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Mercury in a Sieve: a Search for Meaning in the Responses of Prospective Teachers

by Barbara G. Pace, Jane S. Townsend and Susan Nelson Wood

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Abstract

Investigative, inquiry projects are frequently used in teacher education programs to help prospective teachers develop as critically responsive practitioners who respond to diversity. In this article we examine our effort to explore the influence of these projects. As we trace our exploration of data gathered from respondents, 90% of whom were white women, we disclose how relational priorities surfaced in the data, how these priorities complicated our readings, and how they led us to consider gender and relationship in the lives of the participants. We raise questions about the process that might be used to understand what preservice teachers are learning as they engage in inquiry projects and how we might determine the effectiveness of these projects in teacher education classes.

Introduction

Although we teach at very different universities, we share a common aim: the preparation of teachers who recognize issues related to diversity and who respond to those issues. We believe this responsiveness is rooted in the development of a critical perspective through which prospective teachers question educational policies and the day-to-day practices of teaching. Indeed, such a perspective is one characteristic of teachers who are successful with students from a variety of economic, ethnic, and family backgrounds (Haberman, 1995; Ladson-Billings, 1995). Thus, as teacher educators we are concerned with how to prepare teachers who will take a critical stance and who will act on their perceptions in ways that benefit children and adolescents.

While we recognize that no single classroom experience can result in this goal, we believe that inquiry projects may help prospective teachers become more critically aware of school contexts and practices. Such projects can illuminate the complexities inherent in teaching and learning and can challenge the assumptions that many teacher-education students hold. This belief arises from the work of other researchers (i.e., Cochran-Smith & Lytle, 1992a; Ellis, 1994; Magolda, 1992) as well as our own sense that a systematic investigation of educational events can challenge old understandings. The ordinary can become problematic or compelling when prospective teachers attend to others, collect observational and taped data, and struggle through interpretive acts. These processes can challenge the assumptions that preservice teachers have about teaching, learning, and themselves.

Even though inquiry projects may not result directly in a critical stance, we hope that they will move students toward such a stance by helping them to develop habits of inquiry. We want prospective teachers to question instructional policies and their decisions about teaching and student learning. We also want them to value both their abilities to construct professional knowledge and the necessity of doing so. Furthermore, we agree with Kincheloe's (1991) notion that "[i]n order to create their own knowledge, individuals must understand that such an endeavor is both important and possible" (p. 2).

Over the last several semesters, as we have collaborated to investigate these goals, we have become aware not only of the difficulty of achieving them but also of the complexity of recognizing whether or not we have done so. We have learned that like our students we must assume a critical stance towards our own teaching. We must examine our work in order to assess the influence of course projects.

In our struggle to be more accountable to our selves and our students and to gauge the effectiveness of our own teaching, we have explored how we might assess the learning of students who have participated in inquiry projects as part of our respective courses. We wondered whether or not the projects have helped students see themselves as researchers and as constructors of their own knowledge. This paper chronicles our efforts to understand the data collected as we attempted to answer this question.

We begin with a description of the method of data collection and the design of the questionnaire. Then we report on 78 completed questionnaires and our methods for analysis. At the heart of our discussion, we trace how participants' responses presented multiple possibilities that were difficult to interpret. At issue in this discussion are the complexities of these responses and the meanings they might have for teacher educators. Finally, we conclude by disclosing how our reading of the participants' responses altered our understanding of collecting data from prospective teachers, most of whom are women.

Method

Setting

This study was conducted simultaneously at two universities. Situated in opposite corners of the United States, the southeast and the northwest, the two institutions are vastly different. Although at the time of this study both sites were public universities with a proud tradition of training teachers, one was a major university housing a large College of Education and offering a fifth-year masters degree as well as doctoral degrees. The other was a small, liberal arts college known for having the last undergraduate teacher-education program in the region. Over a period of two years, we collected data in various graduate and undergraduate classes taught by the three of us at these two sites.

Participants

Students at both sites represented a range of majors. For example, the graduate students in the southeast were enrolled in a five-year elementary teacher-education program or were working in

a one-year master's degree program in English education. The students in the northwest, who were majoring in early childhood, elementary, and secondary education, were in their third year of college. When they responded to the questionnaire, all participants were enrolled in courses that included an inquiry project.

In this paper, we discuss the responses collected from seventy-eight participants, all of whom volunteered to take part in the study. Of the 78 students, 34 were undergraduates, 37 were graduate students, and 7 students did not identify their status. Of the graduate students, 21 were elementary education students in an action research course and 16 were English education students. Significantly, most (90.6%) of the respondents were women as were most of the students in our classes. Because less than 10% of the participants were male, we were unable to do a comparative analysis of the data.

Designing the Questionnaire

To explore whether or not our students valued inquiry and their own ability to find answers to educational questions, we designed a questionnaire. This process proved surprisingly complex, and we altered and revised the instrument at several points during the four semesters during which we collected data.

Originally, the survey was constructed using a Likert-scale format (1932). This closed-response questionnaire asked students to choose a response on a five-point scale (1 meaning strongly agree and 5 strongly disagree). This early version of our questionnaire was administered twice a semester, once at the beginning and then again at the end, in an effort to determine the impact of the action research component of the course.

Sample questions included:

I think decisions about curriculum and pedagogy are best made by district personnel and experts who create policy.

When trying to develop a lesson, I think experience is more important than research or theory.

Responses from the Likert-scale document were quickly tallied so that we might uncover attitudes (MacNealy, 1999) and consider patterns. For example, during the first semester's pretest, 67 students responded to the pretest and 63 of the same students took the parallel posttest. We discarded the four unmatched papers and analyzed the 63 comparative responses. A sample of the data is presented in Figure 1.

Figure 1. *Results from a sample Likert-scale question.*

21. If I want to know something about teaching, I would consult a textbook or a teacher's manual.

Pre

1 (3) 2 (16) 3 (20) 4 (18) 5 (6)

Post

1 (6) 2 (5) 3 (21) 4 (22) 5 (9)

A close scrutiny of the numbers suggested small shifts in attitudes. After participating in an inquiry project for one semester, some preservice teachers seemed less inclined to consult an expository text when they had questions about teaching. Just as quickly as the numbers were tallied and analyzed, we realized that such reporting failed to document our students' thinking, offered no significant insight in terms of what our students actually knew, and provided little feedback to us instructionally. To gain more useful information, we designed an open-ended questionnaire and decided to administer it once at the conclusion of each course.

Our task, now clarified, was to write questionnaire items that would provide insight on whether or not students had developed habits of systematic inquiry and whether or not they valued those habits. It seemed that such information was embedded in students' meaning-making processes and perspectives about knowledge. For example, how did students think answers were constructed? Did they recognize that they had any active role in that process? If so, what was that role and how would it be manifested in a teaching context? With these questions in mind, we finally decided to concentrate on students' epistemic assumptions, the assumptions they held about the genesis of knowledge. We wanted to know what those assumptions were after students had completed their inquiry experiences and struggled through their own interpretive acts.

We knew that important work on intellectual growth in college-aged students had focused on epistemological development. Perry's (1970) study of Harvard students described how students' ideas about knowledge changed as they lived through educational experiences. In his research Perry did interview women; however, he did not use data from women to validate his findings. Because over 90% of our participants were women, we turned to the work of Belenky et al (1986) to consider women's perceptions about knowledge.

In *Women's Ways of Knowing* (1986), Belenky et al identified five different perspectives that women occupy as they attempt to make sense of their world. These perspectives lead to different responses and different levels of activity. They ranged from a silent perspective, from which a woman's own voice and opinions are absent in her reasoning, to a perspective of connected knowing. Connected knowers recognize their role in constructing knowledge. They see that knowledge is situated, but understand that it is not relative, that all opinions are not equally valid. Women with this perspective recognize their ability to sort through information, to create understandings, and to claim authority.

Our own research in this area (Pace, 1996, 1998; Townsend, 1998; Wood, 1998) and our experiences with the participants suggested that our students fell between the two above positions. They often espoused the belief that that correct answers were fixed and could be found if one could only locate the proper authority. They often used the words of these authorities and subscribed to others' perspectives without reflection or without noting ideas that were in conflict.

We had each observed how a perspective that called on external sources of knowledge often kept students from engaging in meaningful discourse about teaching and from developing informed solutions to classroom difficulties. We also recognized that even students who developed habits

of inquiry were likely to abandon those habits if they did not recognize that knowledge could be constructed and that they were capable of doing so. Thus, we saw the students' ideas about the nature of knowledge as an underlying issue that would shape their practice as teachers.

As we considered the creation of the questionnaires, we knew we needed to craft questions that prompted students to provide information we could evaluate to learn how they viewed the genesis of knowledge. Did they see their role in constructing knowledge as an active one? Did they see the construction of knowledge as both important and possible? And so, with our focus finally established, we designed an open-ended questionnaire comprised of thirteen prompts. Each item was designed to elicit short answers that probed how students' experiences with inquiry projects might influence their epistemic assumptions.

The question on which we focus in this report is "If you had a question about your (future) classroom or the students you (will) teach, what action might you take to find an answer?" In this question, we asked students to describe what process they might follow to investigate questions that might emerge in future classrooms. Students had to project from their current stance how they might behave in an imagined future situation. Whether they would or would not act as they predicted was not relevant. What was important was what participants disclosed in the act of predicting itself. We thought these disclosures might provide information on the participants' perspectives about knowledge as they considered what strategies they would use to find answers in a classroom context. We thought that the sources of knowledge they would value and whether or not they would attempt to find their own solutions would be obvious as they described courses of action.

Procedure

We administered these questionnaires to determine the degree to which preservice teachers who had completed inquiry projects valued their own ability to answer professional dilemmas. The questionnaires were given to participants at the two universities during the last week of classes. The open-ended questionnaires took about thirty minutes to complete.

We examined 78 questionnaires. As we read and sorted the responses into domains, our analysis of the data cycled through three phases: (1) identifying major categories, (2) defining subcategories as appropriate, and (3) describing characteristics of a subset of responses.

In the first phase of data analysis, we identified categories by reading and sorting responses. Four domains emerged (Figure 2). Students reported that if they had a question about their classroom or their students they would ask others, conduct research, read research, or use a combination of methods. The categories, the number of responses in each category, and the rules of inclusion (Maykut, 1994) used to code responses are listed on the next page. Five of the seventy-eight students did not answer the focus question.

Figure 2. Data categories, rules of inclusion, and responses to Question 10

Category	Rule of Inclusion	# of responses
Ask Others (AO)	Student indicates that she would rely on those around her to supply solutions	25
Do Research (DR)	Student indicates that she would investigate by using research methods, such as questioning, observing, keeping a journal, interviewing, and the like	19
Read Research (RR)	Student indicates that she would read research articles, journals, and so on.	1
Multiple Methods (MM)	Student indicates that she would use some combination of the above strategies.	28

The first three categories accounted for almost two-thirds of the responses. However, we were especially intrigued by those who had listed multiple methods in their responses. We examined this category more closely to untangle the varied responses.

In phase two of our analysis, we coded the data from the multiple methods category into four subcategories (Figure 3). According to the responses, some students described strategies that relied on either an external authority or an internal authority. Others suggested that they would first consult an external authority followed by an internal resource, or an internal authority followed by an external source.

Figure 3. Subcategories of Multiple Method category, rules of inclusion, number of responses

Subcategory	Rule of Inclusion	# of responses
External Authority	Student strategies include asking others and reading what others have said but do not include primary research beyond that required to make sense of what others have said	1
Internal Authority	Student strategies are based on using multiple methods of research, such as interviewing, observing, journaling, and reading the research of others	3
External/Internal	Student strategies begin with asking others and then using independent investigation	14

Internal/External	Student strategies begin with independent investigation move to asking others	10
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These responses seemed to loosely reflect the development of Dewey's grounded assertions which are conclusions that are based on "evaluation of evidence, consideration of expert opinion, adequacy of argument, and implications of proposed solutions" (Kitchner & King, 1990, p. 160). Many students said they might look first in one area. They then indicated that if that information did not seem helpful they would collect additional data. It seemed, at least on the surface, that the students who indicated they would resort to multiple methods to answer classroom questions were more sophisticated in their understandings of how knowledge is constructed. They seemed more likely to investigate possibilities than those students who simply reported that they would "ask others." Of course, there was no way to determine how the students who listed Multiple Methods response would judge the adequacy of the information they received or in what manner they might follow the trajectory of the solutions offered. Nevertheless, at this point in our analysis, we acknowledged the students' reference to a variety of strategies, including their own abilities, to draw conclusions.

In the third phase of our analysis, we identified a subset of data within the Multiple Methods category. This subset was composed of responses that indicated participants were conscious of the audience who would read the questionnaires. Some of these responses were witty or somewhat chatty. They contained references to other faculty members, multiple exclamation points, or a quickly sketched smile. These responses had a "voiced" presence, a personal tone that was only found in two other responses, which had been grouped in the Do Research category.

Results and Discussion

The voiced samples began to emerge as engaging bits of data. While the casual, natural tone of these responses did not contradict our original coding categories, they did offer a complicated and compelling cluster of data because they reflected the conversational mode that we had each worked to establish in our classes. As we considered the way these responses reflected the social situations in our classes, they became data samples that exposed and ultimately unraveled some of the assumptions and traditions that had guided our work thus far.

The Voiced Responses

The Voiced Responses represented a fork in our path toward understanding the data. We began our exploration of this subset of data by considering the context in which it had been collected. First, we recalled our efforts to establish an environment in which conversation was easy and an initial sense of doubt was encouraged. We each had tried to wean students away from the mask of certainty that many had learned to wear in academic settings. We had attempted to create safe spaces (Lewis, 1993) in which doubt could be expressed and ambiguities could be entertained. Through valuing questions, we had encouraged students to assume an interrogative stance. For example, students were frequently told that uncertainty was part of the process and that they should expect to be somewhat inundated with data. Indeed, as the data mounted and the

writing/reporting task began to loom, humor and the group work inherent in a writing workshop approach were used to support students as they worked through the process of interpreting and presenting their work.

These and similar experiences provided a basis for establishing relationships with students that were friendly and supportive. In assisting students as they struggled through inquiry and interpretive processes, we had shared moments of insight and frustration. We knew that, like all teachers who work closely with students, we oscillated between positions of support and positions of evaluation/critique. We understood that the stances of the students were equally fluid, that they had also assumed multiple positions in the context of the class. What we did not understand and needed to explore was how these teacher-student relationships might be influencing our data.

Voiced Responses and Teacher-Student Relationships

In our early zest to understand the data, we thought the responses in the Do Research (DR) category signaled success. They suggested that students had learned to value the research process and to recognize that they were capable of conducting research. Both conditions matched what we and Kincheloe (1991) identified as the assumptions that individuals must hold before they could or would attempt to create their own knowledge. Thus, on the surface these responses seemed to signal teaching success. However, when we were prompted by the Voiced Responses to consider the contexts in which these responses had been gathered, we wondered if some students had offered DR responses because of the in-class relationship, rather than because those responses reflected what students would actually do in schools.

For example, we wondered if some of the responses in this category were rooted in the students' conception of what we wanted to hear. One answer seemed to offer a holistic endorsement of one of the teacher-education programs in which data were collected. This response "Act! Reflect! Observe!" mirrored the reflective-action cycle that the participants had explored in at least two other courses. During informal conversations many students referred to this cycle as though it were a motto for the program. Though we did not use this model in our classes, we recognized that the work we were asking students to do did, in part, duplicate the processes represented in the cycle. The student response suggested at least four possibilities: (1) the work done in class had been aligned with her assumptions about the program and she was responding with what she thought we wanted to hear; (2) the answer was a tongue-in-cheek one, designed to provide some humor; (3) the student had learned in our courses and in other work in the program to value the model as a way to approach teaching; or (4) against amazing odds the student had stumbled upon those three words because they accurately represented the courses of action she would take to answer a question in her classroom. We wondered if this answer was consciously or unconsciously "staged" to make some sort of an impression.

Likewise, others responses suggested that some of the students' answers may not have been authentic but may have been crafted to tell us what the student perceived we wanted to hear. One student, for example, directly referred to action research: "Wow. I would use all the measures I had learned about during my time in college and would definitely make use of observation skills tweaked during the action research class." This response, like the previous one and several others

in the DR category, raised interpretive issues. It was impossible to say with certainty whether or not the students had been empowered by the courses or whether or not they had staged their answers as part of a habitual "posing" process through which they could gain approval from authorities (or could be kind to their professors).

We faced the same interpretive dilemma in examining responses in the Multiple Methods category. While a favorable reading of the data indicated that the participants were poised to be active agents in the construction of their own knowledge, such a reading became problematic when we scrutinized the Voiced Responses. We were concerned that these students, like those discussed above, were providing "staged" answers. One respondent noted she would "Call Dr. Gardiner! [a pseudonym] If he was unavailable, then [I] would look up information and modify it to my situation." Another student referred to class readings and included a sketched smiley face. "First I'd sit down and think...hmm (smiley face drawn)--it really depends on the situation--I might call you up or I might consult [class texts]."

At the least these answers suggested that students acknowledged a shared context and a shared history with us. They assumed a common pool of knowledge based on class readings and mutual acquaintances. These answers could simply suggest that the students drew on this pool to communicate efficiently, that students were attempting to add a humorous note to their responses, or that the students wanted to win favor. In any case, they indicated that the participants were responding, at least in part, out of a personal relationship with their professors.

The responses in this category also raised another issue: Did the gendered patterns of socialization that students had absorbed to varying degrees account for their desire to seek multiple opinions from others? The second issue revolved around the fact that most of the respondents had a life-time of experiences as women. The primacy of relationship in the lives of women could account for their desire to seek multiple opinions from the various people who would populate their imagined future context. This fact, rather than the experience of the inquiry projects, might be driving their plan to use multiple methods. How might these various influences and ways of responding to questions possibly be untangled?

Unvoiced Responses and the Relational World

The insights gained and the questions raised by the voiced data subset prompted us to reconsider those we had come to think of as "unvoiced." Most responses fit this descriptor, and we wondered if the primacy of the relational world in the lives of women might be submerged in these data. Using the lens of relationship to guide our understandings, we returned to the data to consider how relational priorities might appear.

We began with the largest category, Ask Others. Responses had been placed in this category when participants stated they would rely only on others to find answers to classroom problems or dilemmas. Earlier in the process of data analysis we had read responses such as these as indicating that the participants did not value systematic inquiry. While that reading was not reversed, it did become more complicated as we viewed data from a relational stance. Answers like, "Ask other educators. Preferably experienced ones. Find the person who knows the answer

(i.e., principal, superintendent, etc)" clearly suggested that some of the participants were certain there would be a definitive answer and that someone would provide it.

Other responses in the Ask Others category were not so easy to interpret. Most participants simply stated that they would talk to the people with whom they worked. Frankly, this seemed like a reasonable place for a new teacher to begin. Did it seem so to us because as women that is how we might initially approach a work-related dilemma? Were these responses simply extensions of the ways that many women are socialized to be in the world?

Faced with these questions, we agreed that a key element was what the women would do with the information that they had gleaned from others. Though none of the Ask Others respondents provided a next step, other participants did. We turned to the Multiple Methods subcategory External/Internal to evaluate those responses. We placed responses in this category when students indicated that they would approach problems or issues in their future classroom by asking others and then by using independent investigation. The following responses are typical:

"I think the first thing I would do is ask my colleagues then do some research."

"I would first ask my colleagues, and if I didn't find the answer there, [I] would look for research on the topic."

"I would begin by asking a peer for input. Then I would ask one of the 'specialists' -- curriculum coordinator, speech teacher, special ed. teacher, principal, etc. Lastly, I would consult the literature and read to find support."

Perhaps, like other answers, these responses reflect the convenience of doing the simplest thing. However, they could also reflect the participants' understanding of the politics of the school context for a new teacher. It might be quite politic for a new teacher to ask others and to incorporate their advice into her practice if possible. Of course, there was also that other possibility: the women could simply be describing patterns of negotiation that many women develop.

These participants did indicate that eventually they would investigate whatever issue was before them. But two other responses in this category of Multiple Methods suggested that some of the students would be autonomous in their future classrooms:

"I would observe closely. If I couldn't find an answer my own research, then I'd ask another teacher."

"I would go directly to my students, and then depending on the situation, I would ask other teachers to see what they would do (or had done)."

In both instances, three elements seem significant. Number one, the first comment is not "ask someone else." Instead, they position themselves as researchers. The language and tone of their responses do not seem contrived but hint of maturity. Second, both women cite a method they would use to collect data in order to conduct their "own research." And finally, as a second step for finding solutions to their own research questions, these respondents claim they would ask "other teachers" or "another teacher." Thus indicating that they see themselves as members of the

faculty, experts in their own right. Such moves seem authentic, possibly representing a different kind of voiced agency, one that arises from confidence.

The issue of voice in the questionnaire data has raised questions for us as teachers. In our exploration of these data we have discovered the many ways that the issue of student voice and of relationship can complicate how we understand our work. We have recognized how very difficult it is to discern the difference between those problem-solving strategies that originate in the students' construction as women and those that originate in a fact-gathering or opinion-gathering process that has been incorporated into their knowledge-making.

Conclusion

We recognize that in addition to adopting relational priorities, many young women who choose to be teachers are socialized to accommodate the opinions of others. In some cases this behavior is part of what many women believe they need to do to maintain relationships (Belenky et al., 1986), and in other circumstances this behavior may be a way to avoid confrontation. We wonder how these patterns might be issues in our work with prospective teachers and in our efforts to learn from our research. Might these participants' desire to speak with various authorities signal a need to be compliant and cooperative? Might this desire be connected to the many messages about silence and compliance that they have received as recipients of the kind of educational experiences described by Sadker and Sadker in *Failing at fairness* (1994)?

In our initial efforts at designing the questionnaires we gravitated toward learning about participants' epistemic assumptions partly because of our experiences as teacher educators and because of previous work on women as learners. However, the presence of the "voiced" responses set us on a twisted path through the data, one that led us to consider the issue of relationship. Perhaps we were hesitant to do so in the beginning because in the current climate of standardization and teacher-bashing, the issue of relationship seems irrelevant or representative of an emotional stance that encumbers rational thought and signals simplicity. We know that this is not the case. In fact, in studying the intellectual development of male and female college students, Magolda (1992) found that "different reasoning patterns led to equally complex ways of viewing the world" (p. 14). After our struggles with the responses of these participants we certainly would not deny or discount the complexities of their perspectives. We now recognize that in order to gain some understanding about the ways these participants accept or reject their own capacity to know, we must include questions that expose their thinking about professional relationships.

To paraphrase E. M. Forster, how do we know what preservice teachers think until we listen to what they say? And how do we know that what they say is what they think? The process of conducting our own inquiry on the inquiry processes of our students has seemed somewhat slippery. Like mercury in a sieve, their ideas have been difficult to capture. Certainly, we have been aware throughout this process that the use of self-report data could be complicated. Nevertheless, open-ended questionnaires did provide a format for exploring what our students think, for exposing the details of that complexity.

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