Costs and Benefits of Electronic Portfolios in Teacher Education: Faculty Perspectives

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Abstract

This descriptive study investigated the benefits and costs of using electronic portfolios (EPs) in preservice teacher education. Grounded within change theory, the study examined the perspectives of faculty in six programs in which EPs have been used on a large scale for two or more years. Benefits identified include increased opportunities for students to reflect and learn, better student understanding of teaching standards, better faculty access for assessing student work, increased faculty communication with students, and improved tracking of student performance for purposes of accreditation and program improvement. The costs or disadvantages include issues pertaining to the amount of time and effort expended and to the lack of compatibility with faculty members' beliefs, values, and needs. Overall, the authors conclude that faculty satisfaction with EPs appears strongly associated with their values for student-centered teacher education and in some cases, their willingness to sacrifice individual preferences to accomplish program goals.

This descriptive study investigated the benefits and costs of using electronic portfolios (EPs) in preservice teacher education by examining the perspectives of faculty in six programs thought to be mature users of EPs. Prior areas of the larger study examined the initiation, adoption, and continuation of EPs in teacher preparation programs (Strudler & Wetzel, 2005), next steps and recommendations (Wetzel & Strudler, 2005), and the benefits and costs from a student perspective (Wetzel & Strudler, 2006). The focus of the current study was to examine faculty perspectives in sites in which EPs have been used program-wide for two or more years. Specifically, the study sought to answer the following three research questions:

1. What do teacher education faculty see as the benefits of electronic portfolios?
2. What do they see as the costs or disadvantages of electronic portfolios on a large scale?
3. From a faculty 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.

Literature Review: Teacher Educators Views of Electronic Portfolios

Faculty members bear the responsibility of setting the requirements and evaluating the electronic portfolios, as well as motivating students to use it effectively. Previous researchers have found that faculty views of electronic portfolios revolved around four themes: clarifying the purpose of the EPs, considering the value of reflective versus assessment portfolios, EP effects on the development of technical skills, and issues of implementation including the time commitment required of faculty and academic freedom.

Purposes for Use in Teacher Education

What is the proper purpose of EPs in teacher education? The literature is replete with reports of those who argue that preservice teacher EPs should be used for reflection because this is the avenue by which students best learn to teach. Other portfolio users believe that portfolios are useful for program accreditation, and still others advocate the use of EPs for employment and enhancement of technical skills. Can portfolios be useful for all these purposes simultaneously? Is the multi-purpose portfolio the optimal form of implementation?

Multiple Purposes vs. Single Purpose. Carney (2002) conducted case studies of six preservice teachers and asserted that faculty must make three key decisions for EPs to be used effectively for assessment purposes: specifying the purpose and audience, clarifying ownership, and providing focus. She argued that if portfolios are used for multiple purposes (demonstrating teacher competence for credentialing, employment, and reflective thinking) that none of them will be done well. Further, she found that students who are concurrently learning the technology skills needed to construct Web-based EPs while also learning to reflect deeply about practice may suffer from cognitive overload, and as a result, become proficient at neither task. Finally, Carney declared that the EP should focus on K–12 student work samples and the teacher candidates' analysis of student learning. Then the EP becomes a portrait of preservice students as teachers. Where students were required to include artifacts that focused on teacher actions (such as creating lesson plans and classroom management plans) with less emphasis on pondering the effects of a lesson on a particular student, the portfolio rubric served to reduce the teacher candidates' reflective thinking.

Ma and Rada (2006) studied the use of EPs designed to balance the learning focus and accountability. Their EP system allowed candidates to collect artifacts in multiple formats, modify them, critically reflect on their practices, and align evidence to standards. Survey results of a stratified sample of 31 students from four teacher education programs, revealed that students expressed positive attitudes toward the use of the EP to facilitate learning, but less positive attitudes toward the assessment parts. Similarly, Montgomery's (2002) review of the literature concluded that teacher educators should design EP procedures that facilitate teacher candidates' reflective practice as they create their EPs. Once again these authors raise the issue of the tension between EPs for multiple purposes, and indicate that attempts to use the same portfolios for both reflection and evaluation may not meet with success.

Reflection

How successful are reflection portfolios in the development of teachers? In a study of 207 preservice and beginning teachers, Beck, Livne, and Bear (2005) found that formative portfolios focusing on teacher development through reflection better supported professional outcomes than the summative accountability portfolio. These researchers compared students in

four different types of portfolio conditions, three emphasizing reflection and one focused on summative evaluation. Students used an assessment scale (the Electronic Portfolio Assessment Scale) to rate their own knowledge of four major areas: an understanding of assessment roles, backward planning, the benefit of analyzing student work, and the benefit of teacher peer collaboration. The fourth condition—the summative portfolio based on teacher accountability through participant analysis of professional teaching standards—scored significantly lower than the three conditions where the purpose of the portfolio was reflection.

In a study of five preservice students who constructed reflective or self-assessment EPs over two semesters, McKinney (1998) found that reflective portfolios allowed students to demonstrate their growth to themselves and others, and to make connections between classes and field experiences. One of the five students interviewed illustrates her point: "Constructing my portfolio helps me cement my philosophy into something concrete. It provides a place for me to record my growth and progress and helps me to see the improvements I made over time" (p. 96). These students thought deeply about their experiences as students and teachers and brought new ideas to their teaching. Over a five-year period, Levin and Camp (2002) focused their preservice teacher licensure EP program on a reflection cycle (select, describe, analyze, appraise, and transform). Candidates used this cycle to guide their teacher licensure EPs. The researchers noted that "by the time our prospective teachers graduate, reflecting seems to be a natural process . . ." (p. 576).

Standards, Program Improvement, and Accreditation

Portfolios that focus on the accomplishments of teacher candidates as related to professional teaching standards may be used for the program improvement as well as for the assessment of the individual students for licensure. For example, Evans, Daniel, Mikovch, Metze, & Norman (2006) describe their program's use of EPs to document teacher candidate performance toward the Kentucky New Teacher Standards. The portfolios include the assessment of critical performances that provide evidence of required skills and knowledge. An analysis of the data aggregated from these EPs for program review purposes indicated an over-emphasis on some standards and under-emphasis on others, as well as differences in the cognitive level of complexity students achieved among standards. The reporting of this type of data to faculty led to more faculty interest in improving the program and to removal of some redundancy and addition of other critical performances.

On the other hand, faculty also noted some difficulties in implementing the accreditation portfolios. Faculty members entered performance assessment data into the electronic portfolio system. Data were tracked within and across programs. However, some faculty felt more comfortable scoring from paper copies. Additionally, some students were allowed to revise an artifact several times before the final score is submitted, raising questions about the validity of scores (did the score represent the candidates' mastery of the teaching standards or was it overly impacted by the faculty member's feedback?). To make this clearer the faculty added a "times attempted" field to the database to provide additional insights when analyzing the data for program reform (Evans et al., 2006).

Technical Skills Enhancement

Finally, it has been argued that EPs provide a means by which to enhance the technology skills of teacher education students. Milman (1999) and Gatlin and Jacob (2002) found that preservice teachers learned technical skills as a result of their EP experiences. Ma and Rada (2006), however, found that students reported no gain in their technology skills. The authors speculated this may have been due to the use of pre-built templates and the fact that the portfolio technology lab staff members reported they often did much of the task for the students who faced technology obstacles. However, in a study of 14 educational technology graduate and 23 preservice students, Sherry and Bartlett (2005) survey revealed that both groups of students believed they moderately improved their EP authoring skills, and that this experience could contribute to their ability to develop multimedia skills among their K–12 pupils. The authors concluded that the conditions that support student enhancement of technology skills and the transfer of these skills to K–12 teaching practice need to be further examined.

Implementation Issues

The innovation implementation literature is consistent in reporting that the initial response of educators faced with implementing a change is to ask questions about how it will impact them personally, followed by questions about how to manage the task (Hall & Hord, 2001). Both of these levels of concern are present when faculty discuss the time and effort required to manage the electronic portfolio process, issues about academic freedom, and technical issues involved in the process.

Time and Effort

In a pilot project to encourage reflective practice in preservice teacher education, Cunningham (2002) noted that the process requires a great deal of effort in which faculty need to work in concert over time. Lind (2007) also noted:

> Certain questions remain. First, this project required an immense amount of faculty and student interaction. Because the class size was relatively small and because only a few students were working on their portfolios outside of the requirements of the department, ample time was available for department members to devote to this project. Using portfolios in larger programs would be challenging. Certainly, any department would have to consider the resources required when looking at implementing e-portfolios" (p.v).

Pecheone, Pigg, Chung, & Souviney (2005) found that a majority of students (72%) thought the electronic portfolio process was more time consuming than paper and videotape submission, but 70% preferred completing the portfolio electronically. These researchers found that candidates appreciated the quick formative feedback from supervisors as their portfolios were in progress. Supervisors (78%) also thought the electronic portfolio process was more time consuming than paper and videotape submission, yet 63% preferred supervising the EPs. Supervisors greatly appreciated not having to deal with the large paper portfolios. Finally, 70% of the EP scorers thought it was less time consuming and 60% preferred electronic scoring. Thus, it appears that more time and preference for EPs can co-exist, but it would also be helpful to examine the experiences of faculty members in greater depth to explain their attitudes.

Academic Freedom

Expectations that faculty participate in teacher candidates' portfolio assessments can be viewed by some as a threat to their academic freedom. Historically professors have been given the freedom and flexibility to select course content and assessments. In a standards-based system, however, programs may decide that the need for candidates to meet the standards may outweigh the academic freedom of the faculty (Olson, 2005). As Pulin (2004) explained, "…the recent press to reform teacher education programs presents a challenge to faculty members' views that they should have autonomy to make independent determinations about curriculum, course content, and grading (p. 302)…." Of course, issues of academic freedom become more pronounced when a higher degree of conformity is expected among faculty in terms of learning activities, outcomes, and assessments. Flexibility in the ways that students can demonstrate that they've met particular standards can serve to alleviate faculty concerns

about academic freedom (Sandoval & Wigle, 2006), as can ample faculty input in the portfolio planning process (Strudler & Wetzel, 2005). Ledoux and Henry (2006) frame the professional standards vs. academic freedom debate aptly by considering the costs of the potentially "coercive nature of standards" vs. the potential benefit of this "coercion that simply tracks the best qualities of candidates and helps us to weed out the chaff of the profession" (p. 116).

Theoretical Framework

The theoretical framework of this study is grounded within the change theory of Fullan (2001), Hall and Hord (2001), and Rogers (1995). Together these bodies of work serve as a lens for analyzing specifics of the change process, including the degree to which individual faculty "buy in" to actually participating in the EP process. Specifically for this component of the study, Rogers' work on the diffusion of innovations was particularly relevant.

In the Diffusion of Innovations, Rogers (1995) provides useful constructs from which to analyze how an innovation diffuses within a social system. He delineates five criteria to analyze the characteristics of innovations that influence their adoption: (a) Relative Advantage: Is it perceived as better than the previous approach? (b) Compatibility: Is it consistent with existing values, past experiences, and needs of adopters? (c) Complexity: Is it difficult to understand and use? (d) Trialability: Can it be experimented with on a limited basis? (e) Observability: Are the results easily visible? "Innovations that are perceived by an individual as having greater relative advantage, compatibility, trialability, observability, and less complexity will be adopted more rapidly" (Rogers, 1995, p.16). In the current study, while all five of Rogers' characteristics were considered, relative advantage and compatibility were seen as particularly salient for analyzing faculty views of EPs.

Methods

This study employs case methodology (Yin, 1989) to investigate faculty and administrative perspectives pertaining to the implementation of electronic portfolios within teacher education programs. During the first phase of the study, the researchers sought to identify teacher education programs in which the use of e-portfolios was well-articulated and 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.

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 is 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 and 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 were scheduled for the research team for approximately three-days each. 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 people interviewed, 64 were faculty or administrators. Twenty of the 64 served in identified leadership roles in the college or departments, with the remaining 44 serving in faculty positions.

The interviews ranged from 15 to more than 90 minutes in length. The average interview took approximately 45 minutes. The interview guides for faculty members and administrators can be accessed at: http://coe.nevada.edu/nstrudler/epstudy.html.

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 to address the research questions. As the study progressed, we revised our codes as needed to reflect the data gathered. Eventually we arrived at 50 unique codes, 30 of which were employed for this component of the study. Examples of codes used to illustrate the benefits of the use of EPs included opportunities for students to reflect and learn, and better understanding of teaching standards. Examples of codes used to support the costs of EPs included substantial faculty time and effort, and incompatibility with faculty goals, values, and needs.

Drafts of individual case summaries were written. Then, based on the cross-case analysis, drafts of the paper were 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

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

Benefits of EP use cited by education faculty include a range of opportunities for students to reflect and learn, better student understanding of teaching standards, better access for assessing student work and communicating with students.

Students Learn through Reflection

To varying degrees, faculty members at all of the sites emphasized the value of EPs for student learning and reflection. Although all sites required students to reflect on their work, the timing, nature and extent of student reflections differed. Three of six sites required extensive reflection. In the

higher reflection programs faculty provided extensive feedback to the students on their work and their reflections and required students to participate in a cycle of response and improvement. A faculty member explains the prominent role of reflection:

> And the electronic portfolio is not just the scrapbook situation…for us it is a huge reflective exercise for the students. So its not just, "here are the things that I did," but students have to write a rationale that provides the reviewer with information regarding why they thought that was the most representative thing they could provide, to illustrate that particular INTASC principle...we have a process we call 'collect, select, reflect' because you are always collecting, you are reflecting and then you select the thing you think is the best. You reflect on that and then you write your rationale.

Another characteristic of the three high reflection sites was that instructors taught a formal procedure with systematic and extensive requirements for reflection.

The timing and placement of student reflections differed across the sites. At three of the sites, the portfolios were course-based. Here teaching standards were embedded within courses and students reflected on course embedded assignments such as position papers, lessons and projects. At three of the sites, the portfolios were organized around checkpoints, for example, occurring prior to and after student teaching. A faculty member explained the nature and extensiveness of the reflection at the final checkpoint.

> Our final reflection is structured for them to go back through their entire portfolio…and reflect on what it has meant in terms of their development as teachers. The idea is to get them to really state where they are right now. How far have you come? How did you get there? And then to take the next step and say, "What is this going to mean for your first couple years of teaching? What are you going to have to focus on? What do you think your professional development's going to need to look like? What are your strengths and weaknesses?"

Two sites with checkpoints had the following features in common: national standards, reflection on practice and theory, checkpoints with benchmarks, and a final presentation or defense of their EPs. A faculty member at one of these institutions explained the impact of the EP process on students as they complete their teacher preparation programs:

> Well, not only is it the culminating activity or presentation that they need to do to complete the requirements of graduate program, but it's really an integration of everything that they have learned and their teaching experience. It's a celebration of what they have been able to accomplish. It gives me an assessment of their knowledge, other than the INTASC principles, and how well they are able to implement it in the classroom.

At the three institutions that incorporated the most significant levels of reflection, the EP programs provided students with formal procedures and extensive requirements for reflection on their performances. At these sites, faculty provided feedback on student work and their reflections, leading to a cycle of re-thinking and revising their work. At two of these sites, checkpoints were employed that required students to reflect on their growth across the semester as well as on the professional development plan that they revised and revisited at the next checkpoint.

The other three sites experienced a lower level of student reflection. Although, the faculty at these sites valued student reflection, they often found that they did not have the resources to provide students with extensive feedback and then to revisit students' subsequent work and continue to work with them to achieve a high level of work. In response to the question "Are student reflections substantive?" a faculty member commented: "I think it is more hit or miss …." Another faculty member elaborated:

> And I like the self-reflection pieces, but I don't think they're as strong as they could be from our students right now…I really see the value [of students] choosing the pieces that go with the standards, and then writing really a good critique of those pieces that they've chosen.

Here a student explained the reflection process: "It's a brief summary of what you're talking about and how you feel about it." Typically these sites had a ratio of students to faculty that made checkpoints or extensive commenting (beyond pointing out grammatical errors) unworkable. Consequently, these students wrote initial reflections on their work, but did not revise to meet higher levels of the evaluation rubrics for their reflections.

Understanding of Teaching Standards

State and national teaching standards played an important role in guiding the purposes and the organization of the EP. Across the six sites, the faculty members referred to the role of standards in their EP systems. This faculty member typifies the central role: "Standards keep us focused on what we need to do for teachers to help them be successful in the classroom. It's like an undergirding. It provides the foundation for the EP."

Further faculty expressed the view that teaching standards drove the teacher education program:

> I don't actually think the e-port is driving it as much as the principles and standards. The electronic piece is out there, but it is more the standards and quality of instruction that ultimately transfers to the e-portfolios.

In addition to keeping fulltime faculty focused, it also helps faculty associates. As one faculty member explained, "It helps when you have so many faculty associates because they must also make certain that all of the standards are incorporated in the program."

Also, faculty voices across all sites were clear that students gained a fuller understanding of teaching requirements from their continual interaction with the standards. Notably, student voices supported this conclusion as well (Wetzel & Strudler, 2006).

The standards driven EP appeared to be an integral part of the learning portfolio. Student reflections on the standards showed that they can display their understanding of the standards and their application in the classroom. Further, faculty members noted that when student teachers included pupil samples in the portfolio, they were able to see the standards implemented in the classroom:

> It's one thing to talk-the-talk, but it's another thing when you can really see the products that they have been able to do with children. That's what I look at, what they have done with children. How they have helped children achieve. To me that is the ultimate outgrowth of this….

Access for Assessing Student Work and Communicating with Students

Faculty members noted a distinct advantage of electronic portfolios over paper portfolios. Five of the six sites had a history of paper portfolio use prior to EPs. In the past they had to pass a thick three ring binder from

one faculty member to another. A faculty member spoke of carrying them in a cart to her car's trunk in order to evaluate them at home. They concurred that sharing the EPs through the Web-based interface made it much easier to access and more timely to assess the EPs at the end of the semester. This was particularly true for the sites that conducted checkpoint assessments with more than one reviewer examining the EP.

A few faculty members noted that they preferred examining student work on line and commenting on it. They also found it helpful to have an audit trail of their comments to students and to be able to view subsequent student revisions. On the other hand, most faculty members found the online or electronic commenting features of the EP systems clumsy and online typing did not match their preference for writing margin notes on the paper.

What Do Teacher Education Faculty See as the Primary Costs or Disadvantages of the Use of Electronic Portfolios?

The main costs or disadvantages of EP use from a faculty perspective include the amount of time and effort required for implementation and incompatibility of EPs for some faculty with their goals, values, and needs, including issues of standardization of curriculum and academic freedom.

EPs Require Substantial Faculty Time and Effort

To varying degrees, faculty reported that the implementation of EPs in their programs had a significant impact on the amount of time and energy required of them. When asked to estimate the amount of time they spend working with the portfolios, faculty reported a wide range, averaging 15 to 50 hours or more per term. In some cases, however, not all faculty participated equally in the EP program. Several of the variables reported are discussed below, followed by a summary of these factors presented in Table 1.

Selection and Assessment of Artifacts. If the artifacts for inclusion in the EPs are pre-determined and assessed within courses, then this may not add appreciably to the faculty workload, other than the degree to which faculty must use the system to assess the work. If, however, students choose the artifacts that address particular standards and the portfolios are assessed outside of courses at the conclusion of the program and at other checkpoints within the program, then this is a significant additional responsibility for the faculty. As one faculty member noted, "There's no way around it that it's more work when you have choice and then you have a lot of feedback and interaction, and the more student-centered it is, the more work it is for the faculty."

Another faculty member commented on the additional burden of assessing the portfolios at checkpoints within the program (i.e., outside of courses):

> We have to correct it two and three times. And correcting is a big part of our time. It really is. It's not our favorite thing to do, and having to do it two and three times, then it's just redundant. They've already seen the grade, they already know what our comments are; but it feels like bookkeeping sometimes.

Another added, "There is this logistical problem of who is going to evaluate these things at the very end… That has no connection to course credit or load."

Rigor of Assessments & Feedback. The rigor in the assessment of the portfolios varied greatly across sites. Even if the artifacts were evaluated within courses, artifacts to be included within the portfolios tended to take on a higher profile and often involved requiring students to revise work that did not meet established standards. While "re-dos" may indeed contribute to higher-level work and greater student learning, they also require more of the faculty. Of course, the level of feedback given by faculty is also a key variable in the overall amount of time expended. Especially in cases in which the assessments were done outside of class responsibilities, faculty were confronted with the choice of providing substantive, time-consuming feedback or settling for more cursory feedback that sometimes was limited to checking that all required elements were in place. Especially in the larger programs, some faculty felt that the only way to deal with the quantity of portfolios generated was to settle for a cursory approach to portfolio assessment.

Table 1: Implementation Factors Impacting Faculty Time and Effort Expended

Implementation Factors	Less Time & Effort	More Time & Effort
Selection of Artifacts	Prescribed	Students choose
Nature of Reflections	Cursory	Substantive
Submission Policy	Single	Multiple; revise until proficient
Approach to Evaluation	Course based	Checkpoints
Evaluation & Feedback	Surface level; minimal	Rigorous; detailed

Number of Artifacts. One theme consistently reported by faculty was the need to streamline the assessment process in the interest of time. As one faculty member explained, "The more lesson plans, the more evidence you have that students can write a good lesson plan. But that's where things really started to break down." In many cases, faculty did not account for the amount of work involved in assessing multiple artifacts that address a range of required standards. As one administrator astutely noted, "If it's too much work for the students to complete on time, and it's too much work for us to evaluate on time, then it's probably too much work."

Time for Portfolios Within Courses. In some cases, faculty discussed the need in their programs to allocate class time for students to talk about or work on their portfolios. This was especially pronounced in programs that did not support the "how to" component of the portfolio in a required technology course, In such cases, faculty were ambivalent about allocating course time to address these needs. One faculty member noted, "The major issue that many of the faculty would have is the fact that all of this or some of this has to infringe on class time, on teaching time." Many faculty, of course, feel that their classes are crowded with content and they differed on how open they were to spending class time on EPs.

Table 1 provides a summary of factors that were reported to impact faculty time and effort expended.

Incompatibility with Faculty Goals, Values, and Needs

While the amount of time expended clearly influences faculty perceptions of EPs, data gathered suggest that faculty adoption and overall satisfaction is largely influenced by the degree to which the innovation fits with their goals, values, and needs. As delineated in Rogers' Diffusion Theory (1995), "Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (p. 224). One of the strongest held socio-cultural values and beliefs in the academy is that of academic freedom, an issue raised by faculty who felt that the EP program may be encroaching upon their prerogatives as professors. Faculty members often commented on the need to standardize syllabi, assignments and rubrics, as well as concerns about the state and national standards-based reporting accompanying accreditation EPs.

Faculty Goals: Research Versus Teaching

One clear variable among faculty in the study was the degree to which faculty value and pursue scholarly productivity. As one might expect, for those faculty expected to conduct research and publish, EPs may not

readily fit into their professional goals, especially if it is perceived as requiring additional time and effort of them. As one faculty member noted when discussing the research faculty's involvement with EPs, "I never got the impression that anyone's passionate about it, like for example, their research…It's not who they are."

An administrator added:

> Convincing people in a Research-1 university that undergraduate teaching is absolutely central to their university's mission, but also to their own mission as professionals, is sometimes a hard sell. They see who gets the highest salary increases, they see who gets the publicity across campus, who gets the awards, and telling them, "Yes, but this is important too," is a hard sell.

Philosophical Concerns, Standards, and Academic Freedom

Many faculty raised issues with the movement toward standards-based assessment, driven by accreditation needs. While some supported that the emphasis on standards and reflection contributed to better-prepared teacher candidates, others were less supportive of such practices. One faculty member explained, "We're doing this because we're told to, not because it's pedagogically sound and not because it's good for the curriculum." Another commented on their program's preoccupation with assessing and documenting student outcomes: "I think it's based on the corporate model—that the people who are doing the funding, they need to have something to count."

While some faculty might take issue with any constraints that seek to influence what and how they teach, a large majority of those who raised issues of academic freedom did so pertaining to what they saw as the prescriptive nature of the EP program. One faculty member, who was supportive of accountability for outcomes in teacher education, took issue with how that translated into practice. He explained, "I personally think we're violating academic freedom, where they're telling us now that we have to use a rubric to evaluate the assignment. Who's to say that the rubric was the best approach to that. You know, it's a one size fits all." He added:

> I think it's terrible to say, "You know you're such a nincompoop, we're going to prescribe your syllabus, your rubric, the whole nine yards..." I'm a professor. I'm a curriculum expert. I know how to get people from point a to point b, and I'm finding my control of that process is slipping away.

Discussion

Are the Benefits Worth the Costs from a Faculty Perspective?

Rogers (1995) provides a helpful lens from which to analyze the benefits and costs that faculty associate with EP use in teacher education programs. According to the author, the meaning of an innovation is "gradually worked out through a process of social construction" (Rogers, 1995; p. xvii) in which individuals eventually choose to adopt or reject an innovation. While in this study adoption may well have been mandated within the respective programs, our data indicate that individual faculty nevertheless make choices about their degree of participation—from minimal or virtual non-participation to willing adoption, participation, and support. Clearly, early factors that led to program-wide adoption and implementation of EPs have a great bearing on how faculty perceive them (Strudler & Wetzel, 2005). Were the faculty involved in conceptualizing the program to meet perceived needs? Did they have sufficient resources for professional development and support? Were they afforded ample input in modifying the program during implementation? These issues, among many others, influence faculty members' perceptions of EPs and their buy in during the implementation phase.

For the purposes of this discussion, we will analyze the benefits and costs of EP use by faculty in terms of their satisfaction with the innovation and how it is being implemented. We fully recognize, however, that faculty satisfaction with the program is largely influenced by the myriad factors involved in the local context in which the EP was adopted and implemented.

Relative Advantage

If faculty members perceive EPs as having a relative advantage over prior approaches employed, then that clearly contributes to their satisfaction with the new approach. In this study, five of the six programs had prior experience with paper portfolios. For those faculty who supported prior goals with print-based portfolios, a large majority saw electronic portfolios as having a relative advantage by eliminating the mass of three-ring binders and allowing 24–7 access for evaluation and feedback by reviewers. Furthermore, faculty who support the goals of student learning through reflection recognized the relative advantage of EPs for more efficient communication with students and the opportunity for providing more timely feedback. While administrators were motivated by the potential relative advantage of using EPs for accreditation purposes, this typically was less of a motivator for faculty.

Compatibility with Faculty Goals, Values, and Needs

According to Rogers, an innovation can be compatible or incompatible with socio-cultural values and beliefs, previously introduced ideas, or client needs for the innovation. In the current study, we found varying compatibility of faculty values and beliefs with the requirements of the EP program. For example, while a majority of faculty interviewed recognized how EPs can contribute to program accreditation requirements and can inform program improvement, those goals were not necessarily compatible with their beliefs about standards-driven assessments and academic freedom. While some were willing to modify their teaching and evaluation approaches for what they perceived as the good of the program, others found such requirements (e.g., common learning activities and evaluation rubrics) as an invasion on their sense of professionalism and academic freedom. As Sandoval and Wigle (2006) found, flexibility in the ways that students can demonstrate that they've met particular standards can alleviate faculty concerns with academic freedom. In addition, informed leadership that involves faculty in planning process can decrease the degree to which faculty perceive what Ledoux and Henry (2006) characterized as the "coercive nature of standards" (p. 116).

Table 2 provides a summary of factors that were found in the current study to impact faculty satisfaction with EPs. If faculty perceived students as engaged and learning from the EP process, they, of course, were more likely to be satisfied with the program. In cases where the EPs were viewed as extensive checklists with cursory reflections and minimal student engagement, then faculty were much less likely to be satisfied. Further, if faculty were not in agreement with the goals of the program, whether that be for accreditation purposes, student learning and reflection, employment, or fostering technology skills, then they were less likely to be satisfied. In addition, those who value their research above all else are much less likely to be satisfied with demands upon their time to learn and interact with an EP system.

Interestingly, while time is typically a key factor in cost-benefit analyses, it should be noted that more time does not necessarily lead to rejection of an innovative practice. As Pecheone and colleagues (2005) found, EP users may report spending more time with the system than with previous approaches and still be quite satisfied. Findings of the current study include many instances where this was the case. The implementation

Table 2. Factors Impacting Faculty Satisfaction with Electronic Portfolios

	Low Faculty Satisfaction	High Faculty Satisfaction
Student Engagement & Learning	Minimal level of student effort & achievement	High level of student achievement and motivation
Nature of Student Reflections	Cursory	Substantive: Cycle of reflection exhibited
Agreement with Goals of EP	Lack of agreement	High degree of agreement
Orientation: Individual vs. Program	Values individual goals and academic freedom; constrained by teaching standards & standardization	Values group or program goals; willing to come to consensus regarding syllabi and common assignments
Research vs. Teaching	Values scholarly productivity	Values student-centered learning & teacher preparation program effectiveness

factors that require more faculty time and effort (see Table 1) appear to be approaches that one could characterize as student centered or constructivist. And if faculty believe in these approaches and perceive them as being successful, then they tend to be satisfied, assuming that the amount of time expended is manageable.

Overall, faculty satisfaction appears strongly associated with their values for student-centered teacher education and in some cases, their willingness to be "team players" to accomplish agreed upon program goals. For those faculty who are more individual oriented in terms of their teaching goals and scholarly productivity, program-wide implementation of EPs may be viewed as a distraction rather than a welcomed innovation. And finally, that delicate balance of costs and benefits for faculty appears strongly dependent on the context in which the portfolios are being implemented.

Acknowledgements

The authors would like to thank participants from each of the six sites for graciously agreeing to share their insights and experiences with us. We especially would like to thank those who helped arrange and facilitate the respective site visits. Without their contributions this study would not have been possible.

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