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Preservice Teachers' Perceptions of an Electronic Portfolio as a Tool for Reflection and Teacher Certification

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This study explored preservice teachers' perceptions of an electronic portfolio intended to develop their reflective skills and to serve as a basis for initial teacher certification. Eight preservice teachers in a teacher education program participated in a semi-structured interview. Most participants thought that the portfolio served as a record keeping mechanism and helped them develop their reflective skills to some extent. At the same time, they thought more work was needed to make the portfolio reflection more meaningful. The participants did not think the portfolio provided sufficient evidence of their teaching competencies.

Introduction

A portfolio is a purposeful collection of work used to document student achievement or progress. Since its introduction to teacher education twenty years ago, it has been enthusiastically adopted in many teacher education programs in this country (Delandshere & Arens, 2003). The extensive use of the portfolio can be attributed to widely held assumptions regarding its potential usefulness (Delandshere & Arens). Recent studies, however, showed that the portfolio may not significantly enhance

a preservice teacher's critical reflection skills (Mansvelder-Longayroux, Beijaard, & Verloop, 2007; Orland-Barak, 2005). There is also little empirical evidence to support the appropriateness of the portfolio for documenting a preservice teacher's competencies. At the same time, some research suggested that going through the portfolio process helped the preservice teacher develop a good understanding of the standards for the teaching profession (e.g., Wetzel & Strudler, 2006).

Portfolios for Developing Reflective Skills

One purpose for using the portfolio is to enhance preservice teachers' skills for reflective thinking (Gordinier, Conway, & Journet, 2006; Zeichner & Wray, 2001). Reflective thinking is a process that "consists in turning a subject over in the mind and giving it serious and consecutive consideration" (Dewey, 1933, p. 3). Schön (1987) suggested that reflection-in-action was critical to a teacher's career, because it provided an opportunity for the teacher to question "the assumptional structure of knowing-in-action" (p. 28).

A major goal in teacher education is for preservice teachers to develop their skills to engage in critical or transformative reflection (Hatton & Smith, 1995; Ward & McCotter, 2004; Yost, Sentner, & Forlenza-Bailey, 2000). According to Yost et al. (2000), critical reflections examine "the assumptions underlying a decision or act and on the broader ethical, moral, political, and historical implications behind the decision or act" (p. 41).

It has been suggested that without a carefully scaffolded portfolio structure, preservice teachers may produce superficial, low level reflections (Gordinier et al., 2006). In a study of portfolios in three teacher education programs, Delandshere and Arens (2003) found that the preservice teachers rarely explained why certain portfolio artifacts were selected, what they exactly meant, how they related to each other, and how they constituted evidence of teacher competencies. In their portfolios, "teaching is perceived as a list of things to know, to believe in, and to do, but with few justifications or rationales" (Delandshere & Arens, p. 63).

Portfolios for Teacher Certification

Another major use of the portfolio is to serve as a basis for initial teacher certification, by documenting whether a preservice teacher has met predetermined standards for teacher competencies (Pecheone & Stansbury, 1996; Zeichner & Wray, 2001). This use has been influenced in a large measure by the certification model of the National Board for Professional Teaching Standards (NBPTS). The NBPTS relies upon an applicant's reflective writings in making decisions about teacher certification (Burroughs, Schwartz, & Hendricks-Lee, 2000). According to Burroughs et al. (2000), NBPTS defines accomplished teachers as "those who are able to articulate reasons for the many practices they engage in as teachers" (p. 348). Those teachers are expected

to have the ability to "apply steady, disciplined judgment and reflective scrutiny within the bounds set by [a] constantly expanding body of knowledge" (NBPTS, n.d., p. 6). Aside from the reflective writings, candidates seeking National Board certification are also required to provide three types of evidence about their teaching, including samples of student work, video recordings of classroom practice, and documentation of accomplishments outside of the classroom (NBPTS). The competencies and qualifications of the candidates are assessed directly on the basis of such evidence as well as the narrative reflections that the candidates provide.

Although portfolios in many teacher education programs using the NPBTS portfolio model often include artifacts as well as reflective writings, the artifacts that may be used as direct evidence of teaching competencies are not necessarily factored in the grading of the portfolio work (Yao et al., 2008). Even if they are reflected, the artifacts typically found in a preservice teacher's portfolio may not furnish sufficient evidence of a teacher's competencies. According to Painter and Wetzel (2005), school administrators seldom took the electronic portfolio into consideration during the employment process, since they felt the portfolio would reveal much about an applicant's qualifications.

Formative and Summative Uses

Underlying the use of the portfolio for reflection and teacher certification is the potential tension between the formative and summative uses of the portfolio as an assessment tool. According to Chetcuti, Murphy, and Grima (2006), a portfolio as a summative tool may assess the achievement of a preservice teacher with reference to public standards, whereas a portfolio as a formative tool may assess the individual's progress of learning with reference to the person's own standards. "When used for the purposes of accountability, students view this [portfolio] process as having to jump through hoops in order to earn a passing grade or to graduate" (Chambers & Wickersham, 2007, p. 353). In contrast, "portfolio development for learning nurtures students through their learning process" (Chambers & Wickersham, p. 353).

To ease the tension between different uses of the portfolio, some people suggested using separate portfolios for addressing different purposes (e.g., Zeichner & Wray, 2001). Others, however, thought that different purposes may still be served by the same portfolio, as long as one function of the portfolio does not adversely affect another (Chetcuti et al., 2006; Wiliam & Black, 1996).

The Electronic Portfolio

In recent years, the electronic portfolio has become particularly popular in teacher education programs (Herner, Karayan, McKean, & Love, 2003; Norton-Meier, 2003; Strudler & Wetzel, 2005). An electronic portfolio is "a digital container capable of storing visual and auditory content including text, images, video and sound" (Abrami &

Barrett, 2005, p. 2). It contains the same contents as the regular paper-based portfolio, except that "the information is collected, stored, and managed electronically" (Lambert, Depaepe, Lambert, & Anderson, 2007, p. 76). According to Abrami and Barrett, the electronic portfolio has the following advantages over the paper-based portfolio: (a) the availability of a variety of tools to demonstrate and develop student understanding; (b) a better way to catalogue and organize learning materials; and (c) convenience for sharing the results with other people and receiving feedback.

In the field of teacher education, the electronic portfolio was believed to provide the preservice teachers with better access to and organization of portfolio documents, and an opportunity to enhance their technology skills, develop their reflective skills, and understand the standards of teaching (Wetzel & Strudler, 2006). It was considered a way for them to develop, demonstrate, and reflect on their pedagogical practice, knowledge, skills, and attitudes (Sherry & Bartlett, 2005). It was also thought to allow them to demonstrate more complex learning outcomes (Woodward & Nanlohy, 2004). At the same time, the electronic portfolio was believed to have its own issues, in such areas as access to and reliability of technology, and the amount of time and effort involved (Wetzel & Strudler).

Purpose of Study

Although there have been many discussions regarding the usefulness of the portfolio in teacher education, especially that of the electronic portfolio, most of the discussions are based on speculations. There is a general lack of research on how the people directly involved in the portfolio process think about the usefulness of the portfolio. This study explored the perceptions of eight preservice teachers regarding an electronic portfolio they were required to complete. There are two research questions for the study: 1) To what extent did the portfolio enhance their reflective skills and measure their teaching competencies? 2) What issues did the preservice teachers encounter in the portfolio process?

Method

Context of Study

This study took place in an early childhood, elementary, and middle school (ECEM) education program at the University of Central Missouri (UCM). Each year an average of 367 students entered the teacher education program at UCM. Among these students, 161 were from the ECEM program.

Portfolio structure. Although a portfolio had been required of all candidates in the UCM teacher education programs, only the ECEM program used an electronic portfolio. During their program of study, the preservice teachers at the ECEM program were asked to develop a portfolio that consisted of a pre-determined set of artifacts and

reflections pertaining to Missouri Standards for Teacher Education Programs (MoSTEP standards). All the artifacts and reflections were linked to a portfolio template (see Appendix 1 for sample items) that was accessible on campus. The MoSTEP standards, which were divided into 11 broad Quality Indicators (QIs) and subdivided into 42 more specific Performance Indicators (PIs), were also listed on the portfolio template. For each of the PIs, the preservice teachers were required to provide an artifact, often a course project or assignment, and write a reflection that discusses how the artifact documented the preservice teachers' ability to meet the standard of the PI. Aside from the PI reflections, the preservice teachers were also required to develop a reflection (called Meta-Reflection) that would address each of the 11 QIs. Because each QI was a summary of several PIs, the construction of the Meta-Reflection required the preservice teachers to reflect on the artifacts corresponding to the PIs in a holistic way. Appendix 2 is the guide for the preservice teachers to develop the two types of reflections.

Portfolio reviews. There were three stages at which the portfolio was reviewed: initial, midlevel, and final portfolio reviews, corresponding to three checkpoints during the preservice teachers' program of study: admission to the teacher education program, admission to student teaching, and completion of student teaching. At least a satisfactory score was required for the preservice teachers to pass each review and move on to the next stage of their teacher education program. At each stage, the portfolios were reviewed by a two-member faculty review team, based on a scoring guide designed specifically for that stage of review (see Appendix 3 for midlevel review). The basic structure of the three scoring guides was very similar. All three guides focused on the extent of portfolio completion, the mechanics (including aesthetics and writing mechanics), and the reflections. At each level, the quality of the portfolio reflections was more heavily weighted than the mechanics or the extent of portfolio completion. Student reflections at the initial level focused on the PIs, whereas reflections at the midlevel and the final level were based on both the PIs and the QIs.

Portfolio process. The preservice teachers of the ECEM program were introduced to the electronic portfolio process early in their program of study, in the Models of Teaching class. They also had access to a portfolio handbook, three scoring guides, and other relevant information regarding the portfolio on the Blackboard website that was accessible to students through the internet (although the portfolio itself was only accessible on campus). In addition, the faculty reviewers acted as portfolio advisors for the preservice teachers. The initial level portfolio was usually due in the second semester of a student's sophomore year, before the student was admitted to teacher education. The midlevel portfolio was due in the first semester of a student's senior year, before the student was admitted to student teaching. The final level portfolio was due a semester later, when the student completed student teaching.

Interrater reliability. In Fall, 2004, the faculty in the ECEM program participated in a whole day portfolio workshop in order to furnish data for an interrater reliability study. After a regular training session on portfolio grading, eight portfolio review teams were paired up into four groups. Each group of review teams were assigned six

to ten portfolios prepared for the initial review. The generalizability of the portfolio scores across the different review teams was summarized in Yao, Foster, and Aldrich (2006). It was found that the rating team factor accounted for a very small portion of the overall variance of the portfolio composite score, ranging from 0% within one pair of review teams to 11% within another pair. The average generalizability coefficient (a measure of relative agreement) was 0.83, and the average dependability index (a measure of absolute agreement) reached 0.81. However, there was substantial variation across review teams in their ratings of the writing mechanics and aesthetics of the portfolio.

Portfolio validity. In 2006, another study was conducted to examine the validity of the portfolio as a measure of a preservice teacher's competencies in the ECEM program (Yao et al., 2008). The study involved 128 preservice teachers who completed their portfolio process and student teaching experiences. The study found support for the substantive validity of the portfolio based on a match between the cognitive processes underlying the portfolio artifacts with the processes implied in the MoSTEP standards. The study also found a match between the topics of the portfolio artifacts with the target domain of the portfolio, yet the use of a single artifact for each performance indicator reduced the content validity of the portfolio. Factor analysis of the portfolio component scores and the Meta-Reflection scores suggested that the portfolio score was primarily a reflection of the preservice teacher's reflective skills. Furthermore, the students' portfolio scores were found to have small although significant correlations with their ACT scores, CBASE scores, overall GPA, and summative student teacher evaluation scores, and no significant correlations with their Praxis II scores, suggesting that the portfolio had limited external validity as a measure of teacher competencies.

The Qualitative Approach

This study adopted the qualitative approach as the method of investigation. The qualitative approach gives ample considerations of the contextual factors (Creswell, 1998; Strudler & Metzler, 2005). Creswell suggested that the qualitative approach be used for a topic that remains to be explored, with variables yet to be identified, and theories yet to be developed. The qualitative approach would make it possible for the researchers to take into account all possible factors that might impact the process of portfolio assessment, without being confined to any pre-determined variables.

The Interviews

There were eight preservice teachers who participated in the interviews in the summer of 2006. The interviewees, all of whom had completed both the initial level and the mid level portfolio reviews and were preparing for their final level portfolio review, represented a wide spectrum of the preservice teacher population, with difference in portfolio scores, education majors, and status as traditional or non-traditional students. All eight interview participants were female candidates. Table 1

summarizes the background information of the interviewees. The names used here are all pseudonyms.

Table 1
Background Information of Participants

Participant	Gender	Traditional *vs* Non-traditional	Major	Midlevel rating
Amber	Female	Traditional	Elementary	Good
Becky	Female	Non-traditional	Elementary	Not Passing*
Claire	Female	Non-traditional	Early childhood	Excellent
Deanna	Female	Non-traditional	Early childhood	Good
Emelda	Female	Non-traditional	Elementary	Excellent
Florence	Female	Traditional	Middle school	Not Passing*
Gloria	Female	Non-traditional	Elementary	Not Passing*
Holly	Female	Traditional	Early childhood	Satisfactory

Note. *The score represented their original rating. Eventually these participants received a passing score after they made revisions based on the feedback their reviewers provided.

The interviewers of the study were four faculty members of the ECEM program. Three of them taught in the classes that provided artifacts for the portfolios. Each researcher was responsible for two interviews.

Except for one case, the interviews were all held in the interviewer's office. Each interview lasted from 30 to 60 minutes. The interviews were based on ten semi-structured interview questions that were designed for the whole portfolio process (see Appendix 4). The interviewers were free to adjust the actual questions used during the interview, and seek clarifications and expand the conversations with appropriate follow-up questions. All interviews were audio-taped, with the consent of the interviewees.

Data Analysis

The process of open coding (Creswell, 1998) was applied to the interview transcripts to identify key terms or ideas. These terms were then pooled together and examined in terms of their inter-relationships before the common themes and sub-themes of the study were identified.

Results

An extensive analysis of the interview transcripts resulted in four themes and their corresponding sub-themes. The themes emerged from the study are: portfolio utility, portfolio design, faculty consistency, and need for support. A summary of the themes and the sub-themes is provided in Table 2.

Table 2
Summary of Themes and Sub-themes that Emerged from the Study

Themes	Sub-themes
Portfolio utility	
	Future reference
	Organization skills
	Opportunities for reflection
	Portfolio use for employment
Portfolio design	
	Theoretical artifacts
	Reflection template
	Evidence of teaching performance
	The portfolio score
Faculty consistency	
	Consistency of instructions
	Consistency of ratings
Need for support	
	Portfolio instructions
	Reviewer feedback
	Missing artifacts
	Technology

Portfolio Utility

One emerging theme of the study is the utility of the electronic portfolio for the preservice teachers. Some of the participants suggested that the portfolio provided documentation of their work that may be used for future reference. For instance, Amber felt the portfolio had given her a collection of her previous that she could go back and use for future reference. “I can even add to it in the future as I make new lesson plans and activities in my classroom,” she said.

Another benefit of the portfolio was that the portfolio process taught them how to keep things organized. According to Florence, the portfolio had made her “become more organized and not to procrastinate.”

The portfolio also provided the participants with opportunities for reflection. For instance, it made Emelda go back and think about her major accomplishments, the rationale behind the learning, and how she would apply the learning. "When you do the performance indicators, the first ones you write aren't very good and [*sic*], as you get along, they get better," she said.

On the other hand, the participants felt the portfolio had little use for employment purposes. Holly said: "They tell us that you can use it in the future. You can give it to people who interview you. They want us to think they do, but [in reality] no one will look at it."

Portfolio Design

Although the interview participants agreed that the portfolio was useful in helping them develop their reflective skills, they felt the design of the portfolio may have limited such usefulness. Several participants suggested that the portfolio artifacts that were based on educational theories rather than their field experiences did not lend themselves to in-depth reflection. Florence, for instance, felt that it was hard for her to write reflections for artifacts that were theoretical since there was not much to reflect upon in those artifacts. She wanted all the artifacts to be based on her field experiences.

Another issue related to the portfolio design that may have limited the usefulness of portfolio reflections is the template for reflection (Appendix 2). The template included five components students are required to address when writing the reflection: a description of the artifact(s), how the artifact(s) met a QI or PI of the MoSTEP Standards, what one had learned, what impact the artifact had on student achievement, and what plan one had for the future. The participants felt the template prevented them from expressing their thoughts freely. Amber commented: "An outline is good to help give ideas on where to start with [when] writing a reflection." However, writing the reflection without a fixed format made more sense for her, since it would enable her to "put your own thoughts into it." Holly had a similar view: "There are a lot of things that I would like to include in the reflection, but it wasn't acceptable. So I had to leave it [*sic*] out." The rigid template of the reflection also made the reflection seem repetitive and not so meaningful. Gloria said: "I could just cut and paste my information on this reflection, put it on another one, and just change the things to make it match [a specific performance] indicator." She said this was the purpose of the reflection.

Another issue with portfolio design is the lack of evidence in the portfolio for documenting a candidate's teaching competencies. Florence, for instance, said that the portfolio might show that one had the knowledge base, but it did not document how one would apply the knowledge in the classroom. Holly felt the same way: "Unless you actually see somebody do it… you can't really say if they have the application or not." She felt that the current design of the portfolio would make it possible for people

to fake evidence about their teaching skills. "I can write things on paper that I really don't do, and you will never know the difference, to be quite honest," she said.

Another design issue that was believed to invalidate the portfolio as a measure of their competencies pertained to the portfolio score. Some of the participants were concerned that the quality of the artifacts was left out of the portfolio score. Amber, for instance, said that the score she received at the portfolio midlevel review was mainly a reflection of her ability to write a meta-reflection, and to organize everything in the portfolio. Gloria said:

> An excellent portfolio grade would show that you are a good writer, that you are a good reflector… You can go back and you can look at what you've done and … cognitively be aware of what's going on at your work. But it does not necessarily mean that you would be a good teacher.

Faculty Consistency

In addition to issues concerning the design of the portfolio, many participants were concerned about the lack of consistency among the faculty in their interpretation of the requirements for the portfolio. Several participants suggested there were inconsistent instructions between their professors regarding how to write the reflections and build the portfolio. According to Emelda, "There was a lot of inconsistency of what was required [for the portfolio reflections] from class to class." She said such variations created confusions and frustrations among the candidates. Another participant Holly said she had worded her portfolio reflections to fit the expectations of the instructor in the Models of Teaching class, and then had to reword them to meet the requirements of her portfolio reviewers.

The inconsistency was also reflected in the way the faculty reviewers graded the portfolio reflections. According to Gloria, some professors wanted to see different colors for different sections of the reflection, and some professors preferred the use of bullets. Instead of the five paragraphs most portfolio reviewers asked for, one reviewer asked her to develop two paragraph reflections,

Need for Support

Related to the issue with faculty consistency is the need for support during the portfolio process. Several participants expressed the need for adequate instructions on portfolio development. Deanna said: "It would have been nice, before we had to hand them in, if somebody came in one of our classes and told us exactly what they were expecting." For Becky, finding portfolio instructions on a designated Blackboard website was a challenge: "There are so many choices online to select from. I wasn't really clear where to start."

Another participant Holly felt she did not get enough feedback from her portfolio reviewers. She had some difficulty getting a faculty member on her review team to

respond to her questions.

Some of the participants needed help due to some unique challenges they faced during the portfolio process. For instance, as transfer students, both Becky and Claire did not have all the artifacts required for the portfolio. As a result, they had to think about the work they had completed in their previous institutions and recreate the portfolio artifacts. Gloria, who took all her courses at UCM, also ran into issues with the portfolio when she was asked to make up for the artifacts from a course that she had not completed.

Some of the participants mentioned technology as an area where they needed extra support. For instance, Emelda recalled someone from a computer lab had to sit with her and walk her through the process of building hyperlinks for the portfolio. She said:

> The part that is the hardest for me is the electronic part… just trying to create it, trying to format it, trying to pull it together online at the school and then, going home, thinking: Oh, I hope it works when I get back to school!

Conclusions and Implications

A Summary of Findings

This study found that the electronic portfolio was perceived as helpful in facilitating the development of a preservice teacher's reflective skills. Most interviewees felt the portfolio provided them with an opportunity to go over their work, especially their field experiences, and reflect on ways to improve their work. The portfolio also provided a record of their work for future references. At the same time, the design of the portfolio prevented them from developing in-depth, meaningful reflections, an issue that was often reported in the literature (Delandshere & Arens, 2003; Gordinier et al., 2006; Orland-Barak, 2005).

Although the interview participants considered the portfolio to be somewhat successful in facilitating the development of their reflective skills, they did not feel it adequately documented their competencies of teaching. They thought that it was the artifacts rather than the reflections that reflected how competent they were as teacher candidates. In order for the portfolio score to be an indicator of their teaching competencies, the quality of the artifacts should be factored into the score. They also thought more authentic artifacts were needed in the portfolio to show how they applied their knowledge and skills in the classroom.

The participants also expressed the need for support, in terms of adequate instructions for them to complete the portfolio process, and timely feedback from their faculty reviewers so that they could improve their portfolio work. Some of the participants also needed help with issues such as missing artifacts that were required for the portfolio and limited access to the portfolio server.

Implications for Using Portfolio to Develop Reflective Skills

The results of the study have implications for teacher education programs that are interested in using the electronic portfolio to develop their candidates' reflective skills. One such implication is the need to base reflection on actual experience. For portfolio reflections to be meaningful, the artifacts in a portfolio need to be based on the preservice teachers' field experiences. The need to base reflection on actual experience is line with Schön's (1983, 1987) model for professionals to engage in reflection-in-action and reflection-on-action.

In order for a portfolio to serve the formative function of fostering the development of reflective skills, there is also a need for the faculty reviewers to provide timely feedback to the preservice teachers. It may be tempting for a reviewer to provide simply a portfolio score and a few summative comments at each review stage, instead of detailed feedback on how they can improve their portfolio work. Although the preservice teachers may have a vested interest in learning whether they have passed portfolio review at a certain stage, the focus on a summative evaluation would not be helpful in telling them what they need to do to make their reflection more meaningful.

Implications for Using Portfolio in Making Certification Decisions

To justify the use for certification purposes, a portfolio needs to be designed to furnish real evidence of teaching competencies. Such evidence may include video-clips of teaching, and pre-post student assessment data. In this way, the portfolio will provide evidence for both the process and the result of teaching.

In order for an electronic portfolio to focus on evidence of teaching competencies, there is also a need to highlight the quality of the artifacts and their corresponding reflections rather than the mechanical aspects in the summative evaluation of a portfolio. Although it is necessary for students to have the necessary skills to build the portfolio and write reflections that are grammatically correct, the mechanics should not be a deciding factor on whether a candidate should receive recommendation for initial teacher certification. The final score needs to represent the ability of preservice teachers to apply the knowledge and skills to the teaching process, have a positive impact on the learning of their students, and reflect on their action in a meaningful way.

Implications for Future Studies

This study explored portfolio use through the perceptions of the preservice teachers. Future studies are needed to validate such perceptions, and examine factors that may have impacted such perceptions. One area that the study did not explore is the potential relationship between the portfolio score a preservice teacher received and the

perception that person held towards the portfolio process. There were signs in the study that candidates with better portfolio ratings might have more positive perceptions of the portfolio process than the other candidates. The confirmation of such a relationship would have important implications for interpreting the results of the study.

Although the two companion studies (Yao et al., 2006; Yao, et al, 2008) served to triangulate the results of the current study, more such studies may be needed to verify the results of the current study. One approach is to directly examine the quality of the reflective writings and the artifacts used in the preservice teachers' portfolio, rather than asking the preservice teachers' opinion of their portfolio work. It is also helpful to examine the perceptions of the portfolio reviewers, who may provide additional perspectives on the process.

References

Abrami, P. C., & Barret, H. (2005). Directions for research and development on electronic portfolio. *Canadian Journal of Learning and Technology, 31*(3), 1-15.

Burroughs, R., Schwartz, T. A., & Hendricks-Lee, M. (2000). Communities of discourse and discourse communities: negotiating boundaries in NBPTS certification. *Teachers College Record, 102*(2), 344-374.

Chambers, S. M., & Wickersham, L. E. (2007). The electronic portfolio journey: A year later. *Education, 127*(3), 352-360.

Chetcuti, D., Murphy, P., & Grima, G. (2006). The formative and summative uses of a professional development portfolio: A Maltese case study. *Assessment in Education, 13*(1), 97-112.

Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage Publications.

Delandshere, G., & Arens, S. A. (2003). Examining the quality of evidence in preservice teacher portfolios. *Journal of Teacher Education, 54*(1), 57-72.

Dewey, J. (1933). *How we think*. Boston: D. C. Heath.

Gordinier, C., Conway. K., & Journet, A. (2006). Facilitating teacher candidates' reflective development through the use of portfolios, teacher work sample, and guided reflections. *Teaching & Learning, 20*(2), 89-105.

Hatton, N., & Smith, D. (1995). Reflection in teacher education: towards definition and implementation. *Teaching and Teacher Education, 11*(1), 33-49.

Herner, L. M., Karayan, S., McKean, G., & Love, D. (2003). Special education teacher preparation and the electronic portfolio. *Journal of Special Education Technology, 18*(1), 44-49.

Lambert, C., DePaepe, J., Lambert, L., & Anderson, D. (2007). E-folios in action. *Kappa Delta Pi Record, 43*(2), 76-83.

Mansvelder-Longayroux, D. D., Beijaard, D., & Verloop, N (2007). The portfolio as a tool for stimulating reflection by student teachers. *Teaching & Teacher Education, 23*(1), 47-62.

NBPTS. (n.d.). What teachers should know and be able to do? Retrieved February 5, 2009, from http://www.nbpts.org/UserFiles/File/what_teachers.pdf

Norton-Meier, L. A. (2003). To efoliate or not to efoliate? The rise of the electronic portfolio in teacher education. *Journal of Adolescent and Adult Literacy*, *46*(6), 516-518.

Orland-Barak, L. (2005). Portfolios as evidence of reflective practice: What remains 'untold.' *Educational Research*, *47*(1), 25-44.

Painter, S., & Wetzel, K. (2005). School administrators' perceptions of the use of electronic portfolios in K-8 teacher hiring. *Journal of Computing in Teacher Education*, *22*(1), 23-29.

Pecheone, R. L., & Stansbury, K. (1996). Connecting teacher assessment and school reform. *Elementary School Journal*, *97*(2), 163-177.

Sherry, A. C., & Bartlett, A. (2005). Worth of electronic portfolios to education majors: A "two by four" perspective. *Journal of Educational Technology Systems*, *33*(4), 399-419.

Schön, D. A. (1983). *The reflective practitioner*. New York: Basic Books.

Schön, D. A. (1987). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*. San Francisco: Jossey-Bass.

Strudler, N., & Wetzel, K. (2005). The diffusion of electronic portfolios in teacher education: Issues of initiation and implementation. *Journal of Research on Technology in Education*, *37*(4), 411-433.

Ward, J. R., & McCotter, S. S. (2004). Reflection as a visible outcome for preservice teachers. *Teaching and Teacher Education*, *20*(2), 243-257.

Wetzel, K., & Strudler, N. (2006). Costs and benefits of electronic portfolios in teacher education: Student voices. *Journal of Computing in Teacher Education*, *22*(3), 99-108.

Wiliam, D., & Black, P. (1996). Meanings and consequences: A basis for distinguishing formative from summative functions of assessment. *British Educational Research Journal*, *22*(5), 537-548.

Woodward, H., & Nanlohy, P. (2004). Digital portfolios: Fact or fashion? *Assessment and Evaluation in Higher Education*, *29*(2), 227-238.

Yao, Y., Foster, K., & Aldrich, J. (2006, April). *Generalizability study of a team based scoring approach*. Paper presented at the Annual Meeting of the American Educational Research Association. San Francisco, CA.

Yao, Y., Thomas, M., Nickens., N., Downing, J. A., Burkett, R. S., & Lamson, S. (2008). Validity evidence of an electronic portfolio for preservice teachers. *Educational Measurement: Issues and Practice*, *27*(1), 10-24.

Yost, D. S., Sentner, S. M., & Forlenza-Bailey, A. (2000). An examination of the construct of critical reflection: implications for teacher education programming in the 21st century. *Journal of Teacher Education*, *51*(1), 39-49.

Zeichner, K., & Wray, S. (2001). The teaching portfolio in U.S. teacher education programs: What we know and what we need to know. *Teaching and Teacher Education, 17*, 613-621.

Appendix 1

The Portfolio Template

Quality Indicators Performance Indicators	Course	Artifacts Reflections	Date
1.2.1 The preservice teacher understands the central concepts, tools of inquiry and structures of the discipline(s) within the context of a global society and creates learning experiences that make these aspects of subject matter meaningful for students.	Completed during Student Teaching	Meta-Reflection	
1.2.1.1 knows the subject(s) applicable to the area(s) of certification or endorsement (defined by Subject Specific Competencies for Beginning Teachers in Missouri)	EDCI 2101	Program of Study	
1.2.1.2 presents the subject(s) in multiple ways;	EDCI 3220	Lesson plans (*also add to LP file*)	
1.2.1.3 uses students' prior knowledge;	EDCI 3210	Field Experience- Reflection Journal	
1.2.1.4 engages students in the methods of inquiry used in the subject(s);	EDCI 1310 EDCI 4340 EDCI 4350	Inquiry Project (includes partnered inquiry with elementary students) In class activity, research paper, field experience	
1.2.1.5 creates interdisciplinary learning.	EDCI 3420 EDCI 4340	Web quest, unit (*also add to LP file*) research paper, science integrated unit; Lesson Plan (*also add to LP file*)	
1.2.2 The preservice teacher understands how students learn and develop, and provides learning opportunities that support the intellectual, social, and personal development of all students.	Completed during Student Teaching	Meta-Reflection	
1.2.2.1 knows and identifies child/ adolescent development;	EDCI 2240 or EDCI 2101 EDCI 4830	Developmental Stages Summary Case Study	
1.2.2.2 strengthens prior knowledge with new ideas;	EDCI 2310	iAdventure or Unit (*also add to LP file*)	
1.2.2.3 encourages student responsibility;	EDCI 4400 EDCI 4340	Classroom management plan or philosophy paper	
1.2.2.4 knows theories of learning.	EDCI 2240 or EDCI 2101	Theories of Learning Summary	

Note. Only part of the portfolio template is reproduced here.

Appendix 2

Reflection Template that Provides Instructions on how to Write the Portfolio Reflections

The written reflections (for both the Performance Indicator assignments/artifacts and the Quality Indicator Meta-Reflections) are required to include the following:

- A short description of the assignment/artifact. This should include a brief description of the artifact's context and should also explain the knowledge base (experiential, observational, and theoretical) and decision-making that informed its creation.

- A description of how the assignment/artifact you are discussing meets a specific indicator (Performance Indicator or Quality Indicator). Be sure to use keywords from the indicator that make a clear connection between the assignment/artifact and the specific indicator. This should also demonstrate your understanding of the standards by which the teaching profession is evaluated.

- An assessment of what you have learned and the competence you gained from the activity or experience your assignment/artifact represents.

- An analysis of the assignment's/artifact's impact on PreK-12 student learning.

- A projection of what you might do in the future to increase your effectiveness related to the activity or experience reflected in the assignment/artifact.

Appendix 3

The Scoring Guide for Midlevel Portfolio Review

Student Name _____

Student # _____ Date _____

Total Points* _____ **Rating _____

Raters _____

* Points awarded according to the following scale:

Still needs a lot of work	Needs some work	Satisfactory	Solid work	Excellent
1	2	3	4	5

Midlevel Review Criteria	Points	Qualitative Feedback
Artifacts and reflections for the vast majority of the Performance Indicators are complete (and the strategy and assessment file and lesson plan file are established). 1 2 3 4 5 x 2 =	/10	
Quality of the artifacts and reflections used to address the Performance Indicators 1 2 3 4 5 x 2 =	/10	
Quality of the aesthetics (colors, graphics, etc.), writing mechanics, spacing/formatting, and functioning of portfolio links and organization 1 2 3 4 5 x 2 =	/10	
Quality of the one comprehensive Quality Indicator Meta-Reflection 1 2 3 4 5 x 4 =	/20	
Total Points	/50	

** Ratings awarded according to the following scale

Not Passing Yet	Passing: Satisfactory	Passing: Good	Passing: Excellent
Less than 35 points	35-39 points	40-44 points	45-50 points

Appendix 4

Semi-structured Questions on the Interview Protocol

1. How do you define reflection?
2. Why should/should not teachers reflect?
3. How do you feel about the written reflections in the portfolio?
4. How do the assigned written reflections from your courses assist your reflections?
5. In what ways has your understanding of teaching been improved as a result of the portfolio process?
6. What changes would you recommend for the current portfolio to encourage you to reflect on your teaching practice?
7. What do you think makes a competent teacher?
8. In what ways does this portfolio document your teaching competencies?
9. Do you think your portfolio rating is a good indicator of your teaching competencies in the classroom?
10. What changes would you recommend to make the portfolio a good indicator of your teaching competencies?