

The REFLECT Initiative:

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

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

Helen C. Barrett, Ph.D., Research Project Director
REFLECT Initiative, 2005-2007

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?

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. The research drew upon the established literature and theoretical constructs with validated research instruments and data collection protocols.

The REFLECT Initiative Research Project Final Report

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 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. 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.

The complete final research report with supporting data and all data collection instruments is available online at <http://electronicportfolios.org/reflect/>

The REFLECT Initiative Research Project Final Report

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-Point”
- End of the process (Spring 2007 – after first half of second school year) – “Post”

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.

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 their MySpace pages
- 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

The REFLECT Initiative Research Project Final Report

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, while on many of the other schools, the administrator was either unaware of the project, or did not provide any support.

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, perhaps due to the fact that they had new teachers who were not part of the initial training.

The REFLECT Initiative Research Project Final Report

Findings

This discussion of the findings will be organized around the Research Questions outlined earlier. The Discussion and Conclusions are summarized here. There is a more complete research report available with the detailed data that supports these conclusions.

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.

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

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

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.

The REFLECT Initiative Research Project Final Report

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

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.

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

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

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.

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

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,

The REFLECT Initiative Research Project Final Report

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.

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

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. 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.

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

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 that 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 1: Skills for Electronic Portfolio Development

The REFLECT Initiative Research Project Final Report

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.

What is remarkable about the comparison between students and teachers computers and Internet access, as shown in the demographic data, 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 much more access time for 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.

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.

The REFLECT Initiative Research Project Final Report

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 study’s findings.

- 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.

The REFLECT Initiative Research Project Final Report

- 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-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.

The REFLECT Initiative Research Project Final Report

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. 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.

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.

The REFLECT Initiative Research Project Final Report

References

- 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]
- 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. (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.
- 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/>]
- Mahoney, J. (2002). *Power and Portfolios: Best Practices for High School Classrooms*. Portsmouth: Heinemann
- National Research Council (2001). *Knowing what Students Know: the science and design of educational assessment*. Washington, D.C.: National Academy Press
- 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.
- 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 Wetzal, K. (2005) Electronic Portfolios in Teacher Education. [Retrieved March 20, 2008 from: <http://coe.nevada.edu/nstrudler/epstudy.html>]
- 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