Costs and Benefits of Electronic Portfolios in Teacher Education: Student Voices

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Abstract

This descriptive study investigated the benefits and costs of using electronic portfolios (EPs) in preservice teacher education by examining the voices of students in six programs thought to be mature in their implementation. Benefits included opportunities to reflect, better access to and organization of professional documents, increased technology skills, and better understanding of teaching standards. The costs or disadvantages included issues of program implementation, access to and reliability of the technology, and the amount of time and effort expended. The authors conclude that understanding student perceptions of their experiences can lead to improved practices and policies with regard to EPs and should be considered in future research.

This study investigates the benefits and costs of using electronic portfolios (EPs) in preservice teacher education by examining the voices of students who are or have implemented EPs throughout their teacher preparation programs. It is an extension of a larger study examining perspectives of administrators and faculty members in these programs as well. Earlier, Strudler and Wetzel (2005) reported that leaders who provide vision and resources are an important factor in initiating the use and implementation of electronic portfolio programs. However, the students and faculty are the implementers and their perspectives are vital to understanding EPs. As Fullan (2001) reminds us about educational change, "Meaning must be accomplished at every level of the system, but if it not done at the level of the student—all is lost" (p. 163). This study, therefore, focuses on the voices of the students. It examines their perspectives in mature and well-articulated programs in which EPs have been used for two or more years program-wide. By examining the voices of students, the study seeks to answer the following three research questions:

1. What do teacher education students see as the benefits of electronic portfolios?
2. What do teacher education students see as the costs or disadvantages of electronic portfolios?
3. From a student perspective, are the benefits worth the costs?

Questions one and two are addressed in the results section. Question three, based on an analysis of the data presented in questions one and two, is addressed in the discussion section.

The Effect of Teaching Portfolios on Preservice Teachers

Student portfolios have been used in teacher education programs for some time, and are generally thought to have positive effects on learning. For example, some researchers have concluded that through the use of portfolios, teacher candidates understand the teaching profession by reflecting on assignments and their alignment of standards with artifacts, engage in the process of self-assessment, design professional growth plans, and participate in the final evaluation of their teaching portfolios (Campbell, Cignetti, Melenyzer, Nettles, & Wyman, 2001). In a study of 10 teaching interns and first and second year teachers, Lyons (1998) discovered that nearly all of the students found the process of constructing a teaching portfolio "an important and significant reflective learning experience" (p. 255).

These researchers describe portfolios that Wolf and Dietz (1998) would categorize as learning portfolios, having the purpose of promoting reflection and "ownership of the learning process" (p. 15). They identify two other types of portfolios: the assessment portfolio, which "presents educational organizations with information about a teacher candidate's effectiveness," and the employment portfolio, which "provides prospective employers with information about a teacher's suitability for a position" (p. 15). These different purposes drive the structure, contents, and format of the portfolio.

Student Learning through Reflection. Reflection is a key element of the learning portfolio (Shulman, 1998; Zubizaretta, 2004). "With reflection, the portfolio can become an episode of learning; without reflection, the portfolio may be little more than an exercise in amassing papers" (Wolf & Dietz, 1998, p. 14). Wiseman (2004) made distinctions between types of reflection: critical reflection that is based on a commitment to personal growth and reflection that is guided by external mandates such as proving competence according to others' criteria. However, external mandates such as standards-based electronic work samples can be meaningful, if students received proper guidance and if teacher educators align program philosophy, purposes, and assignment. Further, Wiseman (2000) pointed out that teacher educators needed to guide preservice teachers to reflect and electronically represent the professional, psychological, socio-historical, political, ethical, and moral aspects of themselves as educators. In addition, Lyons (1998) explains that one view of reflection is the justification of teachers' actions by offering rationales and reasons. Another view is that of making connections. In the latter view, students tell the story of practice and in dialogue student string together strands of connections.

Finally, Stone (1998) added that reflection is a process that needs to be nurtured in students and developed. The reflective process can be taught. In a study of reflective statements in the electronic portfolio of 10 preservice students, Robbins (2004) analyzed their reflective statements. Students were taught a specific process for reflection using the Reflection Cycle (select, describe, analyze, appraise, transform). Robbins found that students focused on their emergent personal theories of education and their future plans and concluded that the Reflection Cycle approach did support the reflection of preservice teachers. Finally, the reflections were more focused on teachers (self and survival) than on students in their classes.

Technology Skills. Creating EPs may also enhance students' technology skills. Surveying 26 students who created EPs in the first year of their

teacher education program, Bartlett (2002) explained that students created EPs that included teaching standards, two lessons, and video clips of the implementation of a lesson. She found that students identified learning about technology as the greatest benefit, but also that the student time devoted to the electronic portfolio was extensive. Students spent seven class periods building their EPs, and they also spent many hours out of class working on them. Many students commented that the project was time consuming and expressed the desire for more time to work on it.

Similarly, Piper analyzed 12 preservice teachers' responses to open-ended interview questions, and found that most said they improved their technology skills by creating their EPs. Technology skills that students mentioned most often in the interviews were: HyperStudio authoring, HTML skills, scanning/video/audio capture, and cut/paste/transfer of files. Most of the problems students experienced related to digitizing artifacts and troubleshooting hardware and software.

After students designed and implemented their EPs, Wright, Stallworth, and Ray (2002) surveyed them and found that 88% thought the additional technology elements integrated into the methods block to create their portfolios were worthwhile.

Use after Graduation. The effect of teaching portfolios on graduates who had developed portfolios during their preservice programs is an area that has remained largely unexplored. However, in an interview with 11 first-year teachers who had developed teaching portfolios during their teacher education program, Rolheiser and Schartz (2002) found that these first-year teachers valued portfolios as an important form of assessment and reflection for themselves and their students. Most of the participants intended to continue to maintain their portfolios in the future, but many did not do so due to the challenges and demands of first-year teaching. The researchers thought that if mentors, new colleagues, and administrators were supportive of portfolio use, the chances were improved that new teachers would implement them. Further, if there were external expectations or accountability for professional or student use of portfolios, this might also facilitate use by new teachers.

Time, Effort, and Timing. Shulman (1998), a pioneer in research on teaching portfolios, commented on the time that portfolios require:

> Portfolios done seriously take a long time. They are hard to do. Teaching is a job that occupies every waking and some nonwaking moments of a good teacher. Given such demands, the question is: Is that much work worth it? And, if it is, is there any chance of reorganizing the life of teachers so they can do this hard work without killing themselves? (p. 35).

When multimedia requirements were added to the portfolio, Smith, Harris, and Sammons (2001) found that more time was required. Teacher candidates also consistently commented on the time investment needed to prepare electronic work samples for the electronic portfolio. Wiseman (2004) concluded that the mechanics of preparing the electronic work sample that met the teaching standards required so much energy that survival and mechanics were more important than thinking and reflection. How can reflection, pondered Wiseman, be fostered in the electronic portfolio within the reality of students' limited time, skills, and attitudes?

On the other hand, Hartman (2004) found a solution that helped to minimize the time issues. Through a series of interviews with seven preservice mathematics teachers and an examination of their EPs, Hartman found that the process of creating a teaching portfolio supported high levels of reflective activity; however, students also reported a lack of time to develop a comprehensive portfolio. One factor cited was the lack of explicit connection between the teaching portfolio and assignments in classes. In a subsequent semester, students participated in a mid-program portfolio seminar. The seminar provided a structure and support for students to construct their EPs. During the seminar, portfolio templates were introduced and participants had an opportunity to observe peers' successful development of portfolio artifacts. The seminar helped students overcome the lack of time and other obstacles. Additionally, by working together in the seminar format, students encountered new ways to describe and reflect on their practices.

An important use of EPs is for program assessment, as colleges of education may use them to demonstrate that their teacher candidates are progressing toward standards for program accreditation purposes. Some teacher education candidates' performances are best captured while they are student teaching. For example, to meet Arizona Professional Teaching Standard 3: The teacher implements and manages instruction that develops students' abilities to meet Arizona's academic standards, teacher education candidates would use lessons they developed, implemented, and evaluated. In addition, samples of pupils' work demonstrating that the preservice teachers' lessons are effective would be compelling. However, this requirement may also place a heavy time commitment on students and their instructors during student teaching.

How much emphasis do the preservice teacher portfolios need to place on the work of their students? Shulman (1998) explains the place of the work of the pupils:

> Portfolios of the best kind include not only the documentation of teaching, but the documentation of student learning. In the ultimate nirvana, the very best teaching portfolios will consist predominantly of student portfolios (p. 36).

If teacher candidates focus on the work of their pupils, they are faced with another set of problems related to timing. The most illustrative work samples (those that show teacher education candidates effectively implementing lessons and affecting pupil achievement) are created during student teaching. Selecting these artifacts and placing them in the portfolio is time consuming. However, student teaching is a particularly busy time and student teachers feel they need to focus on their teaching (Wright, Stallworth, & Ray, 2002), not the creation of a time-consuming portfolio. Also in this study, 40% of the preservice teachers surveyed described time as a major deterrent to electronic portfolio use.

Thus, time and timing are issues. In one study (Borko, Michalec, Timmons, & Siddlle, 1997), teacher candidates created a major part of the their portfolios during their student teaching experiences, the busiest time of the semester. Timing was one of several factors that played an important role in students feeling of frustration about their EPs. In the subsequent year, the authors repeated the study but reorganized the student teaching semester. They had students start student teaching earlier in the semester and end prior to the completion of the semester. Thus, student teachers had one week of sheltered time to build their EPs when they were no longer responsible for the classroom.

Better-Prepared Teacher. In a study of teacher candidate use of EPs, Wright, Stallworth, and Ray (2002) interviewed 15 former preservice students, four university supervisors, six cooperating teachers, three administrators, and four members of the exit portfolio committee. The researchers found that students most frequently cited increased reflection as a benefit of EPs, but also cited development of practical skills of lesson planning, improved organization, and preparation for job interviews. Although the use of EPs is projected to have benefits for future teachers, only limited studies of the effect are available and the results are somewhat mixed. For example, in case studies of four student teachers who were creating multimedia portfolios, Smith, Harris, and Sammons (2001) reported that only two of the four students completed their portfolios. One of the teacher candidates was quite positive about the experience, commenting that by continually reflecting on her teaching and meeting the needs of her pupils, she was more able to fully meet the needs of her

students. She also thought the video included in her multimedia portfolio helped her evaluate the clarity of her instruction. The student teachers' host teachers also thought the process was valuable because they were able to monitor the student teachers' progress by focusing on the components of the portfolios.

In summary, this review of literature provides a glimpse of the possible benefits that can be derived by teacher candidates as a result of creating and implementing EPs. The review also cites several costs or disadvantages that teacher candidates may experience with EPs. The present study seeks to add to the literature base by further examining both the costs and benefits of using EPs as perceived by teacher candidates.

Method

This study employs case methodology (Yin, 1989) to investigate student perspectives pertaining to the implementation of EPs within teacher education programs. During the first phase of the study (Wetzel & Strudler, 2005) the researchers sought to identify teacher education programs in which the use of e-portfolios was well articulated, mature, and optimally in place for a minimum of two or three years. We reviewed related literature, polled experts, and posted a call for nominees on several listervs pertaining to teacher education and technology, including AERA, SIGTE, and AACE. Twenty-six programs were nominated by one or more of their peers or were self-nominated. The nominees represented 25 universities in 15 U.S. states and one Australian university. As programs were identified a letter of nomination, accompanied by a brief survey, was sent out to deans to gather information, including their purposes for electronic portfolio use and the dates of program-wide adoption. Twenty-three of the 26 deans or their designees completed the survey.

The fifteen-item questionnaire (available at http://coe.nevada. edu/nstrudler/survey3.pdf) was administered using Survey Monkey's online survey tool. Upon analysis of the surveys, phone interviews were then employed to gather more data to inform the final selection of six programs for the case studies. The primary criteria for selection were the length of time that the electronic portfolio program had been in place and the extent to which it was a program-wide venture that involves a large percentage of faculty and other personnel. We also considered nominees for variations in their emphases and approaches.

Data Sources & Analysis

Six programs were selected: California Lutheran University, Eastern Kentucky University, Indiana University of Pennsylvania (IUP), Johns Hopkins University, University of Rhode Island, and University of Iowa. Site visits of approximately three days each were scheduled for the research team during November and December 2004. During that time, semi-structured interviews were conducted with teacher education faculty, university administrators, and teacher candidates in various stages of their program (i.e., beginning, middle, and student teaching), recent graduates, and technology support providers. We opted for a non-random, purposeful sample of informants arranged with the help of one or more people serving in a liaison role at each of the universities. Overall, we conducted 80 interviews of individuals and small groups with 124 informants in all. Of the 124 informants, 35 were students and 13 were recent graduates, for a total of 48 representing the student perspective. The interviews ranged from 15 to more than 90 minutes in length. The average interview took approximately 45 minutes.

In addition, we reviewed supporting artifacts and observed various facets of the implementation process, taking field notes throughout the visit. At times we observed computer labs on an impromptu basis. During unscheduled intervals during the visits and subsequent to the daily schedule, the researchers discussed reactions to the interviews and observations. Notes were recorded and any unanswered questions were noted for follow-up in subsequently scheduled interviews. It was our goal in each of the site visits to probe into any unclear areas so that by the end of the visits, we arrived at a clear picture of each program and how it was perceived by the various stakeholders.

All interviews were audio taped and transcribed, and then analyzed using HyperRESEARCH Qualitative Analysis Tool. Using the constant comparative method (Strauss, 1987), data analysis began as data were first collected and continued throughout the study. Data were triangulated as our review of documents and field notes from observations served to confirm the trustworthiness (Lincoln & Guba, 1985) of the interview data.

We began by reading and rereading our field notes and transcriptions of the interviews. Guided by the research questions, we coded the data, beginning with a common set of codes established by the researchers. As the study progressed, we revised our codes as needed to reflect the data gathered. Eventually we arrived at 50 unique codes, a subset of which was employed for this article.

Drafts of individual case summaries were written. Then, based on the cross-case analysis, a draft of the paper was written and sent to key informants at each site to check for accuracy of the data and feedback on our analysis. Corrections and modifications were then made to the paper as needed.

Results

The researchers solicited the views of a variety of students about their perception of the benefits and costs of EPs. At each site we interviewed three groups of students: those beginning the teacher education program, those at the mid-point, and student teachers or those completing the program. To gain the perspective of students who had created and used EPs throughout their entire teacher preparation program, recent graduates were also interviewed. We asked: What do you see as the primary benefits or advantages of the use of EPs? and What do you see as the costs or disadvantages? In analyzing the data, we found that generally the benefits included: an opportunity to reflect, better access to and organization of professional documents, increased technology skills, better understanding of teaching standards, and usefulness for employment. The costs or disadvantages included issues pertaining to program implementation, access to and reliability of the technology, and issues of time and effort expended.

What Do Teacher Education Students See as the Primary Benefits or Advantages of the Use of EPs?

Portfolios Support Reflection and Student Learning

All universities required students to write reflections as part of the portfolios, and students spoke at length about this. Faculty also required students to write reflections at different points in the teacher education program and for different reasons. In some cases they were an integral part of the assignment and would be included in the paper and at other times the reflection would be placed in a separate area such as a box or a link to the included artifact. Student reflections fell into several categories: (1) personal response, (2) reflection on standards and theory, and (3) a combination of 1 and 2.

An Iowa student explains their focus on personal reactions:

> One of the main things that they would have us do in a reflection was look at what we did well and if we would do that again. And also things that we could work on to improve: I could have done this a lot better, so next time I will do this.

Similarly, a Johns Hopkins student explained one of the methods they used for reflection that emphasized the personal:

> … Carol Rogers who wrote an article in the Harvard Ed review for the Voices Inside Schools section, and so

we use her reflective practice and her circle … And just looking at things from that perspective, "What happened? What happened with me? What am I going to do different or the same next time?" It's a great way to reflect, every day almost.

Another Johns Hopkins student who was student teaching explained that their cooperating teachers provided feedback on lessons they taught. The student teachers captured this feedback and their responses to it in a written reflection. Such reflections were an important part of their EPs and allowed them to show how they met specific standards.

An IUP student emphasized connecting to standards and learning theory:

> There were three questions we had to answer: how does the artifact meet the standard? What did we learn from making this artifact? And how is this artifact connected to learning theories or development of children?

At Eastern Kentucky, a student explained that both personal reflection and a connection to standards are required:

> Our reflections tell what we've learned from the experience, why we submitted it, why we chose to include it as one of our entries. You can only pick two standards [that the entry supports], so if you think that it's one of your best works, you're trying to explain why you put it there and what the purpose was and what you got from doing the assignment.

Rather than reflecting on specific artifacts, Cal Lutheran students at oral interview checkpoints discussed the benchmarks and their professional development plans with goals they had and had not yet met. In addition, they would chose one or two exhibits to talk about an artifact like a lesson plan, and why that exhibit successfully demonstrated their competency in fulfilling a standard.

In summary, most of the students reported that they were to address questions that asked them to provide personal responses such as their reactions to the assignment experience and what they would do differently. Other personal responses included responses to the observations of cooperating teachers and the exit interview defense of their progress toward goals in their professional development plans. In numerous cases, students also reported on their understanding of the teaching standards and the rationale for believing they were accomplishing the performances specified in the standards. Finally, some students were to include in their reflections their understanding and application of educational theories to their experiences. This distinction between personal response and responses that make connections to theories and standards is key to understanding students' beliefs about the value of each type of reflection.

The Value of Reflection. Although reflection required time and effort, students valued reflection. A Johns Hopkins graduate explained: "Sure…yes. I mean, we had to reflect, but if I hadn't, I probably wouldn't have dug in as deep." Many students considered more valuable the writing of personal responses such as reflecting on the success of a lesson presented in student teaching and what they might do differently next time and less valuable the written discussions of educational theories and their understanding of each teaching standard. A Johns Hopkins graduate who had reservations about the extensiveness of the reflections also remarked:

> I mean, I kind of liked that part of the reflection [personal reflections on student teaching] because you were sharpening your game, you know. And that's worthwhile absolutely….

Portfolios Provide Access/Storage/Efficiency/Organization

At all of the universities visited, students to some degree discussed the use of their EP to help save and organize their course work. However, student reactions ran along a continuum of perceived value. At several of the sites, students were in general agreement that this was an important or even the most important use of the EP and, yet at other colleges, students placed less value on the EP for this purpose.

Several students noted that EPs are less bulky and unwieldy than paper portfolios, and reduce the chances of losing documents. An Eastern Kentucky student explained:

> I think that with the changing technology in the world it's so much easier to view all of those things when you can just click where you want to be and where you want to go. The hard copies were so big and bulky to carry around and having to flip through and try to find things. I think e-portfolio is just easier access for us.

Cal Lutheran and Johns Hopkins students discussed the ease of access that EPs provide. A Cal Lutheran student reported:

> I like having all my work in the EP. [Otherwise] all the paperwork is under my bed or wherever; with this I know it's right on there always nice and neat. Any computer you go to you can access it, in the library or at home.

A Johns Hopkins student expressed a similar point of view.

> The most basic benefit is that you never lose anything. I'm prone to just have things falling out of my bag, and if I just do it, and right when I type it, before I even save it to a disk, I just upload it really quick, and then it's there and I don't have to think about it.

In addition, students appreciated having all of their work together. Another Cal Lutheran beginning student explained the value of building on the prior work saved in your electronic portfolio:

> I think it's great because your classes are interrelated. You can go back and forth between your papers and ideas you've already used. It's all right there and you don't have to search through your binders.

Some students, however, expressed concern about the media for maintaining their files. Should they burn a CD of their files, use a USB drive or a diskette? With a Web-based system, access was less of an issue. A Cal Lutheran student teacher explained the access advantage: "… and if you have an oral presentation you just come in, go into your Web folio, find your PowerPoint you saved at home, bring it to your class."

Finally, students recognized that the electronic portfolio provided more than just easy access to assignments. One of the significant potential benefits of EP systems was that they provide a means for students to keep and organize most of the important work from their classes and field placements. The work samples or student artifacts could be organized in folders by course title, teaching standards, or by checkpoints. A Cal Lutheran student teacher captured this advantage:

> I think it's really useful for me personally because it's one source you can go into and you have all the syllabi for all your classes. If you know what you need to do for that week you can bring up all the syllabi and each assignment has a rubric or an outline stating what it required for the assignment so you can just go in and look at everything without bringing out all your folders and paper and go through everything.

An advantage accrues when the course support system and the EP system are combined into one package that students use for both purposes. Students at Cal Lutheran liked having access to important course

materials such as syllabi and assignment descriptions in the same area as their personal space for their completed assignments.

The purpose and design of the EP may have affected the perceived value that students saw in the area of storage and organization. At Rhode Island, for example, the purpose of the EP was program and student assessment, and the EP was designed so that students were to include only one key assignment from most courses. This EP system was not intended to house all of a student's work. On the other hand, the EP system at Cal Lutheran was designed so that students organized their assignments into course folders and checkpoint folders. Students selected artifacts from the course folders that best represented the benchmarks in the checkpoint folder. Cal Lutheran students, who were in the middle of their program or student teaching, reported that they submitted to the instructor many of their course assignments through the EP system.

Building a Portfolio Improves Technology Skills

Students from all of the universities participating in this study indicated that they learned new technology skills as they built their EPs. This seems especially true in programs that were based on templates and involved students' creating their own Web pages. Students from Eastern Kentucky served to illustrate the views of students about technology skills gained.

Beginning Eastern Kentucky students thought that learning to create their EPs allowed them to practice their computer skills. One reported:

> It's helped to keep up with the computer skills because I lost a lot after high school. I wasn't working on the computer much before I was in this class and it got back my skills. You forget a lot of stuff. As an educator, you're going to be using a computer for a long time.

An Eastern Kentucky student teacher believed that learning technology skills is the main advantage of the EP system.

> I think it seems like Eastern Kentucky really is pushing technology. They really want students to get involved in technology. I think probably part of the reason they do it is just to get people involved in working with the technology and preparing them for things they might need to do as a teacher in the classroom.

Generally all of the student groups commented on learning skills such as uploading documents, scanning, changing file formats (e.g., Word to Acrobat PDF), and dealing with cropping and sizing pictures. In addition, at universities that used template approaches to EP building, students also discussed learning to use an editor such as Front Page to modify Web pages, add hyperlinks, and use FTP to move documents to a server. Finally, some students indicated that the skills they learned aligned with state and national teacher technology standards, and students from all of the sites commented on the notion that these technology skills would serve them well in their future classrooms.

Using Standards to Measure Growth toward Becoming a Teacher

Students articulated their understanding that the portfolios were standards based and their progress toward the standards was important. A Rhode Island post-baccalaureate student stated:

> Right away when I saw the list of assignments, I saw it was a cumulative way to assess students as they progress through a school of education…when I saw the difficulties of the tasks ahead, and the standards that they mentioned, I realized that "Oh, this is all building to a final culmination of certification."

Iowa students explained that the EPs made the standards explicit:

> Standards become very visible because they're on the

e-portfolio, and because this assignment fulfills this standard and so on. And so I don't know, because I've never been in an education course that didn't have an e-portfolio, but I would think that maybe the standards would be less visible without this kind of program.

Students felt accountable for the standards and their progress toward them. A Johns Hopkins student explained: "It's kind of like a check for yourself in a way, to use these INTASC principles, to check to make sure that you're doing what you should be as a teacher. A URI graduate also explained: "The e-portfolio works standards into your schema."

Finally, an Iowa student noted that the standards also could be used by the college for program review.

> Yeah, I'd heard about it being used to meet standards, and I think it's such a great idea because the University, whenever they're being reviewed or whatever, can be like "here is how we meet these standards, and it's right there for you." Your prospective employers can see how you've met all the standards for certification, and I think it leaves less of a chance for gaps and holes that might cost you your job later—or might cost your university their accreditation.

Students viewed positively their exposure to standards and use of standards as a yardstick to track their growth. Their portfolio helped to make the standards explicit and helped students see their progress as they completed work demonstrating competencies encompassed in the standards.

Portfolios May Enhance Employment Opportunities

Students discussed two views of the use of the EP for employment purposes. Some students emphasized the actual viewing of the EP by the employer as part of the hiring process. Others emphasized using the EP as a tool to prepare for an interview, even if the employer would not view it. Particularly at Cal Lutheran, where students in the program made oral presentations to discuss their progress toward specific standards, and their professional development including goal-setting and review, graduates commented that this process was very good preparation for the types of questions they were asked in job interviews. Another useful approach explained by an Iowa teacher education candidate was to make paper copies of EP artifacts to take with them to interviews.

On the other hand, many students hoped that employers would actually view their EPs, but within this group, most students acknowledged that they weren't sure this would happen. A beginning Eastern Kentucky teacher education student represented many students with similar views:

> I hope that people in administration who are looking for someone for a job will take into consideration our e-portfolios. I have a feeling that we're working and striving to do well on it, and if we apply for a job and they shun it aside, it's really a waste of work. I would definitely like to say if I'm in an interview, "I'd really like you to check out my e-portfolio" and give them the Web site.

Generally, students believed that if employers would look at their EPs it would add and make the time and effort more worthwhile. A student at Eastern Kentucky expressed this view clearly and represents the views of many students: "I think the biggest benefit would be the hiring process. [You would have the EP] to take in and present and show that you know what you are doing."

What Do Teacher Education Students See as the Costs or Disadvantages of Using EPs in Their Preservice Program?

Analysis of costs or disadvantages (used interchangeably) of EPs cited by students yielded three overarching categories: (1) issues pertaining to program implementation, (2) access to and reliability of the technology,

and (3) issues of time and effort expended. Perceptions of the program and the technology are presented first to provide context for the issues of students' time and effort that are subsequently explored. Rather than call attention to a particular university that exemplified a cost or disadvantage, we often did not include the name of the university to protect the anonymity of informants in areas deemed sensitive.

Program Implementation Issues

Changes in Portfolio Procedures Leads to Frustration. Sites were selected for inclusion in this study based on the longevity of the program and the extent to which use of EPs was broad-based and program-wide. As early adopters, it would follow that the sites visited would go through changes in their programs as they progressed in the implementation phase. It appears that the larger the program and the more disparate the purposes and goals of the participants, the more likely procedures would need to be modified as the program progressed. Students were particularly vehement about mid-stream program changes, a comment heard primarily at three of the sites. A recent graduate characterized the changes involved in participating in their newly implemented EP program:

> It seemed they just threw it in; it was real quick; it wasn't real organized. And I realize that has to do with, it's kind of feeling your way through the program, and as they did it they kind of realized "oops, we've got to go back and change this." And I think our class was pretty much guinea pigs.

An administrator confirmed what several students expressed:

> Well those students, they've seen the rules change three times, and they're not happy about that. You interview some of them that have been around here for a while, they will tell you that it would be really nice if we could get it right…so the next time that they're asked to go through one of these checkpoints, they won't have to scrap everything that's in the portfolio because apparently we're asking them for an entirely different set of stuff.

Inconsistent Implementation of Portfolios Leads to Confusion. In several cases, students remarked about the inconsistent manner in which the program was being implemented from class to class and from professor to professor. This reflects, in part, the degree to which particular professors had bought into the EP program and the degree to which they opted to participate. Although some faculty used class time to introduce components of the EP that related to their courses, others appear to have participated minimally or even opted out. For example, at one university, faculty members were supposed to check to see if the required artifacts were uploaded before assigning a grade for the class. When asked about this a student stated, "No, not everyone checks it…they just don't."

Another student discussed the problems that occur when faculty members are not active participants in the process:

> If you go to the teacher, you suffer from some of the problems we talked about—they don't know technologically what it is they're supposed to do; they refer you back to the syllabus. You go down to the e-portfolio office, they don't know what it is that your teacher is asking you to have done for sure.

Faculty advisors were also considered as key players in the process, but were not all regarded by students as helpful. One student described her experiences trying to get help from her advisors:

> …When I asked questions about my portfolio and stuff—it was just—it meant nothing to her. So she didn't give me advice, and my second advisor told me she was going to help me, but then she retired. So then my latest

advisor is very nice—a very nice lady—but she doesn't help because…it's not a priority I guess. So I guess a major concern would be making sure the advisors are aware of the portfolio even when the professors aren't.

Another issue of inconsistent implementation is the degree to which EPs were addressed and reinforced from class to class—over time. This was especially true in programs in which the artifacts were not tied to particular courses. In some instances students cited a flurry of activity with their EPs, followed by two or three semesters of little or no activity. A student recalled:

> I had a couple of instructors that helped, but I felt that we should have had to do a little bit of this in each class. More people should have used it in their instruction—made us put certain things in our portfolios or something to keep us going. I just don't feel like the instructors did what was needed…We had no reinforcement.

Issues of inconsistency seemed to emerge in programs that were largely decentralized. For example, at one site, secondary education programs were housed throughout the university and the various programs were given much latitude to approach the EP. In some of the programs (e.g., music education), expectations for the portfolios were introduced in a technology class designed for music educators. In most majors, however, students took a general technology class. A teacher candidate who also worked in an EP support role, commented on the decentralized approaches to the EPs and the need to clarify expectations within the various programs:

> The instructors' [teaching the introductory educational technology] classes can only deal with the most general parts of the portfolio, which leaves a lot of the standards, not necessarily unclear, but uncovered. And I don't think that in [the general educational technology course sections] all of the standards can be covered for each major. [There should be] a way to bring clarity to everyone's major.

Another issue cited by students in some programs was the inconsistent standards and rigor for evaluating the portfolios within the various programs. At another site, a student remarked about when her EP was evaluated, "I'm sure all she did was click on the link 'is that her paper? Yep. Done.' You know, move on to the next one."

A chair commented on the range of approaches to assessing the EPs:

> People [faculty] are saying, "Well I'm putting a lot of emphasis on the portfolio, and I'm really putting a lot of time and energy into evaluating my student-teachers' portfolios." And someone else is saying, "Fine, all the elements are there. Pass, it's done." So I think that that's one of the challenges that we still need to be dealing with, is how do we sort of standardize the evaluation of this, and make it more equitable across the process.

Timing of the Required Work Is a Crucial Consideration. Students and recent graduates reported the timing for particular components of the EP as a major program implementation issue. Generally, artifacts were due at the end of semester or at specific checkpoints, including the end of the program following student teaching. As one might expect, many EP artifacts were generated during the student teaching experience. This was particularly true for EPs that required "best evidence" of candidates' abilities to meet standards and expected that the artifacts would be "classroom tested" with K–12 students. Thus, students reported a time crunch at the end of the semester where scanned evidence of K–12 student work was required. Of particular concern for teacher candidates was the stress that they experienced with their portfolios during student teaching. Typically they mentioned wanting to spend as much time as possible working on

their lesson plans and preparing for class. Consistent with the literature (Strudler, McKinney, & Jones, 1995), teacher candidates interviewed placed a higher regard for time spent in the schools than time fulfilling university requirements and specifically time to prepare for teaching over EP development (Borko, Michalec, Timmons, & Siddlle, 1997; Wright, Stallworth, & Ray, 2002). One recent graduate expressed in a group interview the sentiments that several had mentioned:

> …the EP was the last thing we had to do before graduation…We were all here in the computer lab, uploading stuff. Oh, God that was miserable! [laughter] I mean, talk about wrong place, wrong time to be doing that…I don't even want to think about it!

Technology Issues

Access to EP Tools and Support Is Needed. All of the sites had electronic portfolio labs with regular hours and trained staff. An IUP administrator described their facility:

> But of course we also have … the portfolio assistance center. And that lab is absolutely key, we feel, to successful completion of the portfolio. The only purpose for that lab is for the students to go in and work on their portfolio. We have student workers in there to assist the students…a faculty member that has been very involved in portfolios right from the beginning. And she has released time to be in there and support the portfolio center and help the students out. She does special workshops for the students, various specific-issue workshops, and then she's there and available to help them with content as well as "How do you scan that?"

Five of the six sites had comparable facilities and support systems. However, teacher education candidates expressed other concerns that had to do with access. A large majority of students mentioned having personal computers and access to the Internet, with perhaps half having broadband access. Although theoretically all students could access the EP systems from their dorms or homes, students did raise issues about having ready access to the requisite technologies. Some students reported doing much of their work at home (e.g., completing their assignments using a word processor), but many mentioned accessing the EP system from school labs. Students reported that lab access was generally good except at the end of the semester. One key variable was the amount of scanning needed to document K–12 student work. Most students relied on scanning work on campus, though some recognized the amount required and decided to purchase their own scanners. A recent graduate of Rhode Island recalled:

> Once I was inducted in to the program and I looked at the e-folio, I bought a scanner…It was automatic. I looked at the requirements coming down the pike and I said, "I've got to buy a scanner, that's it." And so I bought a printer-scanner-copier, and you know you can get them for like $100…With the speed connection that I had, I could do everything at home.

Many others, however, relied on the university labs' high-speed access for uploading files to the EP system. One student commented, "I think it's a pain in the butt…because some people don't have the high-speed Internet." Another added, "It's hard for people without scanners."

Many also uploaded from campus labs because they reported not having access to necessary FTP or Web authoring software and/or not knowing how to perform those operations from home. For example, one student stated, "I don't have FTP Pro at home, so mostly I work in the lab when I need to upload something. I've only found like a 30-day trial, but it's free on campus." She concluded, however, "I would much rather do it at home rather than fight for computers on campus."

Another student commented about access:

> I really wish we had a lab that was open 24 hours and didn't get so busy, but I do…have Microsoft FrontPage. I bought that for like seven bucks at a student discount at the University bookstore. And so I do everything except for upload [at home]…

Students at another university, which also used FrontPage for Web authoring, cited the expense of the program as an obstacle for working at home. In addition, the lack of high speed Internet was mentioned by several students. Finally, students at several sites reported the need for access to specialized software such as Photoshop, which most didn't have at home. Thus, cost was seen as an obstacle for some students who wanted to work on their EPs at home.

Another problem with access occurred for students who took classes at remote sites. For example, at one university it was reported that there was little technical and instructional support for the EP at the off-campus, satellite sites. As a result, students needed to drive long distances to campus to work on their EPs in the support labs. This caused much frustration. Typically students working at remote sites would wait until the end of the semester to make a trip to complete their EPs, often resulting in overloaded labs. In addition, informants at other programs reported difficulty in accessing the EP system from their field placement sites due to firewalls in the schools' networks.

Reliability of the EP System Is a Key Factor. Although most students found the EP systems to be quite reliable, one college was a notable exception. One technical difficulty noted was the system's tendency to "time out," especially while uploading large files. This would require that the student repeat the upload process and sometimes rewrite the accompanying reflection if the student didn't save it using his or her word processor. A student worker explained:

> I think when you're on the system for a long period of time—I think it's like 10 minutes—it just times you out. Because basically the system works like, you go in, you go to your class assignment, you click upload, and you have to write a little reflection on your task, and then you upload it...what happens sometimes is that…you're writing a huge reflection, and it will just time you out.

It should be noted that during our site visit, plans were being made at this school to implement a commercial EP system university-wide. All agreed that their current system was not adequate and there was much optimism concerning the improved functionality and reliability that would accompany the new system.

Time and Effort Required to Create EPs

The amount of time students spent on their EPs varied across sites and across programs and students within each site. In programs in which the EPs were class-based, in some instances the portfolio only required the extra time it took to upload the required artifacts and perhaps reflect on the submission. Many students, however, reported spending much time on the EPs. Uploading scanned work was one major variable, depending on the expectations of the program. A recent Johns Hopkins graduate stated:

> I really scrambled near the end to try to get everything in and scan it in here. And I'd be in here [in the lab] until it was closed, and coming in all the time. But I think that realistically, that's the nature of the beast. I felt like I was floundering, but I looked around and I wasn't the only one.

Another graduate commented on the time issue pertaining to scanning:

> I felt like it just would suck up way more time than I really wanted to devote to scanning things. You know,

I'd much rather spend that time planning my lessons or reflecting on my lessons.

Another variable in the amount time expended was the expectations for EP artifacts and the rigor for evaluation. At Rhode Island, while the artifacts were required assignments within courses, student recognized that assignments designated to be part of the EPs were higher profile and required more time and attention. For example, a Rhode Island student explained:

> I know that there are people in the education program who are influenced by the fact that it's on the e-folio system, and they will try harder because they do know it's being posted and they do know that they do have to meet the standard. And it's being shown at least to university professors.

Students also mentioned having to re-do particular required artifacts—in some cases multiple times. As a Rhode Island student stated while laughing, "I think probably just about everyone in the education department has had to re-do an assignment."

In programs in which the EPs were not course-based, the potential for additional time required was greater, depending on the degree of scrutiny in which the students' advisor or other faculty evaluated the EP. At Johns Hopkins, for example, the EP was employed in lieu of comprehensive exams and required a great deal beyond completing course assignments.

The Emphasis on Reflection Must Survive the Balance Test. Students at each of the universities participating in this study also questioned the number and extensiveness of the reflections required. The interviewers asked recent graduates if there is anything they would change. Although not all participants in this small group of graduates expressed the sentiment as strongly as the graduate below, others chuckled and concurred:

> I think they reflect it to death. I said that to lots of people. It is valuable, but it's just over-kill. The one thing I found in my second semester, we are in the classroom all day, every day, just like the teacher is. We have to keep a daily reflective journal. I can understand that, that's fine. We also had to turn in a weekly reflective sheet. On top of the daily reflective journal, on top of reflecting on our lesson plans and reflecting every time we had an observation and reflection in our methods class. It just got to the point, now I mean I have this mindset in my classroom, reflect, reflect, reflect on everything. Like it seriously changes you. If I had a choice, something they could tone down just a tad bit, it would still be the reflections.

Students did value reflection, but voiced concern about the amount, timing, and repetition of required written reflections. Another graduate explained: "… I just felt like it was forced a lot. And it just made it an activity that you had to do, but just going through the motions."

The Promise of EPs for Employment Must Be Considered Carefully. Many students were optimistic about the potential for EPs to enhance their searches for employment. Unfortunately, it was often reported that EPs were not viewed by principals or district personnel. A recent graduate discussed his experience with his EP that included a digital video of his teaching:

> I interviewed at a brand-new school that's going to be technology oriented….And I talked to that principal during my interview, and he was reluctant to even look at the DVD I made….Sure they're being told about this nice new e-portfolio stuff, but my opinion is that the e-portfolio does not get you into an interview or a job. Maybe in the future, and that's a big maybe. I did not feel that anyone I talked to said that they were looking for an e-portfolio or anything like it.

Discussion

> I fill out my standard and I fill up my class requirements, and I go in it and I click and I see everything that's hyperlinked, and I say, "Oh look at that! Look at how much I have done!" You know, so it makes me feel like I'm taking steps towards my goal of becoming a teacher; it really makes me feel like I'm progressing. (Student)

> You are just making your way along the continuum and you're watching your growth and you are reflecting. You are just kind of moving along and you can see where you were and where you've progressed and it's all right there. Every one of my benchmarks are on my Web folio. (Graduate)

> I think that most of us think that it is a lot of time put in to something that doesn't seem to have much merit. I don't really want to say merit…hmm I can't find the word. Meaning? …I was just talking to someone and he said that it was supposed to be so that we could look back on our university experience and see how we've grown as a professional. But…that wasn't how it was ever explained to me. And so we see it as being a waste of time doing it. I can say that honestly. Some people feel like they're just throwing things in here and they don't know if they're doing it correctly, and whether or not it will ever mean something to them in the future. (Student)

From a Student Perspective, Are the Benefits Worth the Costs?

The above quotes reflect the disparity of students' views that we encountered pertaining to the worth of EPs in teacher education. From a student perspective, then, are the benefits worth the costs? Based on our data analysis, the short answer to this question is, "It depends." Although teacher candidates across cases reported varied levels of satisfaction, it is important to note that students at some sites were more satisfied than others. What were the factors that led some students to be satisfied and positive about the benefits of their EPs and others to be frustrated and dissatisfied? An analysis of our data yielded four themes that may shed light on students' overall perceptions about EPs.

Clarity of Purpose

One of the issues that troubled students most had to do with frustrations resulting from a lack of a clear purpose. On the one hand, when the purpose was clear, the students tended to accept the rationale, saw value in their efforts, and responded to the various challenges to complete their EPs. For example, at Rhode Island students described the need to demonstrate standards-based performances to attain state licensure and for the program to attain accreditation. Although they experienced many technical difficulties working with their EP system, Rhode Island students in general appeared more accepting of the technical difficulties they encountered than students at other sites who perhaps had a less clear sense of the purpose for the EPs. At several sites, for example, some students and faculty thought the major purpose of the EP should be for employment. Recent graduates, however, generally reported that few K–12 administrators were prepared to or interested in considering the EP as part of the hiring process. This disconnect between intended purpose and actual practice led to much frustration on the part of students and to an ultimate resentment of time and effort that the EP demanded of them.

Functional Systems and Clear Procedures

At the risk of stating the obvious, students' overall perspective on EPs were strongly affected by their interactions with the system—the degree to which the system worked as intended, was user friendly, and the degree to which the procedures for use were clear. These basic needs can be likened to the lower order survival needs of Maslow's hierarchy. Although the ultimate goal of the EP may be reflection and deep learning, or in Maslow's case, self actualization, the higher-order goals cannot be attained without first addressing the basic enabling requirements. Although not a widespread issue across cases, technical difficulties were mentioned by students at some sites. In instances where the system crashed too often during crucial end-of-semester times, or students thought it took too long to upload artifacts, students noted those problems and were more inclined to believe that their efforts were not worth the trouble.

Quite often students who had started the program earliest were most critical of their experience. Frequently, these were the students who experienced efforts to work out bugs in the software and templates, and to adjust guidelines regarding student requirements and assignments. Although faculty and staff were attempting to monitor and adjust the EP program during early stages of implementation, students did not appreciate changes in program requirements in mid-stream and suggested that universities allow a cohort to complete the program with the same set of requirements with which it began. Generally, students who started their EPs more recently were more satisfied with their experiences because EP practices went more smoothly.

Students also seem more satisfied when they were introduced to the EPs early in their program, followed by consistent and incremental follow-up as the program progressed. They stated that they appreciated having the instructor model EP creation in class, discuss the standards and performances, and specific course assignments that might be used to meet a standard. Across all sites, students remarked that class time should be used to address guidelines, the meaning of requirements, and EP construction. Even if the initial construction was addressed in an earlier educational technology course, students indicated that they needed to have the concepts and skills refreshed later in the program.

Value of Reflection

Consistent with the findings of Wright, Stallworth, & Ray (2002), students in the present study cited increased reflection as a major benefit of EPs. They stated that they learned important concepts as a result of the required reflections. The value of reflection differed somewhat from site to site depending on the emphasis, but generally, teacher candidates reported that the connections they made to state and national teaching standards helped them to understand the standards and the attributes of well-prepared teachers. They also thought that reflecting on their teaching practice helped them learn from their experiences. However, the sentiment was almost universal that there could be too much of a good thing and that they were being "reflected to death." They recommended that faculty modify the logistics for reflections; for example, the reflection should be embedded within the artifact or inserted separately within the EP system. Requiring both, however, led to redundancy and overload. Furthermore, although some students noted the inherent value of consistent, thoughtful reflection, others derived further benefit from the feedback that they received from faculty.

Faculty Feedback Commensurate with Student Time and Effort

Although data suggest that components of the EP process might be streamlined to be less time consuming, as Shulman reminds us, the fact remains that "portfolios done seriously take a long time" (p. 35). As could be expected, student comments about the amount of time they needed to devote to the electronic portfolio were frequent and emphatic. There were many complaints about the requirement to scan pupil work samples and the time required to upload lengthy documents. Other expenditures of time were met with more varied responses. Overall, it appears that one major variable that affects students' satisfaction with the process is the degree to which they received thoughtful feedback from faculty on their work. In many instances, students mentioned that the EP process—including meaningful assignments, thoughtful assessments, and subsequent student-faculty interaction—stretched their learning in significant ways. There was also evidence, however, of what might be described as elaborate, hyperlinked checklists in which faculty assess the EPs based on completeness rather than the quality of the content. In instances where students perceived this to be the case, they expressed great frustration in having worked hard on a component of their portfolio and feeling that it was not even read by faculty. This clearly is a subversion of the basic intent of a learning or assessment portfolio—becoming what Shulman (1998) refers to as a "very, very cumbersome multiple-choice test" (p. 35)—and understandably leads to student dissatisfaction.

Conclusion

Fullan pointed out that students, the ones who actually do the implementation, should be important stakeholders in the change process. We believe that understanding student perceptions of their experiences can lead to improved practices and policies with regard to EPs. Clearly, benefits cited by students in this study point to the promise of EPs to positively affect teacher education. However, the costs from a student perspective can also be substantial and must be considered.

In part, we need to better understand the factors that in combination allow students to conclude that EPs are meaningful and worthwhile. The present study can attest to the value in seeking the student perspective on these issues and for doing so in subsequent research on EPs. However, there are other forces at play that also must be addressed. For example, the value of program evaluation and accreditation seldom appears in students' answers to "What do you value about electronic portfolios?" Clearly, the perspective from faculty and administrators provides another key piece of the puzzle that must be considered. From a faculty and administrative perspective,

- What is the purpose of the EP and do the requirements, statements to students, and collection of artifacts align with the purpose?
- How much and what type of reflection is necessary and sufficient to inculcate the desired learning without triggering negative reactions or a "going through the motions" response?
- What are the programmatic changes that faculty and administrators should consider with the input of students to make the use of EPs worthwhile?

Finally, considering a range of issues from multiple perspectives, including that of students, is the large-scale implementation of EPs a good idea that should be pursued and sustained in the coming years? Under what conditions will the benefits of EPs outweigh the costs for all of the stakeholders involved in the process?

Acknowledgements

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