useful. The students went through the process of doing the project and had learned exactly what they needed to in order to complete the assignments. What the movie did was make them fill in the blanks between assignments... so they created a person and designed a house, but they had yet thought about what that kind of house said about their person. Seeing what they were writing as they created their storyboards, I was able to ask them questions to help them think about what their creations meant. In essence, the movie started out as an "assessment of learning" and became an "assessment for learning".

Dr. Anne Davies Assessment for Learning Self-Assessment

Indicate below how regularly you involve students in these assessment-for-learning activities.

Regularly... (N=68)	Beginning	On the Way	Met
1. Students are able to articulate the learning destination.	32%	59%	16%
2. Students collect and refer to samples that show quality work.	32%	52%	19%
3. Students are able to describe what evidence of learning might look like.	47%	41%	18%
4. Students set criteria with me to define quality.	57%	35%	10%
5. Students have time to learn.	29%	56%	19%
6. Students receive and give themselves specific, descriptive feedback as they learn.	44%	51%	10%
7. Students debrief their learning with their peers and others.	37%	44%	19%
8. Students self-assess, and set goals.	44%	46%	16%
9. Students revisit and reset the criteria as they learn more.	50%	43%	10%
10. Students collect evidence of their own learning.	32%	47%	27%
11. Student present evidence of learning to others and receive feedback.	37%	50%	19%
12. Students are fully involved in the assessment process. They are working harder and learning more.	46%	46%	13%
13. I involve student in on-going assessment for learning.	29%	44%	27%
14. I summarize in my own words the learning that students are expected to accomplish.	24%	44%	34%
15. I collect and review samples and models to show what the learning looks like for students of a particular age range.	34%	37%	31%
16. I think about what kinds of evidence students could produce to show they have learned what they needed to learn.	29%	43%	32%
17. I ensure the evidence of learning is valid and reliable by using the process of triangulation. I collect evidence over time so emerging trends and patterns can be identified.	50%	35%	16%
18. I use classroom assessment information to fine-tune instruction and the learning environment for students.	32%	37%	37%

Table 6. Self-Assessment Checklist for Student Involvement in Assessment

The data shown here is consistent with the CBAM data on portfolios in the classroom. Teachers, for the most part, rated themselves as just beginning or “on the way” to implementing these strategies, which can be more easily implemented when portfolios are used in the classroom to support formative assessment and learning.

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DESIRED OUTCOMES (HYPOTHESIS #2): E-Portfolios enhance student motivation and engagement.

RESEARCH QUESTION #3: Under what conditions do students take ownership of their learning and work?

RESEARCH METHOD

Questionnaire about Motivation and Learning (students)
Student Focus Groups

Findings

From the comments made by the students in the focus groups, as well as the responses to survey questions, students wanted to be able to express their own individuality, choice, and creativity in their portfolios. While most of them did not have prior experience with either a paper-based or electronic portfolio, a majority of these students had experience with other types of web-based publishing, especially in their social networking sites. That experience, and the elements of choice in both the content and design of their portfolios, influenced their attitudes to their e-portfolios. In a few examples, where students demonstrated extreme creativity in their e-portfolios, the content was focused on their passions, while not necessarily emphasizing their academic work.

For example, in one of the New Jersey schools, a student created a very creative WebFolio with many pictures of her woodworking hobby. In the same New Jersey school, the two English teachers taught their students how to create digital essays using still images and digital video editing software, which was their favorite part of the entire portfolio project. In Arizona, one student created a web page for the Girls Scout troop that she worked with and published. In the Michigan high school, one student focused his portfolio on his love of dirt bikes, including videos he created. Students who were given an opportunity to express their creativity in their portfolios appeared to be more engaged, as expressed in their focus group comments or these open-ended survey responses from the Mid-Point Survey (when asked what they would like to change about the software or their portfolios):

The thing that i would like to use is pictures and music to show my personality.

Be able to place videos and pictures and format the background like a myspace webpage to better personalize my portfolio.

Again, just like other tools, and bloggers, I want to be able to create my own layouts to use in my portfolio and be able to transform the page into something that reflects myself. I wouldn't want to chose a specific background for my page that is offered to all other users of Taskstream, because that doesn't appeal to me. If we all are using the same background, then I don't find uniqueness in the program, or even creativity.

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DESIRED OUTCOMES (HYPOTHESIS #3): E-Portfolios are more effective than paper-based portfolios.

RESEARCH QUESTION #4: What are the benefits of developing e-portfolios as perceived by students, teachers, administrators, and/or parents?

RESEARCH METHOD

Teacher Journal Reflections & Interviews
Student Questionnaire

Findings

The primary benefits of having an e-portfolio, as expressed over and over in the student focus groups, was *organization*. It should be noted that 65% or more of the students appreciated having space to store their work; to have access to their work at home as well as at school; recognized that the e-portfolio gave them new ways of presenting their work; and was good for showing their progress to other people.

More than 80% of the teachers responded that the following qualities on an e-portfolio were very important: Having school work in one location; Being able to have online access to student work from home and school; Being able to view teacher feedback, personal reflections and coursework in one system. At the end of the study, more than 80% of the teachers who responded agreed or strongly agreed that working with portfolios:

- Helps my students to show others what they are really good at
- Gives us all new ways of presenting our work using technology
- Helps my students to be creative
- Helps my students show their progress to other people
- Was a learning experience for me

Mid-Point Questionnaire

The following are features of the e-portfolio. Please rank each based on how important you think the feature will be to you and your students as your students create electronic portfolios	Quite important or Very important
a. Having school work in one location	83%
b. Being able to have online access to student work from home and school	83%
c. Having a website that allows students to keep their ideas and reflections about their school experience.	64%
d. Being able to share experiences (coursework, reflections, thoughts) with peers, teachers, parents	75%
f. Being able to view teacher feedback, personal reflections and coursework in one system	83%
g. Being able to show potential employers examples of growth and development	64%
h. Using a portfolio of evidence built up over the year to demonstrate competence in a subject instead of taking final exams	67%

Table 7: Teachers Perceptions of the Importance of different features of e-portfolios (N=35)

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The following are features of the e-portfolio. Please rank each based on how important you think the feature will be to you and your students as your students create electronic portfolios.	Quite important or Very important
a. Having school work in one location.	53%
b. Being able to have online access to your work from home and school.	80%
c. Having a website that allows you to save your ideas and reflections about your school experience.	53%
d. Being able to show your teachers and your family how much you learned and grew in high school	55%
e. Being able to share with classmates.	40%
f. Being able to get feedback from your teacher.	64%
g. Being able to show potential employers examples of your growth and development.	68%
h. Showing what you know and understand about a subject instead of taking final exams.	70%

Table 8: Student Perceptions of the Importance of different features of e-portfolios
(N=1480)

This quote from the mid-point survey shows one student's attitude:

The electronic portfolio helped me in many ways, like : it organized in a better way my activities, goals and reflexions about my work, it is more important than the other tools like MSN, for example, because those other tools are for fun and the e-portfolio helps me in my study. The only thing that the other tools are better than the e-portfolio it's that they are easier to work with. (Mid-point survey)

Final Questionnaire completed by teachers (N=50)

Working with e-portfolios...	Agree or Strongly Agree
1. Has been fun for my students	76%
2. Made my students more interested in their work than they were before	64%
3. Has taken up too much of my class time	26%
4. Has taken up too much of my time outside of classes	26%
5. Is good to do with other teachers	62%
6. Tells me about what my students are learning	70%
7. Helps me think more about learning in general	64%
8. Gives us all enough space to store material	78%
9. Makes my students take more care with their work	60%
10. Helps my students be better organized in their work	64%
11. Helps my students to show others what they are really good at	88%
12. Gives us all new ways of presenting our work using technology	94%
13. Helps my students to be creative	84%
14. Helps my students feel confident	66%
15. Helps my students see where they need to improve	66%
16. Helps me judge how my students have improved over time	70%
17. Helps my students show their progress to other people	88%
18. Has helped my students understand their school work better	66%
19. Was a learning experience for me	92%
20. Is something I will continue to do	74%
21. Has helped my students to learn	68%
22. Was easy for my students	68%
23. Gave my students more responsibility for their learning	72%
24. Has helped us all to give feedback on other's work	70%

Table 9. Teacher Responses to Final Questionnaire (N=50)

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My e-portfolio...	Agree or Strongly Agree		
	All Students N=664	Arizona Students N=17	New Jersey Students N=83
1. Has been fun to do	39%	71%	36%
2. Has made me more interested in my work	32%	59%	30%
3. Has taken up too much time in class	35%	18%	39%
4. Has taken up too much time outside class	33%	18%	16%
5. Is good to do with other students	51%	82%	41%
6. Tells me about what my friends are learning	30%	41%	31%
7. Helps me think more about my own learning	46%	59%	40%
8. Gives me enough space to store all the stuff I want	65%	76%	70%
9. Makes me take more care with my work	42%	59%	39%
10. Helps me be better organized in my work	50%	94%	54%
11. Helps me to show people what I'm really good at	54%	71%	53%
12. Gives me new ways of presenting my work using technology	70%	88%	71%
13. Helps me to be creative	49%	65%	43%
14. Helps me to be confident	30%	65%	29%
15. Helps me to plan how to improve	44%	65%	29%
16. Helps me judge whether I have improved over time	56%	71%	58%
17. Is good for showing my progress to other people	65%	82%	70%
18. Has helped me understand my work better	34%	65%	31%
19. Has made me pleased with my progress	47%	65%	40%
20. Is something I would like to do again in the future	33%	76%	31%
21. Has helped me to learn	36%	65%	31%
22. Was easy to do because teachers helped me	54%	94%	65%
23. Forced me to do things that teachers should have done for me	28%	29%	18%
24. Has helped us to give feedback on each other's work	41%	82%	29%

Table 10. Student Responses to Final Questionnaire

Students in only four schools responded to this survey, most of them from the largest school in the study. The students in that school were required to complete the study; TaskStream created a small program that let the students print out a slip that said they completed the assignment. By requiring that students complete the survey, there was a more representative sample; but the negative attitude shown in the responses to these questions may also be indicative of mandated participation.

It should be noted that 65% or more of the students agreed or strongly agreed that their portfolios gave them space to store their work, recognized that the e-portfolio gave them new ways of presenting their work, and was good for showing their progress to other people. It was discouraging, though, that the responses to this survey were not more positive. By comparing the differences between all of the students who responded (n=664) with the responses of the students in Arizona (n=17) and the students in New Jersey (n=83), perhaps the answer to Question 22 may have some insight: 94% of the students in Arizona agreed or strongly agreed that their portfolios were easy to do because their teachers helped them, compared to 54% of all students, and 65% of the students in New Jersey. This difference may be indicative of the importance of teachers' assistance with implementation of e-portfolios, and the students' attitudes.

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RESEARCH QUESTION #5: What are perceived obstacles to implementing e-portfolios with secondary school students and how can they be overcome?

RESEARCH METHOD

Teacher Journal Reflections and Interviews
Student Questionnaire or Focus Groups

Findings

Today's teenagers are connected to the digital world in ways that their older brothers and sisters, who are now in college, may not have experienced. The Web 2.0 tools that have emerged in the last three years have dramatically changed the technology experiences for adolescent students. Once content with email and message boards (asynchronous communication) and surfing the Web looking for information, today's young people want to contribute and collaborate more with their peers, especially in real time conversations (and games!). As Marc Presky (2008) recently said, young people told him "e-mail is for old people!" Social networks (MySpace, Facebook, Orkut) are a fact of life for many teenagers outside of the school day. Using those tools, the students have a lot of freedom of expression, choosing the colors, backgrounds, music, and graphics that suit their desires to express their individuality, and Web 2.0 tools appear to motivate student creativity (Plough, 2008). In the controlled structure of this e-portfolio tool, many of the students expressed a desire for more personalization of their web-based portfolios, which is consistent with the stage of their adolescent development when individuality and identity are very strong life tasks (Boyd, 2006).

The major obstacle for teachers was *time* (mentioned in the teacher journals more than any other issue). The complementary issue of *competing priorities* was also mentioned often by teachers. Other teachers expressed frustration with technical issues and, for many, their lack of proficiency with technology and the specific e-portfolio tool. Here are a few representative quotes from different teacher journals:

There never seems to be enough time to do everything fully and to the extent necessary to make a difference

Teachers who don't have a purpose for their portfolio just see it as one more thing to do.

I'm disappointed that I was unable to get administrative buy in for this project. As it turns out, I believe that some very good teachers have gotten on board with me because they see the value in portfolios for teaching and learning.

Students all reported that they liked using the portfolios, though. The big thing for them seems to be that they feel more organized with the ePortfolios.

The creation of the portfolio is a piece of work the kids have control over and they are truly engaged in the process. They have learned how to work the tools quickly and they see the value.... as you create the portfolio, you get to a point where it all makes sense and the story pulls together. I wonder if this is how writers feel as they create a novel.

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RESEARCH QUESTION #6: How do paper portfolios differ from e-portfolios?

RESEARCH METHOD

Teacher Journal Reflections & Interviews

Onsite observation/interviews

Findings

This question could be answered on two levels: the obvious paper vs. computer storage, or the differences in the portfolio development process. Adding technology created a level of complexity that was frustrating for many teachers; it might seem easier to store student work in file folders. However, the benefits of using technology for maintaining an e-portfolio were recognized by many of the students, as illustrated in this quote from the final survey:

It is a modern, contemporary way to show colleges and peers your work. It is also much easier to keep track of than a paper portfolio. (New Jersey student)

There may have been a “technology” effect at work in many of these sites. By having an electronic portfolio, the students used the computer more often, which prior research in the Ed Tech literature has shown to be more motivating for students’ learning (CARET, 2005). Many of the positive comments from students related to how much they enjoyed doing their assignments online, or how much it helped them to keep their work organized. Here are is an excerpt from one school’s annual report after the first year of the study:

Technology:

Technology is vital to the content classroom, especially History/Social Studies. It makes things so much easier for both teacher and student.

For the teacher, for me; gone is the overhead projector which blows warm air, is expensive to make color copies, and is fuzzy. Now, with a laptop, power point and an LCD notes come alive with new pictures that are clear and attractive to the student. It makes life easier and allows easy changes (just re-save a file).

Students have immediate access to a world they otherwise would not have access. Information is at their fingertips. The trick as educators is to harness this immense power, and structure it for learning. I think [our school] was successful in making technology a tool of use, and not a hindrance. Having a class set of laptops allowed students to truly work at their own pace. It made it easy to differentiate lessons and be prepared for all students. Tech. also killed my down time, when there were extra minutes after a test or at the end of an assembly.

Vital to this was the administration. Without the vision and the leadership provided, this tech component could have easily become a living nightmare meant for failure. Our principal found what we needed and got what we needed, understanding those needs would be fluid and rarely final. She didn't buy a few computers and then expect gold from straw. She too has seen the engagement of students and the value of having the computers ready to go without fighting the Media Center Schedule or the hassle of moving kids around.

The best component, aside from the class set of computers and printer was having a place to store work that is web based. Frequently throughout the year, the school server went down and the Tech classes could not work. I can't have that in my classroom. That will not ever work in a content class... When lessons hinge on typing/importing/ uploading/downloading combined with benchmark testing, pacing guides, and

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random scheduling conflicts there is no time for hardware issues. Each day, each minute in education must be used and accounted for in order to ensure success by the standards used to mark achievement.

I am very proud of how I have incorporated technology into History and am excited about improving on the foundation laid this year.

Portfolios:

I am mixed in my evaluation of portfolios. Using TS to archive work is an amazing tool. Digitally stored work, instead of random folders, binders, crates and bins ensures logistical "neatness." The issue for me is "does anyone care?" Achievement is measured by test scores. Period. Not even Chap. test scores, but the benchmark scores and the almighty CST. So if a student scores Far Below Basic that's it. End of story. S/He does not get the chance to say "But wait, look at my portfolio to show that I have mastered the standard." So the usage of portfolios, in my opinion is becoming obsolete at the student level.

Now, that being said, I know that the assignments are the way to ensure success on the mandated exams. But the logic by the Powers That Be is that if a student cannot succeed on the exam, then the work must not have been completed. And no one looks to see if that is a false statement.

Portfolios have served as "proof" for the use of technology in the classroom. Having this work stored for access by myself, administration or the District Office has been vital to ensuring the success of the program. I am proud to say "look at what Johnny did." I am proud to show my lessons with accompanying student work. But when all is said and done, I still remain with one question: What now?

Student Reaction:

The kids loved using the computers. They were mixed about TaskStream, partly due to me. At this level, I am not sure they understand the need for a portfolio and our approach to it probably didn't help (see issues re: portfolios earlier in journal). Most found TaskStream easy to use once they got the hang of it. We faced problems with kids not submitting work, or it being placed in the wrong spot. Tech or not, some kids still can't put a name on their work so I associate it like that.

My students were engaged, excited and found History to be something that came alive. By having the computers immediately available, they were able to create research projects using the Internet, Powerpoint, Word, using pictures, etc. They loved it. It also helps with dead time, b/c the kids are more savvy on the computer than they are with the textbook. Using the computers became as much a privilege as a tool.

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DESIRED OUTCOMES (HYPOTHESIS #4): Developing e-portfolios builds technology skills.

RESEARCH QUESTION #7: What are the skills necessary to effectively implement e-portfolios?

RESEARCH METHOD

Technology Skills Assessment -- Teachers – Students
 Portfolio Facilitation Skills – Teachers

Findings

The skills can be divided into two types: portfolio skills and technology skills. According to prior research conducted by Dr. Barrett, teachers have different portfolio development skill requirements from students. Below is a matrix that begins to outline the skills necessary for implementing e-portfolios:

	Students	Teachers
Portfolio skills	<ul style="list-style-type: none"> • Collect evidence of learning • Select specific evidence the demonstrates a particular outcome, goal or standard • Reflect metacognitively on learning represented in evidence, making a case that the artifacts constitute evidence of achievement • Make connections in their learning • Set goals for future learning 	<ul style="list-style-type: none"> • Model all of student competencies PLUS: • Implement classroom-based assessment FOR learning strategies to provide specific and detailed feedback to learners about their learning • Support student reflection through modeling and research-based practices • Create an environment that facilitates students’ deep learning
Technology skills	<ul style="list-style-type: none"> • File Management Skills (i.e., naming files, organizing in folders, able to move and copy files, search and find files on a network folder, a hard drive, or a portable flash drive) • Using a Web Browser and E-Mail Program, including attaching files • Common tools used for constructing portfolio artifacts, depending on curriculum (i.e., word processing, concept mapping, spreadsheet, presentation software) • Converting artifacts into digital format (i.e., scanning images, taking photos with a digital camera, recording audio, digitizing video – depending on technological background of teacher or student) • Skills in using the specific e-portfolio software being used to organize the portfolio 	

Table 11: Skills for Electronic Portfolio Development

This combination of portfolio skills and technology skills were addressed in the Mid-Point Survey that was completed by 35 of the teachers and over 1400 of the students. The results on the following page provide some insights from both teachers and students on the role of technology and their development of electronic portfolios. The teachers who responded to the survey appeared to have a much more positive attitude toward the use of electronic portfolios than the students who responded, which could be a reflection of the different sample sizes. The different level of technology skills, between teachers and students, may be another factor that could impact on these attitudes. More research on these comparative skills would be informative as this list is further developed.

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Mid-Point Survey from Teachers:

	Agree or Strongly Agree
3. While working on electronic portfolios, my students learned about technology.	86%
4. While working on electronic portfolios, my students learned to organize and present ideas.	75%
5. While working on electronic portfolios, my students learned to apply technology in their learning.	86%
6. While working with electronic portfolios, my students learned to evaluate their own learning.	58%
7. Electronic portfolios are more powerful and convenient than traditional portfolios.	64%
8. Electronic portfolios can showcase learning.	89%
9. Electronic portfolios provide a means of self-evaluation.	86%
10. My students can apply what they learned from creating an electronic portfolio to their learning.	81%
11. We had difficulties related to equipment when working with electronic portfolios.	64%
12. I felt time constraints when working with electronic portfolios.	81%
13. My lack of knowledge about technology was a problem when working with electronic portfolios.	28%
14. It was challenging to select the artifacts for students to include in their electronic portfolios.	33%
15. We had sufficient time to work on electronic portfolios.	14%
16. Sufficient class time was allotted for working on electronic portfolios.	25%
17. We were able to be creative in our electronic portfolios.	58%
18. My students did an adequate amount of reflection on their development as learners.	25%
19. My students' electronic portfolios show an adequate level of reflection on the artifacts included.	33%
20. Our electronic portfolios look professional.	53%
21. We had adequate access to needed software when working with electronic portfolios.	53%
22. We had adequate access to technical support when working with electronic portfolios.	56%
23. We had adequate access to needed equipment when working with electronic portfolios.	56%
24. I felt I adequately protected the privacy of individuals appearing in our electronic portfolios.	78%
25. I would like my students to publish their electronic portfolios on the Web.	42%

Table 12. Teacher Perspectives on Learning from Electronic Portfolios (N=35)

Mid-Point Survey from Students:

Your Portfolio – How much do you agree with these statements?	Agree or Strongly Agree
11. I was able to be creative in my portfolio.	51%
12. I had sufficient time to work on my electronic portfolio.	47%
13. I can apply what I learned from creating an electronic portfolio to my learning.	48%
14. I needed more help in creating my portfolio.	28%
15. My electronic portfolio looks professional.	28%
16. I would like to publish my electronic portfolio on the Web.	18%
17. I plan to use my electronic portfolio in job searches.	30%
18. I plan to use my electronic portfolio to apply for colleges.	34%
19. I do not plan to use my electronic portfolio in the future.	31%

Table 13. Student Attitudes toward their Portfolios (N=1480)

	Agree or Strongly Agree
1. While creating my electronic portfolio, I learned about technology.	46%
2. Electronic portfolios are more powerful and convenient than traditional paper-based portfolios	53%
3. My lack of knowledge about technology was a problem when creating my portfolio.	17%
4. I had enough access to computer equipment when creating my electronic portfolio.	60%
5. I had enough access to needed software when creating my electronic portfolio.	52%
6. I had enough access to technical support when creating my electronic portfolio.	47%

Table 14. Student Perceptions of Technology and Portfolios (N=1480)

DESIRED OUTCOMES (HYPOTHESIS #5): E-Portfolio development benefits all learners and all schools

RESEARCH QUESTION #8: What are the characteristics of the study participants? What are characteristics of school sites?

RESEARCH METHOD

Demographic Questionnaire – teachers & students

Teacher Demographics

Male	21	31%
Female	47	69%

Table 15. Teacher Demographics

Bachelors Degree	33	49%
Masters Degree	22	32%
Ed. Specialist Degree	2	3%
Doctoral Degree	4	6%

Table 16. Teacher Level of Education

Percentage of teachers who have a computer at home: 96%

Percentage of teachers who have Internet access at home: 91%

How many hours do teachers use computers and the Internet at home? (n=68)

Hours using at home	Computers	Internet
0 hours per week	7%	13%
1-4 hours per week	28%	35%
5-10 hours per week	32%	30%
10-20 hours per week	24%	15%
More than 20 hours per week	9%	6%

Table 17. Teacher Computer and Internet Access at Home

How many hours do teachers use computers and the Internet at school? (n=68)

Hours using at school	Computers	Internet
0 hours per week	0%	1%
1-4 hours per week	24%	54%
5-10 hours per week	26%	25%
More than 10 hours per week	50%	19%

Table 18. Teacher Computer and Internet Access at School

Student Demographics

Male	952	46.97%
Female	1075	53.03%

Table 19: Student Demographics

Percentage of students who have a computer at home: 93%

Percentage of students who have Internet access at home: 88%

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Asian American or Pacific Islander	339	17%
Hispanic, Latino, or Spanish origin	358	18%
Black/African American	101	5%
White	865	43%
Filipino	8	0.4%
American Indian or other Native American	16	0.8%
Prefer not to respond	43	2%
Other or mixed	293	14%

Table 20. Student Ethnicity

How many hours do students use computers and the Internet at home? (n=2020)

Hours using at home	Computers	Internet
0 hours per week	10%	13%
1-4 hours per week	32%	33%
5-10 hours per week	28%	27%
10-20 hours per week	17%	15%
More than 20 hours per week	13%	11%

Table 21. Student Access to Computers and Internet at Home

How many hours do student use computers and the Internet at school? (n=2020)

Hours using at school	Computers	Internet
0 hours per week	18%	22%
1-4 hours per week	70%	70%
5-10 hours per week	12%	7%
More than 10 hours per week	0%	0%

Table 22. Student Access to Computers and Internet at School

What is remarkable about the comparison between students and teachers computers and Internet access, as shown above, is the disparity in the access during the school day. More than 88% of the students only access computers and the Internet four hours or less during a school week (as compared to the teachers). Without more consistent access, which is related to both access to the equipment as well as the time allocation in the normal school day, it will be difficult to integrate electronic portfolios.

This chart represents the demographic distribution of the types of communities for the projects in the study. As shown here, a vast majority of the schools were in suburban communities, within 50 miles of a major metropolitan area.

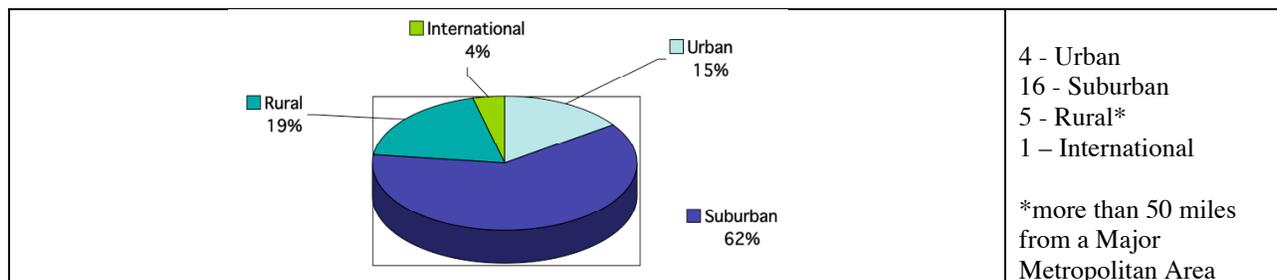


Figure 8. Demographic distribution of the participating schools

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Results and/or Conclusions/point of view

Recommendations for Teachers: If you want to implement ePortfolios...

- “Don’t do it alone” - A single teacher in a school will have difficulty implementing an e-portfolio – teachers need a community of practice. In the Arizona project, when this recommendation was given at the end of the first site visit, changes were made to the professional development of these isolated teachers, so that they could better share ideas with each other.
- “What’s your purpose? Audience?” – Have a clear sense of purpose and audience for the development of an e-portfolio. The sites that had a clear purpose (i.e., high school graduation demonstration, reflection and metacognition) were more successful.
- Questions to ask – There are a variety of questions to ask about implementing e-portfolios. During the initial meeting with the site leaders, the issue of implementing change was discussed, focusing on these factors: Vision, Skills, Incentives, Resources, Action Plan.
- NETS Essential Conditions Rubric – We used ISTE’s (2001) Essential Conditions Rubric to assess where schools were in their integration of technology. That instrument provided each school with an opportunity to address where they met the conditions considered necessary for the successful implementation of technology. The most successful site in the project had been implementing technology on a systematic and purposeful basis for at least five years prior to their participation in REFLECT.

There may be a "technology" effect at work in many of these sites. By having an electronic portfolio, the students used the computer more often, which prior research has shown is more motivating for students to learn. Many of the positive comments from students related to how much they enjoyed doing their assignments online, or how much it helped them to keep their work organized. The theme of organization came up consistently in both the student focus groups and in the questionnaire responses.

Today's teenagers are connected to the digital world in ways that their older brothers and sisters who are in college now may not have experienced. The Web 2.0 tools that have emerged in the last three years have dramatically changed the technology experiences for students. Once content with email and message boards (asynchronous communication) and surfing the net looking for information, today's young people want to contribute and collaborate more with their peers, especially in real time. As noted earlier, social networks are a fact of life for many teenagers outside of the school day. Using those tools, the students have a lot of freedom of expression, choosing the colors, backgrounds, graphics that suit their desires to express their individuality. In the controlled structure of this tool, many of the students expressed a desire for more personalization of their web-based portfolios, more consistent with the stage of their development (adolescence) where individuality and identity are very strong life tasks.

Recommendations for Future Research

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 that we can realize the true potential of using technology to both improve and showcase student achievement across the curriculum.

The following are recommendation for future research, based on the findings of this study.

- Support and follow students in one or two schools for the full four years of high school. One of the schools in the study gave accounts to every freshman during each of the two years, and those students could provide interesting insights after four years of using an e-portfolio.
- Collect data on high school graduation portfolio development. There is a need for more longitudinal research in the implementation of electronic portfolios in secondary schools.
- Develop a different model of training teachers in high schools. Due to a limited budget, the project adopted a two-day, hands-on “Training of Trainers” approach in the summer prior to the first year of implementation, which was not enough for most high school teachers. Many of the sites did not implement the project with students for at least two-to-six months after the training. TaskStream provided an 800 number and a very competent help desk for teachers to call, but many of them did not have phones in their classrooms, and did not find that type of help useful in the middle of the process of working with students. However, teachers were observed handing their cell phones to students to call the Help Desk during class, to help them retrieve their forgotten passwords (a common problem). Furthermore, there is a difference between having a good help desk for “just-in-time” assistance, and a “big picture” introduction to the use of portfolios in education, how to integrate the portfolio process into classroom practices, as well as the use of a specific portfolio software.
- Develop a different model of supporting high school students, since some of the hands-on work happens at home. Many of the students worked on home computers, but were not given the 800 number to call when they had problems. It is recommended that an “Atomic Learning” type of online video tutorials be made available for all users of any e-portfolio system.
- Focus on multiple schools in a single state, with the same statewide assessment requirements. This study involved schools in at least eight states, so there were difficulties with comparison of consistent outcome measures as well as academic requirements. There are several states in the Northeast that are currently requiring e-

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portfolios for all students (New Hampshire and Rhode Island) for different purposes. This requirement provides an excellent opportunity to control for the same in-state requirements, and look for the different factors that lead to successful student learning outcomes, measured with consistent outcome measures.

- Compare multiple tools. As mentioned earlier, this study was funded by the tool provider, and the analysis benefited from the consistent use of a single e-portfolio tool. However, the larger exploration of e-portfolio development in secondary schools would benefit from a study that looks at students using multiple tools, which is the reality of the student Internet experience today. For example, in one school in the New Jersey project, the Language Arts teachers introduced digital video editing to enrich their students' e-portfolios with digital essays, which many students said was their favorite part of the process.

Longitudinal data: There is one site in the study, where all of the Freshman and Sophomore students have received portfolio accounts, and there is widespread implementation across the curriculum. It is also a site that has been systematically integrating technology in education for the last five years. It would be valuable to follow the first cohort to graduation (two more years) and see what the students, administrators, and teachers say about implementation and impact on student learning. TaskStream was told, when this study started, that the literature says that it takes 3-5 years to see any impact of any change. Of all of the REFLECT sites, there is one that would be worth following longitudinally.

Consistency across sites: There were a lot of challenges in this study. Most of the project schools were in different states, or the projects were implemented with very different goals in mind, so it is very difficult to look at student achievement through the use of ePortfolios in this study. We were really looking at reflection and student engagement. There is no one consistent achievement measure that could be used. A good follow-up study would be to get a group of schools in a single state, with some resources behind the research, long-term onsite training, etc., and then follow the students for four years and look at the impact on GPA, test scores, attendance, other kinds of factors. That's the research that needs to be done, but would require a lot of resources to gather that type of data. We left it up to the schools, but none of them really wanted to collect this data on their own. So, this project uses a lot of observation, self-report data and teacher feedback. We have a lot of information about what type of technology motivates students; we also know the challenges that teachers faced in trying to implement this type of change. It's a start.

More variety of tools: This study was funded by the corporate provider of the tool that was used by the students and the teachers in this project. The generosity of this company should be applauded, providing funding for the first study of its kind. However, the limitations of the tool, compared to the students' collective experience with social software and Web 2.0 tools, influenced the students' attitudes toward the portfolios developed as part of this project. Another study, using a variety of Web 2.0 tools, would provide a broader look at electronic portfolio development with high school students. The provider of a single portfolio toolset cannot be expected to underwrite research using competitors' tools. A study like the Becta (2007) research in the U.K. would provide a broader view of ePortfolios in U.S. secondary schools.

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Conclusions

We had great ambitions when this project was envisioned. However, the reality of the high school culture made it obvious that change was going to take much longer than the duration of this study. There were also significant limitations in the schools' access to the technology resources necessary for implementing e-portfolios. Many school networks also blocked many of the popular social networking sites (in one Arizona school, the school network blocked the TaskStream survey where the term "MySpace" was included in a question!). Therefore, the reality in schools is that many of them will need to use these types of customized e-portfolio systems that provide the security required by many school IT departments.

However, there is a real disconnect between the way students use technology during school hours and after school. The difference in the amount of time students access computer and the Internet between home and school was reflected by all of the students in the study. As mentioned earlier, the students really liked the access to their TaskStream portfolios from home, where they could not access their schools' network disk storage. And yet, when access to the free accounts expired, none of the schools in the project found the funding to renew the accounts. In several schools most of the teachers decided not to get involved in the project because they knew there would be no money available to pay for accounts when the project was over.

There are now many free tools on the Internet that replicate the relatively low level use that most of the schools implemented, especially the WebFolio pages used for basic online word processing functions (which can be replicated with blogs and wikis). Less than half of the teachers took the time to take advantage of the assessment management functions, and only a few used the Standards alignment capabilities, mostly in the Lesson Planning tools, used by some teachers but only the students in the Arizona Education Professions program.

If students are going to find the "every-day-ness" in e-portfolio implementation, if they are going to use their e-portfolios as a lifelong learning tool, then we need to find strategies that allow them to use the tools where they have ubiquitous access, whether it is web-based tools from home and school, or the emerging use of "smart" cell phones, PDAs, or MP3 players.

The use of technology can motivate students to develop portfolios, especially if we make the process engaging and rewarding. We must give students opportunities for creativity and personal expression in their e-portfolios. If we can facilitate a higher level of engagement while furthering the goals of learning in formative electronic learning portfolios, then we may realize the real promise of using technology to both improve and showcase student achievement.

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References

- Barrett, H. (2003). Presentation at First International Conference on the e-Portfolio, Poitiers, France, October 9, 2003. [Retrieved January 21, 2005 from: <http://electronicportfolios.org/portfolios/eifel.pdf>]
- Barrett, H. (2004a). "Differentiating Electronic Portfolios and Online Assessment Management Systems." *Proceedings of the 2004 Annual Conference of the Society for Information Technology in Teacher Education* [Retrieved January 21, 2005 from: <http://electronicportfolios.org/systems/concerns.html>]
- Barrett, H. (2004b). "Electronic Portfolios as Digital Stories of Deep Learning: Emerging Digital Tools to Support Reflection in Learner-Centered Portfolios." [Retrieved January 21, 2005 from: <http://electronicportfolios.org/digistory/epstory.html>]
- Barrett, H. (2004c). Presentation at the Annual Meeting of the American Educational Research Association Conference. [Retrieved January 21, 2005 from: <http://electronicportfolios.org/aera/AERA2004slides.pdf>]
- Barrett, H. and Wilkerson, J. (2004). "Conflicting Paradigms in Electronic Portfolio Approaches" [Retrieved January 21, 2005 from: <http://electronicportfolios.org/systems/paradigms.html>]
- Barrett, H. (2007). Researching Electronic Portfolios and Learner Engagement: The REFLECT Initiative. Electronic Portfolio issue, *Journal of Adolescent and Adult Literacy* (International Reading Association). 50:8, pp. 436-449
- Becta (2007) Impact study of e-portfolios on learning. [Retrieved March 20, 2008 from http://partners.becta.org.uk/index.php?section=rh&catcode=re_rp_02&rid=14007]
- Belanoff, P. & Dickson, M. (eds.). (1991). *Portfolios: Process and Product*. Portsmouth: Heinemann
- Black, P., and Wiliam, D. (1998). "Inside the Black Box: Raising Standards Through Classroom Assessment." *Phi Delta Kappan*, October 1998. [Retrieved June 10, 2004 from: <http://www.pdkintl.org/kappan/kbla9810.htm>]
- Boyd, D. (2006) "Identity Production in a Networked Culture: Why Youth Heart MySpace" presentation at the conference of the American Association for the Advancement of Science, February 19, 2006. [Retrieved July 22, 2006 from <http://www.danah.org/papers/AAAS2006.html>]
- Cambridge, B. (2004) Educause Live webcast on ePortfolios with Barbara Cambridge, February 11, 2004.
- CARET (2005) Center for Applied Research in Educational Technology, International Society for Technology in Education in partnership with Educational Support Systems. <http://caret.iste.org/>
- Carney, J. (2001). *Electronic and Traditional Portfolios as Tools for Teacher Knowledge Representation*. Unpublished Dissertation, PhD, Univeristy of Washington, Seattle, WA.
- Carney, J. (2004). Setting an Agenda for Electronic Portfolio Research: A Framework for Evaluating Portfolio Literature. Presentation at the American Educational Research Association Conference, April 14, 2004. [Retrieved January 22, 2005 from: <http://it.wce.wvu.edu/carney/Presentations/AERA04/AERAresearchlit.pdf>]
- Davies, A. (2000). *Making Classroom Assessment Work*. Merville, BC: Connections Publishing
- Hartnell-Young, E. (2007) Data collection instruments for teachers and students. Personal correspondence.
- Hebert, E. (2001). *The Power of Portfolios*. Jossey-Bass
- Herman, J., & Winters, L. (1994). Portfolio research: A slim collection. *Educational Leadership*, 52, 48-55.
- Knezek, G.; Christiansen, R.; Miyashita, K. (2000) Instruments for Assessing Attitudes Toward Information Technology (2nd Edition). Institute for the Integration of Technology into Teaching and Learning, University of North Texas. [Retrieved September 22, 2005 from: <http://www.iitl.unt.edu/>]
- Lankes, A.D. (1995). *Electronic portfolios: A new idea in assessment*. (ERIC Document Reproduction Service No. ED390377)
- Lyons, N. (1998). *With Portfolio in Hand*. New York: Teachers College Press.
- Mahoney, J. (2002). *Power and Portfolios: Best Practices for High School Classrooms*. Portsmouth: Heinemann
- McDrury, J., Alterio, M. (2003). *Learning through Storytelling in Higher Education*. London: Kogan Page.
- Moon, J. (1999). *Reflection in Learning and Professional Development*. London: Kogan Page.
- National Research Council (2001). *Knowing what Students Know: the science and design of educational assessment*. Washington, D.C.: National Academy Press

The REFLECT Initiative Research Project Final Report

- Novak, J.R., Herman, J.L., & Gearhart, M. (1996). Issues in portfolio assessment: The scorability of narrative collections. (CSE Technical Report No. 410). Los Angeles, CA: National Center for Research on Evaluation, Standards, and Student Testing assessments in large-scale testing programs. *Educational Evaluation and Policy Analysis*, 19 (1), 1-14.
- Office of Research Education (OERI). (December, 1993c). Consumer guide: Student Portfolios: Administrative Uses. [Retrieved March 15, 1998: <http://www.ed.gov/OR/ConsumerGuides/perfasse.html>].
- Office of Research Education (OERI). (November, 1993b). Consumer Guide: Student Portfolios: Classroom Uses. . [Retrieved March 15, 1998: <http://www.ed.gov/OR/ConsumerGuides/classuse.html>].
- Office of Research Education (OERI). (September, 1993a). Consumer guide: Performance assessment. [Retrieved March 15, 1998: <http://www.ed.gov/OR/ConsumerGuides/perfasse.html>].
- Paulson, F.L., Paulson, P.R. & Meyer, C.A. (1991). "What Makes a Portfolio a Portfolio?" *Educational Leadership*, 58:5, pp. 60-63
- Paulson, F.L. & Paulson, P. (1994). "Assessing Portfolios Using the Constructivist Paradigm" in Fogarty, R. (ed.) (1996) *Student Portfolios*. Palatine: IRI Skylight Training & Publishing
- Plough, C. (2008) "Web 2.0 Tools Motivate Student Creativity" TechLearning, March 1, 2008 Retrieved March 6, 2008 from: <http://www.techlearning.com/showArticle.php?articleID=196605050>
- Prensky, M. (2008). Keynote address, Northwest Council for Computer Education, Seattle, Washington, February 28, 2008.
- Schank, R. (1991). *Tell Me a Story: A New Look at Real and Artificial Memory*. Atheneum
- Schön, D. (1988). "Coaching Reflective Teaching" in P. Grimmett & G. Erickson (1988). *Reflection in Teacher Education* (pp. 19-29). New York: Teachers College Press.
- Schön, D. (1991). *The Reflective Turn: Case Studies in and on Educational Practice*. New York: Teachers College Press
- Stefanakis, E. (2002). Multiple Intelligences and Portfolios. Portsmouth: Heinemann
- Stiggins, R. J. (1994). *Student-centered classroom assessment*. New York: Merrill.
- Stiggins, R. J. (2002). "Assessment Crisis: The Absence of Assessment FOR Learning." Phi Delta Kappan, June 2002. [Retrieved July 17, 2004 from: <http://www.pdkintl.org/kappan/k0206sti.htm>]
- Strudler, N. and Wetzel, K. (2005) Electronic Portfolios in Teacher Education. [Retrieved March 20, 2008 from: <http://coe.nevada.edu/nstrudler/epstudy.html>]
- Tosh, D. and Wermuller, B. (2004). "ePortfolios and weblogs: one vision for ePortfolio development." [Retrieved June 2, 2004 from: http://www.eraed.org/papers/ePortfolio_Weblog.pdf]
- Tosh, D. and Wermuller, B. (2004). "Creation of a learning landscape: weblogging and social networking in the context of e-portfolios." [Retrieved July 16, 2004 from: http://www.eraed.org/papers/Learning_landscape.pdf]
- Wilkerson, J.R., & Lang, W.S. (2003, December 3). Portfolios, the Pied Piper of teacher certification assessments: Legal and psychometric issues. *Education Policy Analysis Archives*, 11(45). Retrieved [2/15/04] from <http://epaa.asu.edu/epaa/v11n45/>.
- Yancey, K. B., & Weiser, I. (Eds.). (1997). *Situating portfolios: Four perspectives*. Logan, Utah: Utah State University Press.
- Zeichner, K. & S. Wray (2001). "The teaching portfolio in US teacher education programs: what we know and what we need to know." *Teaching and Teacher Education*, 17, 613-621.
- Zubizarreta, J. (2004). *The Learning Portfolio*. Bolton, MA: Anker Publishing.
- Zull, J. (2002). *The Art of Changing the Brain*. Sterling, VA: Stylus Publishing

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Appendix A

Questions for Focus Group of High School Students

Name _____ Location _____ Date _____

These are the general research questions that I want to answer:

- 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 learning and work?
- What are the benefits of developing e-portfolios as perceived by students
- What are perceived obstacles to implementing e-portfolios with secondary school students and how can they be overcome?

NOTE: Not all questions were asked of all students in all focus groups. Depending on the responses to the questions during the focus groups, some questions were skipped to avoid duplication. In other groups, questions were pared down due to a more limited availability of time.

Let's talk for a few minutes about your participation with the TaskStream program and the EP purposes and procedures

1. What year are you in school?
2. Can anyone tell me what a portfolio is?
3. You have been using TaskStream since last year. Can anyone describe what you have been doing with TaskStream?
4. Can anyone tell me what an electronic portfolio is? What do you put into your electronic portfolio?
5. What were the [required and optional self-selected] items that you included in your EP? (Has this changed over time?)
6. What methods did you use to get your artifacts into the computer? (scanned, uploaded)? Was this process straightforward?
7. When you began, what did you see as the main purposes of the EP? Did that change for you? (N2, N1)
8. Did you receive feedback about your work in TaskStream? From your teachers? From your fellow students? Was it helpful? How did it help your learning?
9. What, if anything, did you learn from that process? What did you think you were supposed to learn?
10. Have you ever done a paper portfolio? Do you think using TaskStream was the same, less, or more work than doing a paper portfolio?

Now let's talk about some of the technology issues.

11. How do you store and use artifacts from classes you've taken in the past? [prompt: computer files, papers, data, research, etc.]
12. Do/Did you have sufficient access to computers and other technologies to complete your portfolios in a timely manner?
13. What is the level of support available to you for EP use? What support would be helpful to you? To other students?
14. In what ways did your teachers support your portfolio development?
15. How well prepared do/did you feel to complete the EP? How well prepared are/were the other students?
16. What problems came up when using Taskstream? How did you get support for its use?

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17. Did you or your fellow students have problems in putting together the EPs? Has this changed over time?
18. What technical issues did you have in creating your work?
19. Did you develop any new skills as a result of portfolio preparation?
20. Where did you gain the skills you needed to complete an ePortfolio?
21. In what other ways did your teachers use TaskStream How was it integrated into your courses? What did you gain from using it? Did you collaborate with your classmates more regularly? Review their work more regularly than in other courses? Other benefits?
22. Do you use any other Internet websites to publish information about yourself? MySpace? Others?
23. How does TS compare?
24. What do you see as the benefits of having a portfolio?
25. What are the advantages or benefits resulting from putting together an EP?
 - a. Follow up –How has the EP allowed you to see the big picture of your learning, connecting courses and experiences?
26. What are the disadvantages or concerns resulting from putting together your EP?
 - a. (Follow-up -How much time did it take for you to complete the EP?
 - b. Are the portfolio tasks, requirements and evaluation clear?
27. What was the role of reflection in the EP process? Within each class? For benchmarks? And now has that changed?
28. How do you think reflection helps you to learn?
29. Tell me about “reflection” in your program. Do teachers ask you to reflect on your learning?, How? What role, if any, did formal reflection play in your portfolio development?
30. Do you want to continue using the TaskStream portfolio system?
31. Do you plan to use a portfolio after you graduate? Add to it?
32. As you look back on the EP experience so far, has it been worth your investment of time and effort?
33. What advice would you have for students who were just beginning the EP program?
34. Anything else that you’d like to add?

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Appendix B

Study Participants

Below is a list of the schools involved in the research project, including their level of participation in each stage of the data collection.

State	School	# Student accounts	Initial Surveys	Mid-point Surveys	Final Survey*
AZ	Cactus Shadows	1132	90	56	0
	Buena HS	147	124	28	0
	AZ CTE aggregate *				17
	Dobson HS	26	16	13	
	Cactus HS	95	22	22	
	Sunrise Mt. HS	38	17	0	
	Ironwood HS	94	35	20	
	Centennial	74	0	0	
	Mesa	24	0	11	
	Mountain View	26	2	9	
	Peoria HS	17	10	5	
	Red Mountain	29	1	11	
CA	LAHS	294	96	0	0
	McGarvin Intermediate	440	398	208	57
	John O'Connell HS	806	153	113	0
	Rio Linda HS	103	16	1	0
	Vallejo HS	362	262	150	0
	Analy HS	50	0	0	0
FL	Miami CDS	62	27	26	0
MD	John Carroll HS	457	189	175	0
MI	New Buffalo HS	63	0	0	0
NJ	Eastside HS	66	53	15	
	Keansburg HS	135	112	76	
	Lower Cape May HS	56	34	1	
	Old Bridge HS	126	116	112	
	NJ Aggregate *				83
TN	Mt. Juliet	953	323	176	506
Intl	Brazil **	704		258	0
NY	Mott Hall	242	0	0	0
NM	San Carlos	63	0	0	0
	Totals	6684	2096	1486	663

Table 23. Student Completion of Questionnaires

* The details of the final surveys for the Arizona CTE project and the New Jersey project were not available at the time of this report.

** The students from the Brazil site completed an incomplete translated version of the Initial Survey, and their results were not included in this analysis.