Can Digital Teaching Portfolios Become Tools for Technology Integration?

Rick Baker, M.Ed.
Pendergast School District, USA
rbaker@pendergast.k12.az.us

Alice Christie, Ph.D.
Arizona State University, USA
alice.christie@asu.edu

Abstract: The purpose of this study was to explore a potential relationship between developing digital teaching portfolios and a propensity to integrate technology in the classroom. Graduate students, who were also practicing K-12 teachers and who were enrolled in the initial educational technology course of an M.Ed. program, created digital teaching portfolios centered on a self-selected growth goal based on the ISTE National Educational Technology Standards for Teachers (NETS-T).

The analysis of data from three surveys indicated that there was a positive change in the participants' perceptions of their technology skill level and their use of digital portfolios as a learning/assessment tool in their K-12 classrooms. Teachers also developed technology skills that they could use in their classrooms. Finally, there was evidence that the digital portfolio process engaged teachers in the process of reflection. A follow-up study is planned for Spring 2005.

Introduction

A casual glance into most K-12 classrooms across the United States would expose the American education system's growing love affair with computers and related technological devices. A closer look, however, might reveal a lack of true technology integration in American classrooms. In 2002 alone the number of computers in K-12 classrooms across the United States increased by over one-and-a-half million, yet teachers' skill in using technology effectively for instruction is not keeping pace. While more teachers are using computers on a daily basis, school reports indicate that only 11 percent of teachers effectively integrate technology into the curriculum (Cable 2002). In addition, a study commissioned by the U.S. Department of Education and conducted through the National Center for Education Statistics (Parsad 2001) indicates that teachers report they do not feel well prepared to integrate educational technology into the grade or subject they teach. This finding is unchanged from a similar study done by the same organization in 1998. The data in the 2001 study also indicate that teachers believe their teaching improves when they participate in professional development that connects to or integrates with other initiatives. Additionally, effective professional development programs focus on collaborative reflection and joint action guided by clear student achievement goals (Killion 2000). Professional development in technology is about teaching and learning, and is most effective when it provides time for teachers to collaborate and evaluate their results (Killion 2000; McKenzie 1999). When teachers explore their beliefs within a collaborative culture that provides support for reflection and evaluation, they begin to consider and implement changes in their practice (King 2002).

One tool that offers opportunities for connection and integration with other initiatives, collaboration, reflection and evaluation is the digital teaching portfolio. For many years, educators have successfully used teaching portfolios as a professional development tool to examine their professional practice and reflect on their growth over time (Doolittle 1994). With new technologies available, portfolios can utilize digital formats that allow for greater portability and sharing (Gibson & Barrett 2002). The portfolio development process provides an avenue for teachers to reflect on their practice and to align it to theory, research and best practices while being supported by their colleagues (Doolittle 1994; Heath 2002; Holbein & Jackson 1999). Through the creation of and reflection on portfolios for professional development, teachers grow in their skill and practice (Barrett 2000; Gatlin & Jacob 2002; Heath 2002; Holbein & Jackson 1999). These authors also indicate that teachers involved in creating reflective digital portfolios

develop technology-related skills that have a transfer to the classroom (Gatlin & Jacob 2002; Heath 2002; Holbein & Jackson 1999). Through the collaborative and reflective experiences in the digital portfolio process, teachers become facilitators of student technology use, helping students discover what they must know and be able to do to meet state and national standards (King 2002).

Process and Methodology

The purpose of this study was to explore a potential relationship between developing digital teaching portfolios and a propensity to integrate technology in the classroom. Graduate students, who were also practicing K-12 teachers and who were enrolled in the initial educational technology course of an M.Ed. program, created digital teaching portfolios centered on a self-selected growth goal based on the International Society of Technology in Education's (ISTE) National Educational Technology Standards for Teachers (NETS-T). Participants were required to include in their digital portfolios ten or more artifacts drawn from class assignments, and a reflection on each artifact. The required artifacts included items from an instructional unit developed using the Intel Teach to the Future™ curriculum (one to three documents created with Word™, Excel™, PowerPoint™ and, optionally, Publisher™). Additionally, the participants were required to provide artifacts reflecting their work on a number of additional assignments that included mail merge, a grant proposal, an instructional technology inventory of the their school and district, a virtual tour of their school's technology resources, and others. The growth goal and the selected objectives were also to be included in the final portfolio.

The focus of the study was teacher use of digital teaching portfolios for examining their own progress toward self-selected growth goals and their acquisition of the technology skills needed to support that movement. The intended outcome was that teachers would integrate technology at a higher level or more frequently because they had participated in the process of creating digital portfolios.

Students participating in the study engaged in a five-stage process (Danielson & Abrutyn 1997) of portfolio creation. Each stage is outlined below:

- The *conception stage* of the process involved planning the portfolio. At this point decisions were made to determine the central focus and general direction of the learning path the teacher would take. Growth goals were developed around available standards, in this case, ISTE's NETS-T.
- The *collection stage* of the process involved the collection of all potential artifacts relating to their growth goal. This component took the greatest amount of time, as the collection of artifacts required the entire length of the course to gather, and potentially involved collecting all coursework for consideration for inclusion in the digital portfolio.
- The *selection stage* involved the selection of representative artifacts for inclusion in the digital portfolio. Work in this stage required waiting for the "collection" to become large enough to support a winnowing process for selecting high quality artifacts.
- The *reflection stage* involved reflecting on one's progress toward a growth goal and how each of the "selected" artifacts affected student learning. These reflections were to be included in the digital portfolio along with the artifact.
- The *connection stage* involved connecting the "selected" artifacts and reflections using PowerPoint™ as the medium for displaying digital teaching portfolios. This stage also involved connecting the artifacts back to the growth goal.

The course instructors served as both teachers and researchers for this study. We provided models of digital portfolios as well as numerous examples of digital teaching portfolios completed by former graduate students. We also provided guidance and instruction on the mechanics of linking all the artifacts together in a meaningful way. Finally, we provided in-class time for students to seek our feedback, as well as that of other students, on the organization and structure of their digital portfolios.

Surveys administered to participants at the beginning of the course established a set of baseline data. The participants took the surveys again at the end of the course and we compared the results to the baseline data to determine changes in participants' perceptions of their skill development. The project participants completed three separate surveys: a *Portfolio Survey*, a *Technology Standards Assessment Survey* (skills survey) based on the ISTE

NETS-T, and a *Process Survey*. Collectively, the surveys provided us information on participants' growth toward technology integration, their own skill levels in using technologies, and their experiences creating digital teaching portfolios.

Outcomes

Portfolio Survey

Using a five-point Likert Scale, with a *5* indicating *with great ease* and a *1* indicating *not at all*, the participants completed the *Portfolio Survey* at the beginning and end of the project. As a group, the participants' responses indicated an increase in their skill level on all items of the *Portfolio Survey*. In a comparison of the pre-project survey and the post-project survey, the mean scores increased anywhere from 0.2 to 2.2 points on the five-point Likert Scale.

This study focused on the effect of the digital portfolio development process on the participants' use of technology in their classrooms. Two of the survey items directly targeted this focus, and in both items the mean scores increased substantially. On their ability to teach students to create a digital portfolio, participants' pre-project mean score was 2.8, and their post-project mean score increased to 4.1. Although this is exciting, it is understood that simply believing they are able does not mean that teachers will immediately incorporate this process into their normal routine. However, on the more direct survey item, *I have used reflective portfolios in my classroom to assess my students' learning,* the mean score increased from 2.3 to 3.6 (an increase of 1.3). This increase suggests a direct connection between the digital teaching portfolio development process and the use of those skills in the classroom by teachers.

Participants' responses also indicated improvement on a number of computer skills associated directly with the portfolio development process. The highest gains in this area came in the participants' perception of their ability to create hyperlinks in PowerPoint™. The mean score increased by 1.2, moving from 3.5 to 4.7. This skill was critical in the *connection stage* of the digital portfolio process as participants connected and unified their artifacts in their portfolio. Additional items peripherally connected to the digital portfolio process, but more integral to overall course goals, dealt with files (i.e. saving files to specific areas, navigating to files, understanding the concept of file structure, and moving, copying or renaming files) and managing multiple open documents and programs. Of these seven items, all but one had a final mean score of 4.7 or higher, with the majority of the items recording a mean score of 4.8. In general, the participants' responses on this survey indicated that they felt much more confident in their ability to use technology for professional purposes.

Technology Standards Assessment Survey

The *Technology Standards Assessment Survey* (TSAS) consisted of 32 items presented in a self-assessment format using a four-point scale. The participants selected from the four indicators: *Not at all*, *Need help*, *Knowledgeable and fluent*, and *Able to teach others*. Each indicator was given a point value to aid in data collection and for pre- and post-survey comparison purposes, with *1* being the lowest (*Not at all*) and *4* being the highest (*Able to teach others*). The *Technology Standards Assessment Survey* was based on the six categories of standards developed by the International Society for Technology in Education (ISTE) in their National Educational Technology Standards for Teachers. The project participants based their growth goals and objectives for the portfolio project on these standards after completing the pre-project survey.

Overall, the participants' mean scores on each of the 32 items in the TSAS increased. Item 1 (*I can create a newsletter with graphics and text in columns using a word processor*) recorded the smallest mean score gain (.13), while Item 23 (*[I can] guide students in applying rubrics to assess the products and reports they create with technology*) recorded the largest mean score gain (1.18). The average gain on all 32 items was .61. Considering that this increase was on a four-point scale with rather broad indicators, this movement was impressive.

Perhaps the most appropriate method to connect the data from the TSAS to the project is through the goal setting activity. To accomplish this, individual participants' pre- and post-project survey scores were first compared to identify specific areas of growth. These scores were then compared with the growth goals and objectives selected by the participants earlier in the course. These comparisons revealed an average of a one-point gain on items identified by the participants as growth goals. Furthermore, 89% of the participant scores on the individual items identified as growth goal objectives reflected a one- to two-point gain when the item received a score of 1 or 2 on the pre-project survey. Additionally, six percent of the items were self-developed objectives that could not be identified for comparison, or were items not addressed in the course objectives. When these items were added back into the totals, the percentage of participants with a one- to two-point gain rose to 94%. On the remaining six percent of the items (or growth goal objectives), the participants responded with a "2" on both the pre- and post-surveys.

Process Survey

Only 19 participants (those who completed their digital teaching portfolios before the end of the course) were asked to complete the open-ended *Process Survey*, given only at the end of the study. Their responses were unanimously positive on all six questions. In response to the first question (*Did creating the digital portfolio help you recognize your growth over the semester?*), all 19 participants responded positively. Each one responded "yes", with most explaining that it gave them an opportunity to see their own growth over time. Many also reported that it was helpful to bring all of the course work into one focused activity or final product. A third of the survey participants indicated that they learned how to hyperlink in PowerPoint™, with one participant adding that he learned many tips and shortcuts transferable to other Microsoft Office™ programs.

The second and third questions on the survey were directed toward the learners' growth through the digital portfolio creation process. Responses to the second question (*What aspects of the digital portfolio creation process were most helpful to you as a learner?*) typically focused on the helpfulness of the collection and organizational aspects of the portfolio. Several mentioned the reflections as being very helpful, while others indicated they acquired a deeper knowledge of PowerPoint™ through this process. One of the participants reported applying her new knowledge by going above-and-beyond the required paper-based portfolio in her school's Teacher Advancement Program and creating a digital portfolio. She then modified the digital portfolio for use as a resume in a job interview. In a conversation with that participant, she reported that both principals were *wowed* by what she had developed. Responses to the third question (*What did you discover about yourself as a learner through developing the digital portfolio?*) are summed up best by one participant's answer: *I knew more than I thought. Became aware of areas I need to work on [and] discovered some topics I need to work on*. Most of the other participants' answers fell somewhere into one of those three general categorical ideas, but many also included the benefits of the hands-on nature of the digital portfolio development process.

Questions four and five (*Do you believe digital portfolios can be used successfully in school-based professional development?* and *Would creating a digital teaching portfolio help teachers become betters teachers?*) asked participants to share their beliefs about the potential usefulness of digital portfolios in professional development. All but one of the respondents felt that digital portfolios could be used successfully in school-based professional development. It was difficult to discern if the lone dissenter disagreed with the use of digital portfolios as a professional development tool or with their use as a tool for students in kindergarten, first and second grade. Two of the participants responded to question four very emphatically with *absolutely* and another respondent added *…a digital portfolio is an excellent activity*. Not all of the responses were as enthusiastic. Two participants agreed that they could be used, but added a caveat that digital portfolios should be encouraged, not required, of all teachers; and one added *especially for new teachers*. Participants again mentioned the reflective nature of the encounter as a positive outcome of the process. Several also noted the power of the organizational aspects of the portfolios and their helpfulness in allowing teachers to see their work and share it with others.

Although question five (*Would creating a digital teaching portfolio help teachers become better teachers?*) drew slight criticism from two respondents for the language *better teachers*, all respondents believed that creating a digital portfolio would help teachers become better teachers. Comments on this question are interesting in light of the project's objectives. Participants' responses to this question are very encouraging with respect to how digital portfolios would affect a teacher's use of technology in the classroom. When answering this question, respondents noted:

- *[The digital portfolio process] uncovers strengths and weaknesses for growth and development.*
- *[Teachers] would be more inclined to use it in their classrooms.*
- *I think that [the digital portfolio process] would open a whole new world to teachers.*
- *I feel that the digital portfolio helps a teacher develop technology skills.*
- *It helps a teacher reflect on learning.*
- *[Teachers] can pass knowledge onto students and other teachers.*
- *I think it makes technology look fun, motivating and accessible.*
- *[The digital portfolio process] allows for a wide range of learning styles to be showcased, the possibilities are endless!*

By themselves, these statements are quite encouraging, but when coupled with the statements on question six *(Did creating a digital portfolio help you develop skills that will increase the likelihood that you will use technology in your classroom?*), an even stronger pattern began to emerge. Of the 19 survey participants, the 95% who had actual teaching experience responded positively to this question. Forty-two percent of the respondents reported an increase in their technology skills, or they made general statements along the lines of *the more one uses something the better one gets*. Twenty-six percent of the respondents indicated that they planned to use the digital portfolio process, or the skills learned in the process, in their classrooms with their students. Twenty-one percent of the respondents reported that they had already applied what they learned through the digital portfolio process to their classrooms. One of these respondents enthusiastically revealed that her students did a small presentation for conferences for the first time.

Conclusion

Although the data from the surveys do not conclusively prove that teachers will be more likely to use technology in their classrooms with their students, there is evidence that creating a digital teaching portfolio may have a positive impact in that direction. Indications are that it has already made an impact on a number of teachers in the participant group. There were impressive gains made on two items specific to the notion that teachers can teach students how to create digital portfolios, and that they have used them in their classroom with students.

An analysis of the data from the three surveys indicates that there was a positive change in participants' perceptions of their technology skill level and their use of digital portfolios as a learning tool. Further evidence was apparent in the open-ended survey in which nearly 50% of the surveyed participant group indicated that either they had already increased their use of technology with their students or they were making plans to do so. Other members of that group indicated that they started using digital portfolios with their students after learning how to do so as part of this project.

An additional positive outcome of the project, while difficult to separate from course content and objectives, was the participants' skill development. Specific skill development mentioned by a number of participants as being directly attributable to the digital portfolio process were hyper-linking, creating and consistently using an organized file structure, and developing an organizational plan for creating a portfolio.

There was also evidence that the digital portfolio process engaged teachers in the process of reflection. Even outside of the reflection assignment, it was evident that the participants engaged in a process of comparing their work from the beginning of the course to their work at the end of the course. This was strikingly apparent in the many responses on the open-ended survey that referred to reflecting on or seeing the totality of their work. The digital portfolio process seemed to be the catalyst for this practice, which for some was recursive as they reworked their portfolios to ensure that they highlighted their finest products.

A follow-up self-report survey is planned to assess how participation in the creation of a digital teaching portfolio affects teachers' ability to effectively integrate technology into their K-12 classrooms. This survey will be administered one year after the graduate students created their own digital teaching portfolios. In addition, we will repeat the study with another group of graduate students this spring.

References

Barrett, H. (2000). The electronic teaching portfolios: multimedia skills + portfolio development = powerful professional development. Retrieved October 13, 2003, from http://transition.alaska.edu/www/portfolios/site2000.html

Cable, C. (2002, October). K-12 schools rapidly embrace emerging technologies, but teacher computer proficiency stalls. Retrieved October 15, 2003, from http://www.schooldata.com/PDFs/techined2002pr.pdf

Danielson, C., & Abrutyn, L. (1997*) An Introduction to Using Portfolios in the Classroom*. Alexandria: Association for Supervision and Curriculum Development.

Doolittle, P. (1994). Teacher portfolio assessment. Washington, DC: Eric Clearinghouse on Assessment and Evaluation. (ERIC Document Reproduction Service No. ED385608)

Gatlin, L., & Jacob, S. (2002). Standards-based digital portfolios: a component of authentic assessment for preservice teachers. Action in Teacher Education, 23(4), 35-42. Retrieved April 21, 2003, from Education Abstracts Full Text database.

Gibson, D., & Barrett, H. (2002, November). Directions in electronic portfolio development. Retrieved October 19, 2003, from http://electronicportfolios.com/ITFOURM66.html

Heath, M. (2002). Electronic portfolios for reflective self-assessment. Teacher Librarian, 30(1), 19-23. Retrieved October 3, 2003, from Education Abstracts Full Text database.

Holbein, M. F. D., & Jackson, K. (1999). Study groups and electronic portfolios: A professional development school inservice project. Journal of Technology and Teacher Education, 7(3), 205-17. Retrieved October 3, 2003, from Education Abstracts Full Text database.

International Society for Technology in Education (ISTE) (2002). Creating and assessing portfolios. In NETS Project, National Educational Technology Standards for Teachers: Preparing Teachers to Use Technology (pp.159-172). Eugene, OR: ISTE.

Killion, J. (2000). Teachers who learn, kids who achieve: A look at schools with model professional development. Retrieved October 13, 2003, from http://www.wested.org/online_pubs/teachers_who_learn/TeachLearn.pdf

King, K. P. (2002). Educational technology professional development as transformative learning opportunities, Computers & Education, 39, (3), 283-297. Retrieved October 13, 2003, from ScienceDirect database.

McKenzie, J. (1999). How teachers learn technology best. Bellingham, WA: FNO Press

Parsad, B., Lewis, L., and Farris, E. (2001). Teacher Preparation and Professional Development: (2001). (NCES 2001-008). U.S. Department of Education, National Center for Education Statistics. Washington, DC.