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Reflective Thinking in Elementary Preservice Teacher Portfolios: Can It Be Measured and Taught?

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This study examined whether teacher portfolios can be validly and reliably assessed by investigating the effect of an instructional tool on increasing the level of reflective thinking in elementary preservice teachers' portfolios. It also examined whether reflective thinking in preservice teachers' electronic portfolios represented sufficient quality to make them useful in practice. The *Rubric for Evaluating Portfolio Reflective Thinking* instrument developed for this study demonstrated moderate levels of interrater reliability (r = .66) and sufficient content validity to be used to measure reflective thinking. Also, members of the treatment group scored significantly higher on five of the six portfolio domains and on the total portfolio reflective score than members of the control group. Overall percentage levels of reflection were substantially higher for the treatment group (47%) than for the control group (6.7%). Implications for practice and further research are provided.

Keywords: *electronic portfolios, portfolio assessment, rubric, teacher portfolios*

Introduction

Debates over education reform dominate the news and proclaim teacher effectiveness as the key in-school factor influencing student achievement. Meanwhile, criticism aimed at the quality of teacher preparation programs has grown increasingly strident. Teacher education programs in U.S. colleges and universities are increasingly expected to provide evidence that the teachers they produce demonstrate the knowledge, skills, and dispositions to ensure that all students learn at high levels (Derham & Diperna, 2007). Federal legislation in the form of No Child Left Behind requires schools to employ "highly qualified" teachers. States competing for federal dollars from Race to the Top grant competitions included measures of teacher effectiveness as essential components of their proposals. Newly minted teachers—as well as veterans—face pressure to show they are "highly effective" in order to retain their jobs.

In addition to increasing demands for strong content knowledge and pedagogical skills, budding teachers must demonstrate their ability to think carefully about the impact of their teaching on student learning. One assessment tool frequently employed by teacher educators is the standards-based exit portfolio. Portfolios designed to measure preservice teachers' competencies, growth, and reflective ability are ubiquitous in teacher education programs across the United States. Lee Shulman (1998) defined a portfolio as, "…the structured, documentary history of a set of coached or mentored acts of teaching, substantiated by samples of student portfolios, and fully realized only through reflective writing, deliberation, and conversation" (Shulman, 1998, p. 37).

Although proponents support portfolios' value to enhance the reflective thinking of novice teachers and imply that such thinking improves teachers' practice (Milman, 2005), few studies have confirmed these assertions by directly measuring in-depth reflection or describing conditions that

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develop it. While descriptive studies abound, empirical evidence for both the technical quality of portfolios as valid and reliable measures of teacher performance and the reflective value of portfolios is sparse (Burns & Haight, 2005; Delandshere & Arens, 2003; Herman & Winters, 1994; Yao, Thomas, et al., 2008). Studies that include valid and reliable instruments designed to measure levels of reflective thinking are rare (Orland-Barak, 2005).

Research is needed to validate effective evaluation tools that measure preservice teacher reflective capability (Yao, Thomas, et al., 2008) and to see if portfolios do, indeed, promote reflective practice. This study, which tested an assessment instrument to measure reflective thinking in portfolios and by examining the effects of a scaffolding intervention on the levels of reflection in undergraduate elementary preservice teachers' standards-based exit portfolios, contributes to filling that research gap.

Purpose and Research Questions

This study was designed to determine whether teacher portfolios can be validly and reliably assessed, to investigate the effect of an instructional tool on increasing the level of reflective thinking in elementary preservice teachers' portfolios, and to find whether electronic portfolios designed and assessed in optimal conditions represent sufficient quality to make them useful in practice. To answer that question, it examined a research-based instrument to determine whether it could measure reflective thinking in practice. It also considered whether an instructional intervention designed to scaffold reflective thinking could increase elementary preservice teachers' reflective thinking in the electronic portfolio rationale statements and reflective essays. Finally, it considered whether elementary preservice teachers' portfolio rationale statements and reflective essays showed sufficient depth of reflective thinking to aid their growth as teachers.

Review of the Literature

Beginning with Dewey's (1933) concept of reflection as rational problem solving, teacher educators have considered reflective thinking essential to improving practice. Dewey defined reflection as the "active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends" (p. 9). Schön's (1983, 1987) work increased the focus on reflection as a way for teachers to frame and solve problems within the complex context of teaching situations (Loughran, 2002). By careful reflection on experience over time, teachers develop professional knowledge and connect theory to practice (Lee, 2008; Loughran, 2002; Van Manen, 1977). In essence, effective reflection leads to effective teaching (Loughran, 2002).

One of the difficulties of measuring reflection is that no single agreed-upon definition exists (Rodgers, 2002). Various researchers propose descriptions that ground assessment of reflective thinking. Van Manen (1977) offered one of the first taxonomies for describing reflection. Rooted in various epistemological frameworks or interpretations of "the practical," Van Manen proposed three levels of reflectivity: technical-rational, deliberative, and critical (Boody, 2008). Technical-rational reflectivity, grounded in empirical-analytical theory, is concerned with determining how effectively the teaching method achieved the goals set for it by theory or outside authority. Van Manen's (1977) second level of reflectivity (deliberative), emerging from a phenomenological-hermeneutic stance, asks teachers to recognize their own value commitments to a particular interpretive framework as they make judgments about education practices (curriculum, methods, etc.). Finally, Van Manen proposed a higher level of reflectivity (critical), aimed at pondering "worthwhile educational ends" on

the basis of "justice, equality, and freedom" (p. 227). At this level, teachers consider the political, moral, and ethical impact of established educational practices.

Both novice and experienced teachers struggle to reflect deeply on their work. Various methods to promote critical reflection emerge from the research literature (Lee, 2005). With respect to portfolios, if the necessary conditions exist within the context of the teacher education program to allow candidates to be reflective, then the likelihood that a rubric will detect growth in reflective writing is greater (Rickards et al., 2008). When preservice teachers clearly understand the reflective purpose for the portfolio, have sufficient guidelines for structuring it, and have been taught to write using a reflective writing genre, then one could expect the reflective statements in their portfolios to demonstrate a greater depth of reflection (Hatton & Smith, 1995). A specific tool to scaffold reflective writing that contains the definition of deep reflection, descriptions of the levels in a reflective thinking taxonomy, and models of reflective statements, may enhance the value of portfolios as reflective vehicles (Spalding & Wilson, 2002). This study examined that possibility.

Methods

Setting and Participants

This study was conducted at a small, liberal arts college in the southeast United States. Participants were senior student teachers enrolled in undergraduate early childhood programs during the second of two full-time clinical practice experiences. Standard student-teaching requirements include constructing a standards-based electronic portfolio organized around 12 institutional teacher standards. Candidates select artifacts, write rationale statements explaining why these artifacts constitute evidence of effective teaching, and write reflective essays highlighting their ability to identify areas for improvement in future practice. Portfolios are graded as either *pass* or *fail* based on a designated rubric.

In this study, the control group consisted of 15 participants randomly selected from the population of graduates who completed their program between May 2007 and December 2009. The treatment group was comprised of 15 participants randomly selected from the preservice teachers enrolled in their final student teaching semester during the 2010 spring semester.

Materials and Instruments

A researcher-developed instrument called the *Rubric for Evaluating Portfolio Reflective Thinking* (*REPORT*) measured the levels of teacher reflective writing in both the rationale statements and the reflective essays. Because construct validity is difficult to establish for complex constructs such as reflection, particular attention was paid to develop clear descriptions of both individual domain criteria, and levels of performance quality for each criterion were built into scoring rubrics for performance assessments (Popham, 2006). In addition, the *REPORT* was designed to be psychometrically sound (Carney, 2006) and to mitigate concerns faculty expressed regarding ease of use for assessment (Strudler &Wetzel, 2008; Sulzen, 2007).

The *REPORT* (see Appendix) contained three categories of reflective thinking (technical/descriptive, personal growth, and dialogic/critical) drawn from the research literature. It encompassed Van Manen's (1977) three levels, Hatton and Smith's (1995) notion of dialogic reflection (multiple explanations for actions), and Valli's (1997) focus on personal growth. It also included a level of critical reflection that asked preservice teachers to consider the larger social context and the moral and ethical impact of the expectations of their own profession. Scoring procedures for the *REPORT* were holistic (Meeus, Petegem, & Engels, 2009) and raters scored each type of reflection on a scale

ranging from 0 to 3. Category scores were added within each domain to arrive at a domain score. Then the scores on individual domains were summed to calculate a total reflective thinking score for each portfolio.

Content validity for the *REPORT* was demonstrated through expert analysis and verification. An early draft of the *REPORT* was sent to eight researchers recognized for their expertise in portfolio assessment in teacher education through published peer-reviewed research. Each expert evaluated the content of the rubric, as well as the descriptions of levels of performance, sample reflective statements, and scoring guide. Revisions were made on the basis of expert comments. In order to complete preliminary interrater reliability calculations, two raters each received training on how to use and score the *REPORT* and scored 10 portfolios drawn from the portfolio archives stored in *LiveText*. Interrater reliability was computed using a Pearson *r* correlation (Gay, Mills, & Airasian, 2006). Discrepancies were discussed with a goal of achieving 80% or greater interrater agreement.

Study Procedures

This study employed a variation of a quasiexperimental design known as the Cohort Design (King & Roblyer, 1984) and included two cohorts of elementary preservice teachers: one that constructed a portfolio without instruction regarding reflective writing and the other that had the instruction (treatment). Grade point average was used as a pretest, and the two groups were compared using a *t* test (Gay, Mills, & Airasian, 2006).

The treatment consisted of an instructional intervention—the *Portfolio Reflective Writing Guide,* designed to assist preservice teachers with writing reflective responses to their own work. The treatment group received a single 1-hour instructional session composed of the following activities: (a) a short introduction using the *Portfolio Reflective Writing Guide,* (b) an explanation of different types and levels of reflection using the *REPORT,* (c) a list of prompts and questions designed to promote higher levels of reflection, and (d) discussion with a partner of draft reflective statements.

Data Collection and Analysis Methods

First, the *REPORT* was used to rate the portfolios of the control group and the treatment group. Each rater scored all 30 portfolios after receiving training in early spring, calculated reflective writing scores for each of six domains, and determined a total score. Reliability scores were calculated using the Pearson *r* correlation to determine interrater agreement (Gay, Mills, & Airasian, 2006). Next, differences between groups on each domain and the total were calculated using *t* tests (Hinkle, Wiersma, & Jurs, 2003). Third, a criterion for the designation of high level of reflection was determined a priori. Portfolios earning a high score (7–9) by both raters on at least two domains out of the six were considered to show reflection of sufficient depth to contribute to preservice teacher growth. In addition, the total number and percentage of portfolios that met the high reflection level were calculated for each group. Finally, an independent samples Mann-Whitney *U* test was conducted to evaluate the hypothesis that the distributions of the levels of reflective thinking (low, medium, and high) would differ between groups across all six domains and for the total reflective level scores (Green & Salkind, 2008).

Results

The *REPORT* demonstrated sufficient validity and reliability for use in measuring reflective thinking in preservice teacher portfolios. The total Pearson *r* (.66) was moderate and did not reach the desired level of .80; however, this moderate level of interrater reliability indicates that, even with training, rater agreement is difficult to achieve using a scoring rubric to assess portfolios (Gay, Mills,

& Airasian, 2006). Multiple trainings may be necessary over several years of a portfolio's development to produce reliability levels sufficient to ensure valid interpretations of teacher reflection. It appears raters would benefit from the addition of a detailed written scoring guide to ensure consistent scoring approaches across portfolios. Also, it appears raters could adjudicate scores through discussing any discrepancies until agreement is reached (Johnson, 2006).

Results also indicated that the treatment group scored significantly higher than the control group on the total *REPORT* score and on five of the six domains (alpha level $p < .05$). The treatment group, which had undergone specific instruction in reflective thinking, benefited significantly from portfolio-specific instruction on how to demonstrate clear and convincing reflection for all domains except planning. Training and instruction in writing reflectively, therefore, appeared to be important in helping elementary preservice teachers demonstrate their reflective capability in standards-based exit portfolios.

Finally, results suggested that elementary preservice teachers' portfolio rationale statements and reflective essays showed sufficiently deep reflective thinking to aid their growth as teachers. The treatment group did contain more portfolios (47%) that met the preset criteria for high-level reflection than did the control group (6.7%). While the percentage of the treatment group displaying high levels of reflection was just short of the expected 50%, the treatment appears to have increased the percentage of candidates who are capable of critical reflection. It is interesting to note that three candidates in the treatment group (20%) earned scores reaching the highest level of reflection in all six domains (100%). In addition, the independent samples Mann-Whitney *U* test showed that the distribution of levels of reflective thinking (low, medium, and high) differed significantly across three domains and for the total reflective level (Green & Salkind, 2008); therefore, preservice teachers receiving specific instruction in reflective writing can demonstrate more in-depth analysis of their own growth than preservice teachers who have not had this instruction.

Since analysis of the Mann-Whitney *U* test results indicated that the general distribution of reflection scores *across reflection levels* was significantly higher for the treatment group on three domains and the total portfolio score, it is reasonable to conclude that training and support can increase reflective capability, even if a large percentage of portfolios did not reach the very highest level of reflection. As with any measure of performance, variation across portfolio reflection is expected; however, if teacher education programs embed instruction regarding reflective writing throughout their programs, findings from this study indicate it is likely that, over time, most preservice teachers will be capable of reflecting deeply on their work, demonstrating that reflection in their portfolios and enhancing their growth as effective practitioners.

Study Limitations

Every research study has limitations (Patten, 2005), and this one is no exception. The single setting and small sample size ($n = 30$) may limit generalizability to other teacher education institutions. Selection threats due to subject characteristics may distort the differences between groups, even though groups were compared using overall institutional grade point average and no significant differences were found (Patten, 2005). Researcher bias may have occurred because the researcher and raters instruct in early childhood programs and know the participants. Finally, history or instructional factors other than the specific intervention may have offered the treatment group some additional assistance with writing reflective statements.

Discussion

Implications for Practice

Though findings from this study indicate that interrater reliability is a challenge to achieve, it is possible to design a clear rubric that measures the construct of reflection validly and can be used reliably by teacher education practitioners (Yao, Aldrich, & Foster, 2008). Colleges can provide extensive training to ensure raters understand the constructs and scoring procedures, can compare notes (adjudication), have time to engage in detailed discussion regarding any discrepancies in ratings, and can utilize interrater reliability calculations. Further, interrater reliability could increase over time as raters gain practice using the scoring rubric (Johnson, 2006).

Study results suggest it is possible for teacher education programs to help preservice teachers produce reflective writing using instruction and prompts. Training and support, including a clear rubric and examples, could enable preservice teachers to create reflective rationales and essays that provide full explanations of their work. The *REPORT* used in this study delineated three types of reflection, with levels of quality for each one that seemed to guide preservice teachers as they constructed their portfolios.

Teacher education program design and coursework that include specific scaffolding for reflective thinking and writing is more likely to enable creation of rich portfolios that contain greater levels of critical reflection than teacher education curricula that omit such training. Teacher candidates may also benefit from using the *REPORT* formatively to evaluate portfolio drafts, either alone or in discussions with peers (Gordinier, Conway, & Journet, 2006). Discussions with peers and professors provide teacher candidates with the opportunity to demonstrate reflective capability orally, a skill that will serve them well during employment interviews.

While sound rubrics and high levels of reflection are possible, they take time. Ultimately, teacher education programs need to answer the question of value: whether portfolios prove worth the investments of time and effort that are necessary for them to serve a foundation for sound assessment practice. Though that is a question each teacher education program must answer in light of its own values and available support, the implications that portfolios can be validly and reliably scored and that training can produce high levels of reflection offer strong support for making the decision to invest the time and effort required.

Implications for Future Research

In light of the current intense focus on teacher effectiveness, further research is warranted. First, larger-scale studies of teacher education programs that train and utilize many raters, conduct interrater reliability calculations, and hone sound instruments would contribute to the knowledge base and serve teacher educators as they prepare the nation's future teachers. Second, studies that clarify the relationship between constructs such as teacher reflective capability displayed in portfolios and excellent teacher performance would validate the use of portfolios for reflection (Yao, Thomas, et al., 2008). Findings that establish a direct link between portfolios and teacher quality would strengthen the claim that portfolios enhance excellent performance. Third, portfolio assessment needs to be linked to K–12 student learning outcomes. Impact on K–12 student learning seems to be the gold standard called for by policymakers, accrediting bodies, and the public (Carney, 2006; Gathercoal, Love, & McKean, 2007). Even if portfolios can document high levels of reflective writing, the claim that in-depth reflection enhances teacher performance in ways that increase student achievement needs to be substantiated with outcome data (Zeichner & Wray, 2001). Given

the intense focus on accountability and the need for teacher educators to demonstrate impact on student learning, empirical evidence from further research would demonstrate that highly reflective portfolios allow teacher candidates to improve student learning.

Finally**,** teacher educators may benefit from considering alternative methods of portfolio assessment not rooted in quantitative standards for reliability and validity. This recommendation acknowledges the inherent tension in portfolio evaluation between validity and reliability (Barrett & Wilkerson, 2004). The paradigm conflict in portfolios that pits summative documentation of high-quality performance with formative documentation of growth and reflection is heightened when psychometric guidelines for measurement are applied to portfolio rubrics, as was done in this study.

Conclusion

Visions of teacher assessment that gaze beyond standardization require shifting conceptions of validity (Moss, 1998). The very act of trying to force portfolios into a parametric paradigm may be antithetical to the deeper meaning of reflection (Meeus, Petegem, & Engels, 2009; Tigelaar, Dolmans, Wolfhagen, & van der Vleuten, 2005); yet rigorous standards for responsible research prevent teacher educators from ignoring empirical concerns for validity and reliability. Further research may reveal the means to strike a much-needed balance. Perhaps a clearly written rubric, such as the *REPORT* created for this study, is one step down the path of the integrative approach called for by Moss (1998) and Delanshere and Arens (2003).

The results from this study support the notion that portfolios can validly and reliably assess preservice teacher reflective capability, given that sufficient training and support are provided to both portfolio creators and assessors. Such training takes time and effort but can contribute to the development of higher levels of reflection in perservice teachers. Even with extensive instruction and support, some preservice teachers still find in-depth reflective writing to be challenging. While there is reason to be optimistic that deep reflection will both enhance teacher performance and increase K–12 student achievement, further research is needed to substantiate such claims. Because teacher preparation programs constitute unique contexts, each institution would do well to conduct its own cost-benefit analysis to determine the relative value of its time investment in standards-based portfolios for evaluating preservice teacher reflection.

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Appendix

Rubric for Evaluating Portfolio Reflective Thinking (*REPORT*)

Type of Reflection	**Level 0**	**Level 1**	**Level 2**	**Level 3**
Technical/Descriptive	**(0)** Lists artifact and states artifact topic or skill only OR restates the standard.	**(1)** Reports the event or experience that forms the artifact content; basic description of content of artifact; may include statement of reason without explanation (Orland-Barak, 2005). *"This was a two week unit for science class. The unit was on the solar system, the planets, and the moon."* *"The reason this unit was chosen was in part because I wanted to incorporate as many disciplines as was possible."*	**(2)** Describes artifact AND explains reasons for artifact content based on external criteria (standards, "best practice") or general principles; applies theory to practice in light of own experience only. *"I felt this science experiment was beneficial in showing the students how their sense of taste works with their sense of smell. I feel it is important to allow students to see that things need other things to work, just like people need other people."*	**(3)** Describes artifact AND explains reasons for artifact content based on specific principles or theory; cites evidence from the artifact directly to show application of theory to practice and connections to standards. *I have included in my portfolio two classroom observations of children at play to demonstrate my understanding of how children learn through interactions with others. The constructivist theory believes children should actively construct knowledge and explore their world together. I observed children setting boundaries and preferences, communicating verbally and nonverbally, and how they responded to teacher and student interactions. This play time gave children an opportunity to learn, build motor skills, and relationships. The*

Type of Reflection	**Level 0**	**Level 1**	**Level 2**	**Level 3**
				observations are reminders to me that children can learn in collaborative settings and can benefit from a variety of learning experiences.
Personal Growth	**(0)** Does not relate artifact to personal growth, beliefs, feelings or values at all.	**(1)** Expresses feelings or beliefs about what constitutes good teaching; explains the value or importance of the standard but with little reference to the artifact (Valli, 1997). *"It is important for teachers to have strong colleague, parent, and community connections. Having these strong connections only enhances the students' learning."* *"While teachers cannot physically observe all student interactions, if they model Christ-like words and behavior, they can be change agents in future ways their students work and play together."*	**(2)** Expresses growth from experience represented in artifact by stating that something was learned without specific evidence from the artifact to exemplify this learning. *"I wanted to put these two artifacts in my portfolio because I think they represent my growth in using technology."*	**(3)** Expresses growth from experience represented in artifact; cites evidence from artifact for growth and offers suggestions for improved practice OR expresses growth across time using evidence from multiple artifacts. *"I learned one good lesson from this lesson. Before creating the words, I handed out the different letters to the students to hold while they waited their turn to stand up and insert thier [sic] letter sound to help create the word. However, there was a lot of rustling with the paper plates while students were waiting to go up. If I were to do this lesson again, (which I plan on doing, just with another word family) I will hold all of the extra plates and select those students who*

Type of Reflection	**Level 0**	**Level 1**	**Level 2**	**Level 3**
				are sitting properly and quietly to stand up and help create a word.
Dialogic/Critical	**(0)** Does not discuss artifact's impact on others at all, so multiple viewpoints and impact on ethical, moral and justice issues is not included.	**(1)** Explains how work represented in artifact impacts others (student learning, peers, parents, administrators). *"I then administered, scored, and analyzed the post tests. I am pleased to say that I see progress in what my students know. I also realize that, if I were to teach the unit again, should have been emphasized even more. Sequencing events is something that almost every student missed on both exams."*	**(2)** Weighs competing claims and multiple viewpoints as one analyzes artifacts; explains alternative solutions to a problems that may have been encountered in teaching situation represented in artifact. *"This DIBELS score shows that this student is at risk for nonsense word fluency and needs to have intervention. But she is reading on a first grade level fluently so she can obviously read. I think we need to use various assessment tools together to determine whether a child needs intervention."*	**(3)** Questions practices of the teaching profession represented in artifact ("best-practice," standards, testing, etc.) based on ethical, moral, or justice concerns. *"This unit includes a variety of researched-based reading strategies, but not much social studies content. In fact, during student teaching my cooperating teacher didn't teach social studies at all. It seems that if kids are going to learn to be productive, democratic citizens, they need to have knowledge of history and government. The kids that don't have as many privileges and experience need that knowledge to succeed on tests and in life. I think not teaching content like social studies just makes the 'achievement gap' wider."*

REPORT Score Sheet

Name/Number: _____

	Type of Reflection	Level 0	Level 1	Level 2	Level 3
Domain A *Knowledge*	Technical/Descriptive	0	1	2	3
	Personal Growth	0	1	2	3
	Dialogic/Critical	0	1	2	3

Domain score: _____

	Type of Reflection	Level 0	Level 1	Level 2	Level 3
Domain B *Planning*	Technical/Descriptive	0	1	2	3
	Personal Growth	0	1	2	3
	Dialogic/Critical	0	1	2	3

Domain score: _____

	Type of Reflection	Level 0	Level 1	Level 2	Level 3
Domain C *Instruction*	Technical/Descriptive	0	1	2	3
	Personal Growth	0	1	2	3
	Dialogic/Critical	0	1	2	3

Domain score:_____

	Type of Reflection	Level 0	Level 1	Level 2	Level 3
Domain D *Assessment*	Technical/Descriptive	0	1	2	3
	Personal Growth	0	1	2	3
	Dialogic/Critical	0	1	2	3

Domain score: _____

	Type of Reflection	Level 0	Level 1	Level 2	Level 3
Domain E *Classroom Environment*	Technical/Descriptive	0	1	2	3
	Personal Growth	0	1	2	3
	Dialogic/Critical	0	1	2	3

Domain score: _____

	Type of Reflection	Level 0	Level 1	Level 2	Level 3
Domain F *Professional Growth*	Technical/Descriptive	0	1	2	3
	Personal Growth	0	1	2	3
	Dialogic/Critical	0	1	2	3

Domain score: _____

Total score: _____

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