A Stance toward Inquiry:
An Investigation of Preservice Teachers' Confidence Regarding Educational Inquiry

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Research suggests that effective teaching is a significant, if not the most significant, indicator of student success (Darling-Hammond, 2000, 2006a; Sanders, 1998). However, because teaching has become an increasingly challenging profession (Bransford, Darling-Hammond, & LePage, 2005; Darling-Hammond, 2006b), school reformers have advocated that educational practices be based on evidence of student learning (e.g., Cochran-Smith & Lytle, 1999; Fallon, 2007; Goodlad, 1994), suggesting that teachers should develop a stance toward inquiry. To define teacher inquiry, we rely on Cochran-Smith and Lytle's (1990) working definition—that is, "systematic and intentional inquiry carried out by teachers" (p. 3). Inquiry as a *stance* moves beyond formal research and involves "consistent positioning or way of seeing, rather than a single point in time or a single activity" (Barnatt et al., p. 43). Teachers with a stance toward inquiry are able to make "diagnostic and strategic judgment to address the needs of those whom they serve" (Bransford, Darling-Hammond, et al., 2005, p. 9).

The call for teachers to become more critical, or at least more systematic, inquirers caused us to reflect on teacher education programs in general, and our university's Integrated Bachelor's/Master's (IB/M) teacher preparation program (TPP) in particular, in terms of influences on preservice teachers' (PSTs) development of such a stance. Our TPP, where inquiry is a major theme in the final, master's year, provided a useful forum for an initial investigation. Specifically, we reasoned that a focused look at influences of this inquiry-oriented year on a stance toward inquiry may provide a foundation for future investigations of TPPs and what may occur as PSTs move into their careers as teachers.

Although legislation (e.g., No Child Left Behind Act, 2002) has compelled schools to focus attention heavily on standardized assessment scores, our vision of teachers having a stance toward inquiry is more holistic in nature (cf. cites above). We envision such teachers as having a general research cast-of-mind when making instructional decisions. They gather multiple forms of data, analyze them accordingly, and come to decisions that they recognize have some limitations. They are capable of making decisions based on evidence that positions them with a professional point-of-view.

To help us better understand influences that may impact a stance toward inquiry, and those of the final year of our TPP in particular, we first turned to the literature to explore practices that help make teachers more capable of having such a stance. Numerous researchers (Bransford, Darling-Hammond, et al., 2005; Burnaford, Fischer, & Hopson, 2001; Cochran-Smith & Lytle, 1990, 1999; Darling-Hammond, 2006b; Hammerness et al., 2005; Henson, 2001; Hopkins & Stern, 1996; Hubbard & Power, 1999; Stigler & Hiebert, 1999) have suggested that conducting action research, investigating classroom and school-wide issues, and/or making decisions based on evidence may enhance a teacher's ability to take a stance toward inquiry. Our five-year TPP includes experiences that may promote an inquiry-based perspective throughout the program, but it focuses explicitly on inquiry in the final, master's year primarily through a school-based inquiry project, much like other TPPs (e.g., Barnatt, Cochran-Smith, Friedman, Pine, & Baroz, 2007; Mule, 2006; Rich & Hannafin, 2008). While inquiry projects seem laudable, there has been little empirical evidence about their impact on helping PSTs develop a stance toward inquiry (Barnatt et al.). Thus, we investigated PSTs' changes in their confidence related to a stance toward inquiry in their final, master's year prior to and after completing an inquiry project.

As noted previously, there have been increasing calls not only for teachers to base their practices on research but also for them to participate in inquiry and to act as researchers themselves (Barnatt et al., 2007; Cochran-Smith & Lytle, 1990, 1999; Darling-Hammond, 2006b; Henson, 2001; Hubbard & Power, 1999; Nelson & Slavit, 2008). For example, Nelson and Slavit describe collaborative inquiry that includes "a cyclical process that fosters an ongoing dialogue about classroom practices and student achievement" (p. 100). Teacher inquiry such as this has the

potential to enhance professional dispositions so that "careful observation and systematic collection of evidence can inform both one's own practice and that of others" (Darling-Hammond & Bransford, 2005, p. 16-17). This requires not only an acceptance that evidence-based practice is important but also a stance toward inquiry.

Teacher education plays an important role in building foundations for these professional skills and dispositions. For example, Darling-Hammond (2006b) notes that, along with providing access to relevant knowledge about teaching and learning, teacher education programs should support teachers' dispositions to inquire into their own practice, identify difficult problems, and seek answers to these problems. In essence, teachers need skills and dispositions "to learn *from* practice … as well as to learn *for* practice" (original emphasis, p. 305).

An Example Teacher Preparation Program

To help PSTs develop a stance toward inquiry, appropriate experiences need to be interwoven into teacher preparation programs (Darling-Hammond, 2006b; Goodlad, 1994; Holmes Group, 1995; Schön, 1983). With this in mind, our university's IB/M TPP, which is based on a philosophy aligned with the Holmes Partnership (formerly the Holmes Group), the National Network for Educational Renewal (NNER) (Goodlad), and the National Council for Accreditation of Teacher Education (NCATE), infuses experiences designed to support inquiry and reflection (Reagan, Case, & Brubacher, 2000; Schön, 1983, 1987). It is a five-year program that encompasses a combination of experiences, including university coursework, fieldwork in professional development schools, and seminars that bridge understanding of course content and its application in the field. The experiences in each year are bound by a theme: juniors study the "student as learner," and seniors learn about the "teacher as professional." The program culminates with a post-student teaching, master's year that has twin themes of leadership and inquiry where the PSTs continue to develop professionally through field- and coursework and are required to conduct professional inquiry "to prepare them to serve as innovators and change agents in the education profession" (http://www.education.uconn.edu/departments/teachered/ibm_tenets_masters.cfm).

The inquiry project is the capstone experience, typically shaped by a school-based internship, housed within a yearlong seminar, and supported by related research colloquia. The internship, seminar, and research colloquia comprise approximately half of the required credits during the master's year. The inquiry experiences provide opportunity and support for each master's student to conduct a "significant piece of professional inquiry" that addresses "issues of genuine concern to teachers and administrators working in the internship site" (http://www.education.uconn.edu/departments/teachered/ibm_tenets_masters.cfm). A few seminars produce one inquiry project as a class; others have individuals, pairs, and/or small groups complete projects. School districts identify some inquiry project topics; other ideas emerge from

class discussions and/or PST interests (e.g., investigating mathematical discourse moves on student responses; investigating performance of student subgroups on state-tested literacy strands). Seminar faculty support students in reviewing relevant literature, identifying research questions, collecting and analyzing data, reporting the results, and offering a discussion. Although internships and inquiry projects vary, the TPP establishes minimum criteria for the inquiry experiences, including PSTs' abilities to identity an issue or question that is important for their work and/or their school; to design and carry out appropriate methods of collecting and analyzing data to inform educational decisions; to effectively communicate the process and products of inquiry in a professional and ethical manner; and to demonstrate collaborative and leadership skills that enable professional practice within a school community (IB/M webfolio evaluation criteria).

Although some of the TPP's courses may explore the research process (e.g., reading research articles), completing the inquiry project is the primary research experience for our students. Investigating the influence of the master's year (i.e., inquiry project along with school-based internships and graduate coursework), on PSTs' confidence with respect to a stance toward inquiry could help inform not only our TPP but the broader field of teacher education as well. The results would begin to elucidate the influence of explicit attention to school-based inquiry—particularly with respect to the inquiry project—on our PSTs, which then could be utilized to inform our own instruction as well as inform other programs implementing similar experiences.

Self-Efficacy, Confidence, and Teacher Capabilities

Recognizing the value of identifying experiences that may promote a stance toward inquiry, we relied on Bandura's (1986) seminal work on self-efficacy to help us investigate influences of the inquiry project experience. He defined self-efficacy as "people's judgments of their capabilities to arrange and execute courses of action required to attain designated types of performances" (p. xii). It impacts the things we do, the effort we put into them, and how long we persist in working out a solution to a given problem. Researchers, such as Gable and Wolf (1993), have proposed that self-efficacy "is the basis for a causal model, analyzing human motivation, thought processes, and behavior" (p. 12); additionally, they suggest that confidence is an appropriate indicator of self-efficacy. Although confidence is not an exact proxy for self-efficacy, PSTs who report high confidence levels with respect to a stance toward inquiry are likely to have related high self-efficacy. Further, research suggests that there may be links between teacher efficacy and teacher behavior and, in turn, student performance (Henson, 2001; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Thus, we cautiously suggest that assessing changes in PSTs' confidence toward inquiry may provide an indicator of their potential for a stance toward inquiry, which may impact their future practices. Although confidence toward inquiry cannot guarantee future performance, positive *changes* in

this confidence over the course an inquiry-oriented year would indicate an impact of these experiences.

When investigating a stance toward inquiry through a lens of confidence, we focused on perceptions of specific capabilities that could serve as indicators of such a stance. To identify the indicators, we conducted a review of related literature (e.g., Black & Wiliam, 1998; Bransford, Darling-Hammond, et al., 2005; Bransford, Derry, Berliner, Hammerness, & Beckett, 2005; Darling-Hammond, 2000, 2006a, 2006b; Fallon, 2007; Shepard, et al., 2005) and drew on expertise of teacher educators (see Materials and Methods section for details). This process helped to uncover sources that teachers, as professionals with a stance toward inquiry, should be able to access, make sense of, critique, and apply in order to make evidence-based decisions. The sources included educational theory and research; individual, class-, and school-level assessment data; and district, state, and national/international data.

Research Questions

Building from the review of the literature and input of teacher education experts, one of the questions this study investigated was the following:

> (1) What changes are there in PSTs' confidence with respect to a stance toward inquiry after completing an inquiry project and associated master's year experiences, specifically in their confidence using (a) educational research and articles; (b) class- and school-level data; and (c) district-, state- and national/international-level data?

In an effort to corroborate these findings and more specifically address the influence of the inquiry project, we also investigated the following question:

> (2) How do PSTs' views and perceptions change after completing an inquiry project and associated master's year experiences, specifically their (a) views of the purpose of completing an inquiry project; (b) perceptions of the impact of completing an inquiry project on them as teachers; and (c) perceptions of the impact of completing an inquiry project on them as teacher leaders?

Materials and Methods

Given that an intention of this study was to obtain a holistic understanding of the PSTs' confidence regarding a stance towards inquiry, we sought a way to capture these data efficiently. At the onset of this study, no instrument was available to measure PSTs' confidence regarding their stance toward inquiry. Therefore, to address the first research question, we developed the *Preservice Teachers Evidence-Based Decision-Making* survey ([PEBD[1]]; Casa, Truxaw, & Adelson, 2007) to investigate PSTs' confidence regarding their stance toward inquiry. Because the PEBD did not

specifically address the completion of the inquiry project, which is the PSTs' primary research experience, we employed a mixed-methods design that had them respond to three open-ended questions that addressed their views about the purpose of the inquiry project and their perception of the impact the inquiry project experience may have on them as teachers and teacher leaders (i.e., the second research question). Henson (2001) noted that "mixed methods [the combination of quantitative and qualitative paradigms] can be useful in viewing teacher research from varied points of view in the same study" (p. 834), so the inclusion of both perspectives can enhance an investigation (Johnson & Onwuegbuzie, 2004). In our case, it allowed us not only to measure the changes in the PSTs' general confidence regarding a stance toward inquiry but also specifically to address the inquiry project. A benefit of the PEBD was that it allowed us to quantify more precise changes across subscales, whereas the open-response questions provided us with data based on PSTs contributing their perceptions without being led to a particular idea(s).

Participants

One hundred and ten master's-level PSTs were enrolled in our TPP at the time of this study; 87% were female and 13% were male; typical ages were 21-24 years old. Approximately 50% of them were future elementary teachers, and the rest were future secondary or K-12 special education teachers. All of the master's students who participated in the study also had been students in the TPP program during the last two years of their undergraduate program and had completed student teaching prior to their master's year. In the undergraduate component of the TPP, reflective practice had been emphasized, but formal inquiry had not been required. Most of the PSTs participated in the study in both Fall 2006 and in Spring 2007; specifically, 86% (95 students) submitted data in the fall and 88% (97 students) did in the spring. We collected data through their seminar classes.

Data Collection and Analysis

Development of the PEBD Survey

To examine the first research question, we developed the PEBD, and we examined the psychometric properties using a content validation investigation and an exploratory factor analysis with reliability analyses on the pre-test data. The items on the PEBD survey address areas related to a stance towards inquiry, including making sense of, critiquing, and applying the following: evidence from educational research; classroom- and school-level assessments; and district, state, and national/international data.

Content Validation

To establish the content validity of the PEBD, we designed a questionnaire

based on a review of relevant literature and then invited educational experts to serve as jurors in validating the instruments' content. Ten teacher preparation faculty members who had guided PSTs through research and/or taught a research course participated in the content validation. The content validity questionnaire allowed the experts to categorize and rate potential stems and provide feedback on the design and wording of the instrument. We eliminated items with low inter-rater consistency and revised the remaining items for semantic clarity and syntactic accuracy. Final editing was supported by a second round of reviews by a subset of the original content reviewers.

Factor Analysis

After the content validation investigation, we conducted an exploratory factor analysis (EFA) to determine the factor structure of the 30 PEBD Likert items. We used principal axis factoring because the goal was to identify unobservable latent factors that account for the (co)variances among the measured items, and we used oblimin rotation to allow the factors to be correlated (Preacher & MacCullum, 2004). The sample size (95 surveys from fall 2006) was appropriate for conducting an EFA with this instrument given that, as shown in Appendix A, each factor had at least four items with pattern coefficients greater than .60 (Guadagnoli & Velicer, 1988) and that the communalities were all greater than .60 with a mean communality of .73 (MacCallum, Widaman, Zhang, & Hong, 1999). Also, the measures of sampling adequacy (MSAs; such as Bartlett's Test of Sphericity, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy, and the elements of the diagonal of the anti-image correlation matrix) indicated that the correlation matrix was appropriate for an EFA (Pett et al., 2003). The only items that had an individual MSA that were not satisfactory were two items related to individualized educational programs (IEPs), which were eliminated from the survey.

For determining the number of factors to extract, we looked at the eigenvalues, the scree plot, and two different parallel analysis criteria (average random eigenvalues and 95th percentile). Based on the multiple criteria, particularly the parallel analysis, which Hayton, Allen, and Scarpello (2004) considered "one of, if not the, most accurate method for determining the number of factors to retain" (p. 197), three factors were identified. The 28 retained items loaded on the three factors (see Appendix A for the pattern matrix and communalities) and operationally defined the following constructs: confidence using educational research and articles (Factor 1), confidence using class- and school-level data (Factor 2), and confidence using district-, state-, and national/international-level data (Factor 3), which correspond to research questions 1a to 1c. Nearly every item had a factor loading of at least .4. One item, "How confident are you in seeing the limitations and values of students' report cards to inform your teaching?," had a slightly lower factor loading (.388); however, we determined that the item was near .4 and was necessary for the scope of the subscale, so we retained the item. The three factors

explained 61% of the total variance. The three subscales were statistically significantly correlated ($p<.001$) and followed a predictable pattern: the factors related to the classroom and district had the highest correlation ($r=.60$), the factors related to the classroom and research had the lowest correlation ($r=.47$), and the factors related to the district and research had a correlation between those ($r=.57$).

Reliability Analyses

Before moving forward with the survey, we conducted reliability analyses to determine the internal consistency of the items within each subscale of the PEBD. The resulting Cronbach's coefficient alpha for each subscale represents the proportion of variability (total variance) in each subscale attributable to the true score (Pett, Lackey, & Sullivan, 2003). The reliability analyses from the pre-test data (fall), the post-test data (spring), and the combined data from fall and spring are summarized in Table 1. All reliability coefficients were statistically significantly ($\alpha=.05$) above the acceptable level (.80) recommended by Clark and Watson (1995).

The PEBD Survey Subscales

The final PEBD has 28 5-point Likert items focusing on PSTs' confidence in making evidence-based decisions using multiple sources of data. The items measured PSTs' confidence on a Likert continuum with the points labeled as "not at all confident," "slightly confident," "somewhat confident," "quite confident," and "extremely confident." The PEBD has three subscales that produce scores with strong internal consistency reliability: confidence using educational research

Table 1
Reliability of Final Subscales of the PEBD

Subscale	*No. of items*	*Reliability*		
		Fall	*Spring*	*Combined*
Confidence Using Educational Research and Articles	10	.950 (.933 to .964)[a]	.956 (.941 to .968)	.956 (.946 to .965)
Confidence Using Class- and School-Level Data	12	.917 (.890 to .939)	.928 (905 to .948)	.926 (.910 to .941)
Confidence Using District-, State-, and National/International-Level Data	6	.918 (.889 to .941)	.860 (.812 to .890)	.905 (882 to .924)

[a] Below each reliability is the 95% confidence interval, which were computed using SPSS. For more information, see Fan and Thompson (2001).

and articles, confidence using class- and school-level data, and confidence using district-, state-, and national/international-level data.

Confidence using educational research and articles subscale. This subscale measures how self-assured PSTs feel in their ability to use educational research and articles to inform their teaching. This subscale had PSTs respond to items regarding their confidence in identifying limitations and values of and in making sense of educational research, educational research data, journal articles for researchers, and journal articles for practitioners. PSTs who score high on this factor are assured that they can make sense of the various research and articles, including their limitations, and see the connections to inform teaching. On the other hand, a PST scoring low on this factor does not have confidence in his/her ability to identify limitations and values of various types of research to inform teaching and struggles to make sense of this information.

Confidence using class- and school-level data subscale. This subscale relates directly to what teachers have access to on a daily basis in their classroom. It measures how self-assured PSTs feel in their ability to use the data available in their classroom and in their school to inform their teaching. This subscale has PSTs respond to items regarding their confidence in identifying limitations and values of and in making sense of class assignments, homework papers, teacher-developed tests, other classroom tests, report cards, and students' academic records over multiple years of schooling. A PST who scores high on this factor is confident that s/he can make sense of the various assessment data available to classroom teachers and of school records, including their limitations, and use these data to inform teaching. On the other hand, a PST scoring low on this factor is not self-assured in his/her ability to identify limitations and values of various types of class- and school-level data to inform teaching and struggles to make sense of these data.

Confidence using district-, state-, and national/international-level data subscale. This subscale reflects the age of accountability that we are in and data that are available to teachers from district, state, and national/international assessments. It measures how self-assured PSTs feel in their ability to use data from these assessments that they do not create but often administer and/or are able to access the results. A PST who scores high on this factor is self-assured that s/he can make sense of tests given by the district and state as well as national or international tests, including their limitations, and use these data to inform teaching. On the other hand, a PST scoring low on this factor is not confident in his/her ability to identify limitations and values of assessment data gathered at a larger-scale than the classroom or school to inform teaching and may struggle to make sense of these data.

Analyses of PEBD Data

For each subscale, we averaged the scores from the Likert items to reflect

overall confidence on that factor. Because the PEBD uses a 5-point Likert scale, the subscale scores could range from 1.0 for low confidence to 5.0 for high confidence. To answer research question 1, examining the change in confidence, we then conducted a paired *t*-test on the total scores for each pre- and post-PEBD subscale.

Open-Ended Questions: Description and Analyses

While the PEDB provided us with a general picture of PSTs' stance towards inquiry, research question 2 focused on the inquiry project experience, given that it is the primary research experience for our PSTs. We designed the three open-ended items to allow participants to articulate perceptions related to (1) the purpose of the inquiry project and its influences on their (2) teaching and (3) leadership potential. Specifically, we asked:

- What do you think is/was the purpose(s) of conducting an inquiry project?
- How do you think completing an inquiry project will impact you as a *teacher*?
- How do you think completing an inquiry project will impact you as a *teacher leader*?

We employed constant comparative methods (Creswell, 1998; Miles & Huberman, 1994; Strauss & Corbin, 1990) to identify prominent themes and changes in frequencies of associated responses. We began by open coding a sample of responses to allow initial thematic categories to emerge. Then, we performed axial coding, further assembling and identifying themes. Next, we inspected approximately 20% of the sample when it appeared that the themes and their working definitions were described accurately. From this, we developed an initial codebook to allow us to selectively code each response independently. We compared and discussed the independent coding until total agreement was achieved for the themes and their descriptions. We subsequently collapsed closely related codes and developed a revised codebook for each of the open-response items, providing specific criteria for each theme. Using the revised codebook, we independently coded responses; again, we compared codes and resolved any disagreements until we had complete agreement on all codes.

We used *NVivo7* qualitative data analysis software (QSR International, 2007) to facilitate analysis of the open-ended responses and the associated themes. To identify the prominent themes, we utilized *NVivo7* to sort and count the coded responses associated with each theme. We identified prominent themes by first establishing initial cut-offs—that is, we noted when there was an apparent drop in frequency of responses associated with each theme. For example, for open-response question 1, fall data, initially two themes stood out with 51 and 24 responses; the next most frequent themes had 15 and 14 responses. After that, there were several themes

with response frequencies of 10 and 11. For this question, we opted to identify the prominent themes as those represented by 51, 24, 15, and 14 responses; although 11 is close to 14, the cluster of responses at 10 and 11 responses suggested that these were less prominent themes and, therefore, we did not report them as such. When there was not a clear drop in frequencies, more than one drop, or a great number of themes (resulting in fewer responses per theme), we used a frequency of approximately 10% of the total number of responses as a minimum number for a prominent theme. After identifying the prominent themes, we used *NVivo7* to perform "queries" to count responses associated with each of the themes, locate specific responses for each theme, note changes from fall to spring, and observe trends across participants.

Results

In this section, we first present the results of the first research question, which focuses on the changes in the PSTs' confidence with respect to a stance towards inquiry that may be attributed in general to the master's year experiences; these results are addressed through analysis of PEBD Likert items. We follow with the results of the second research question, which focuses on the primary research experience, the inquiry project, and PSTs' perceptions of the impact the inquiry project may have on their future endeavors; these results are addressed through analysis of the open-ended items.

Research Question 1: Pre-Post PEBD Subscales

We first analyzed PSTs' change in confidence from pre- to post-test on each of the three subscale scores. Table 2 summarizes the gains in PST confidence in each area, including the pre- and post-survey descriptive statistics (scale median scores, ranges, and mean scores with their respective standard deviations) as well as effect sizes (Cohen's *d* calculated with pooled standard deviations) for pairs of data for each subscale. For each of the subscales, similar results were achieved. The total score for each subscale indicates statistically significant gains in confidence from pre- to post-survey mean at the $p<.001$ level of statistical significance. In addition, the effect sizes were all moderate (Cohen, 1988), ranging from .50 to .75. These effects are moderate to large compared to other effects on PSTs' changes in confidence, such as the effects of professional development to support technology integration (d=.19 to .69 for 12-month programs; Tiemann, 2009) and of motivators and mentors as computer pedagogical agents (d=.35 to .49; Bayor & Kim, 2005).

This indicates that from the beginning of the fall semester to the end of the spring semester, PSTs' confidence in using educational research and articles, class-and school-level data, and district-, state-, and national/international-level data increased significantly. There were moderate increases in confidence, as measured by the subscales, during the master's year that included the completion of the inquiry project.

Although the results demonstrate overall positive changes in confidence, there was some variability across the three subscales. Both at the beginning and end of the master's year the PSTs had the greatest confidence in using class- and school-level data. They exhibited the greatest growth in their confidence in making sense of assessments given by the district and state as well as national or international tests, including their limitations, and in their self-assurance in using these data to inform their teaching. This is particularly important given the current assessment-driven state of accountability of many educational systems. These results suggest that while PSTs' experiences in the TPP prior to their master's year (including student teaching), supported a stance toward inquiry, there was value-added from the post-student teaching experiences that included the inquiry project, the major research endeavor for our PSTs.

Although PSTs exhibited growth in their confidence in using educational research and articles, they had the most variability and least amount of growth in this area. This suggests that while they became more confident in their understanding of educational research and articles and their ability to use this information to inform their teaching, they made greater gains in confidence in their understanding of and ability to use assessment data at all levels to inform their teaching. This may relate to the nature of the inquiry project, which is conducted within a classroom or school setting and focuses on connecting research and teaching practices.

Table 2
Pre- and Post-Survey Statistical Gains in Confidence on the Three Subscales of the PEBD

Subscale	*n*	Pre-survey median (range)	Post-survey median (range)	Pre-survey mean (SD)	Post-survey mean (SD)	*t*	df	*d*
Confidence using educational research and articles	80	3.30 (3.50)	3.90 (3.10)	3.42 (.70)	3.76 (.69)	4.60**	79	.50
Confidence using class- and school-level data	82	3.75 (2.58)	4.08 (2.00)	3.84 (.50)	4.12 (.52)	4.67**	81	.55
Confidence using district-, state-, and national/ international-level data	82	3.17 (3.33)	4.00 (3.67)	3.30 (.66)	3.78 (.62)	6.30**	81	.75

** $p < .001$.

Research Question 2: Open-Ended Responses

Next, we present the results from the open-response items that more specifically address changes in our PSTs' perceptions related to completing an inquiry project, which corroborate the more general findings from the first research question. This section first outlines the results of the three open-response questions by looking at the prominent themes prior to (fall) and after (spring) completing the inquiry project. Then, we present major changes between them.

Research Question 2a: Perceived Purpose of Completing an Inquiry Project

Fall. Prior to the master's year, the PSTs had completed 2 years of liberal arts education and 2 years in the TPP; they had taken courses, participated in multiple school-based placements, and student taught. As indicated by the four prominent themes that emerged in the fall, it appeared that the PSTs already had begun to develop a stance toward inquiry after these experiences but before completion of the inquiry project and associated master's year experiences. (See Table 3 for examples of the two most common of these themes[2], number of associated responses, percentage of the PSTs who provided them, and representative quotes.) More than half (54%) of the PSTs noted that the inquiry project would help them learn how to carry out or be exposed to research. For example, one PST indicated that the project would "help us learn to do research as a teacher and to help us improve on inquiry, which is becoming more important in schools these days" (PST108).[3] Other prominent themes included gaining insights about a particular topic (25%)

Table 3
PSTs' Perceptions Regarding the Purpose of Completing an Inquiry Project prior to Completion (Fall), n=95

Prominent Themes	*No. of responses*	*% of PSTs*	*Participant Representative Quotes*
Learn to carry out or be exposed to research	51	54%	To research. To get experience designing a project, choosing question. Collect and analyze data (PST45).
Gain insights about a particular topic	24	25%	To research and learn more about an area of education (PST35).
			The purpose of conducting an inquiry project is to gain new information about a certain topic (PST89).

Note. To save space, for Tables 3-8, examples of only the two or three most common themes for each category are shown.

and investigating personal interests (16%). Finally, PSTs noted that the inquiry project could have an impact in the classroom (15%).

Spring. At the end of the master's year, learn to carry out or be exposed to research continued to be the most prominent theme (65%; see Table 4). The impact in the classroom also was among the prominent themes (14%) in both fall and spring. For example, PST6 addressed both of these themes when stating that the purpose of the inquiry project had been "to gain experience in researching in education and practice using research to make education decisions." Unlike the fall, in the spring PSTs noted that a purpose had been to obtain a more holistic view of the teaching profession (11%). Emphases on particular topics and personal interests were no longer among the prominent themes.

Changes from Fall to Spring. The data indicated some changes in the prominent themes related to PSTs' perceived purpose of the inquiry project. Along with notable changes in the frequency of responses in some themes, the data suggest a collective shift toward a future-oriented perspective. Specifically, there was a marked decrease in orientation toward the particular topic of their inquiry project (fall, 25%; spring, 3%) as well as a decrease in responses mentioning investigating personal interests (fall, 16%; spring, 8%). The PSTs more frequently mentioned that the purpose of the inquiry project was to learn to carry out or be exposed to research (fall, 54%; spring, 65%). Upon further scrutiny, it appeared that this increase was due mainly to responses that indicated a future orientation with respect to knowing how to carry out and encourage research. For example, "The purpose was for us to learn about evidence-based research and conducting an action research project, which we will find ourselves doing as we teach" (PST35, spring) and "to learn how to conduct meaningful research so that you can use the strategies throughout your career" (PST72, spring).

Research Question 2b: *Perceived Impact on Them as Teachers*

Fall. Six prominent themes emerged with respect to PSTs' anticipated impact

Table 4
PSTs' Perceptions Regarding the Purpose of Completing an Inquiry Project after Completion (Spring), n = 97

Prominent Themes	*No. of Responses*	*% of PSTs*	*Participant Representative Quotes*
Learn to carry out or be exposed to research	63	65%	To learn how to be active researchers as teachers (PST13).
Have an impact in the classroom	14	14%	Helping develop teachers who use research to guide instructional practice (PST39).

of the inquiry project on them as teachers (see Table 5 for examples of the three most common of these themes), with some similarities in themes from the previous question. In the fall, almost a third (29%) of PSTs said the inquiry experience would *inform the classroom, learning, and instruction*. For example, PST62 mentioned that the experience "will provide good insight to help improve certain aspects of teaching." The second prominent theme related to *gaining research skills, experience, or familiarity with the research process* (20%) by getting them to "think in a research mind" (PST80). Additionally, PSTs thought *completing the project* would *encourage a critical view of education and likelihood of reflection* (18%) and might make them *able to conduct or give them the intention of conducting future research* (15%). Equal numbers of PSTs anticipated learning more about the inquiry topic (13%) and being *able to advocate for change or problem solve in their schools* (13%).

Spring. In the spring, there were six prominent themes about the impact of the inquiry project on PSTs as teachers (see Table 6 for examples of the three most common themes). The most prominent theme related to *gaining research skills, experience, or familiarity with the research process* (19%), followed closely by PSTs making *evidenced-based instructional decisions* (18%). A good number also gained confidence in conducting or appreciating the value of research (16%). For example, PST83 noted: "Research isn't scary anymore. And when I'm a teacher

Table 5
PSTs' Perceptions Regarding the Impact of Completing an Inquiry Project on Them as Teachers prior to Completion (Fall), n=95

Prominent Themes	*No. of Responses*	*% of PSTs*	*Participant Representative Quotes*
Inform classroom, learning, instruction	28	29%	It will give me skills I will use to make and assess modifications to my classroom/pedagogy (PST1).
Gain research skills, experience, or familiarity	19	20%	It will help to see how one can go about looking into a problem and how to solve it (PST42).
			Completing the project will let me investigate questions I have in my own classroom so I can see how to improve my teaching (PST16).
Encourage a critical view of education and likelihood of reflection	17	18%	[It will] cause us to look more critically at things (PST17).
			It will open my eyes to the process of observing, analyzing, and reflecting to improve as a teacher (PST10).

I don't have to write it up if I don't want to and that is half the work." Similar to the fall, the PSTs noted that the inquiry project helped them to be *able to conduct or have an intention of conducting future research* (15%), *encouraged a critical view of education and likelihood of reflection* (14%), and *informed the classroom, learning, and instruction* (14%). Overall, the PSTs reported that the project helped them gain research experience and an intent to conduct future research; encouraged them toward a more reflective, critical view of education; and better informed them about classroom practices.

Changes from Fall to Spring. The most noticeable change in PST responses with respect to their perceptions of the impact of the inquiry project on them as teachers was the marked increase in the explicit mention of evidence-based decision-making to enhance instruction (fall, 3%; spring, 18%). Although fewer PSTs mentioned how completing the inquiry project would inform the classroom, learning, and instruction (fall, 29%; spring, 14%), the increase in mention of evidence-based decisions suggests a more specific, focused view of an impact at the classroom level. Other changes involved slight increases in confidence with research (i.e., gaining skills, confidence in conducting, and ability to conduct) and fewer responses in the spring addressing how PSTs would advocate for change or problem solve (fall, 13%; spring, 3%). Although changes from fall to spring are not definitive for this question, the increased orientation toward evidence-based decisions is aligned with current teaching reform recommendations (e.g., Darling-Hammond & Bransford, 2005; Fallon, 2007).

Table 6
PSTs' Perceptions Regarding the Impact of Completing an Inquiry Project on Them as Teachers after Completion (Spring), n=97

Prominent Themes	*No. of Responses*	*% of PSTs*	*Participant Representative Quotes*
Gain research skills, experience, or familiarity	18	19%	It has shown me hands-on how to conduct research (PST81).
Make evidence-based instructional decisions	17	18%	Practice using evidence in teaching decisions (PST6).
			I will know how to use data to drive instruction (PST14).
Confidence in conducting or appreciation of the value of research	16	16%	How amazing to feel that confident as a new teacher (PST103).
			Help me to understand the purpose of research in my classroom (PST12).

Research Question 2c: Perceived Impact on Them as Teacher Leaders

Fall. Five prominent themes emerged regarding PSTs' perceptions about the impact of the inquiry project on them as teacher leaders (see Table 7 for examples of the three most common of these themes). Over a third of the respondents (36%) mentioned ideas related to being *more well-rounded, qualified, confident professionals* who can "contribute to the school" (PST30). Almost as many noted that the inquiry project may *encourage or help them to understand how to become leaders or advocates who initiate change or solve problems* (29%), as noted when PST23 wrote, "I will be able to help and encourage others to improve our school environment." Another theme reported by the PSTs related to their *ability to conduct or intention of conducting research in the future* (22%). Less frequently represented themes included *leading or collaborating with others to conduct research* (17%) and *speaking authoritatively on a topic that was investigated and/or sharing new knowledge* (15%).

Table 7
PSTs' Perceptions Regarding the Impact on Them as Teacher Leaders prior to Completion of an Inquiry Project (Fall), n=95

Prominent Themes	*No. of Responses*	*% of PSTs*	*Participant Representative Quotes*
More well-rounded, qualified, confident professional	34	36%	More confident in working with other professionals (PST41).
			It will be beneficial to my future and my knowledge background will broaden (PST79).
Encourage or understand how to become leaders or advocates who initiate change or solve problems	28	29%	It will hopefully give me skills to be a proponent of change in education (PST40).
			We will gain experience with regard to taking initiative and problem solving (PST55).
Able to conduct or intention of conducting future research	21	22%	It will provide us with the skills to have a question and be able to know how to research it and help our colleagues do so as well (PST17).
			I believe it will give me good experience leading or participating in inquiry projects or new theories in the future (PST89).

Spring. The two spring themes (see Table 8) with the greatest number of responses were the *ability to conduct or intention of conducting research in the future* (30%) (e.g., "Action research... in the REAL WORLD," PST 26) and *encouraging or understanding how to become leaders or advocates who initiate change or solve problems* (27%). A less frequently represented theme related to *confidence in conducting or appreciation of the value of research* (13%).

Changes from Fall to Spring. In the spring, there were markedly fewer responses related to general statements about being well-rounded, qualified, confident professionals (fall, 36%; spring, 6%). One might have hoped that this change was because PSTs instead were reporting greater attention to specific leadership roles; however, this was not the case. Overall, there seemed to be little or negative change in responses that indicated being capable of leading inquiry-type endeavors. For example, there were fewer responses related to leading or collaborating with others on research (fall, 17%; spring, 9%). On the positive side, there was a slight increase in responses related to the potential for conducting future research (fall, 22%; spring, 30%) and confidence or appreciation of research (fall, 9%; spring, 13%). While, overall, these PSTs did not evoke leadership roles, they did note confidence in their own abilities to participate in inquiry—an important component in building a stance toward inquiry (Hubbard & Power, 1999; Norlander-Case, Campbell, Reagan, & Case, 1998).

Table 8
PSTs' Perceptions Regarding the Impact on them as Teacher Leaders after Completion of an Inquiry Project (Spring), n= 97

Prominent Themes	*No. of Responses*	*% of PSTs*	*Participant Representative Quotes*
Able to conduct or intention of conducting future research	29	30%	Able to conduct school-wide research (PST43).
			I will be able to generalize my methods and share them (PST78).
Encourage or understand how to become leaders or advocates who initiate change or solve problems	26	27%	Speak up more to make a change (PST3).
			It allows us to take initiative on an issue we believe in (PST68).
			It showed me that I can make a change (PST96).

Discussion

This research suggests that the PSTs demonstrated increased confidence related to a stance toward inquiry during their final, master's year in our TPP. Specifically, there were moderate increases in confidence in all three subscales of the PEBD survey (i.e., evidence from educational research; classroom- and school-level assessments; and district-, state-, and national/international data). The open-ended responses corroborated increased confidence and linked it to the PSTs' perceptions of the impact of the inquiry project experience. Further, the findings suggest that while the TPP experiences prior to the completion of the inquiry project (fall data) supported a beginning stance toward inquiry, there was value added to that stance from the inquiry project and associated master's year experiences (spring data).

This value added, as indicated from both the PEBD and open-ended results, included not only moderate increases in confidence but also shifts from an orientation toward the present (as a student) to one toward the future (as a professional). These shifts were noted particularly in relation to inquiry and evidence-based decision-making—practices advocated by school reformers (e.g., Cochran-Smith & Lytle, 1990, 1999; Fallon, 2007; Goodlad, 1994). Thus, while most PSTs continued to envision the completion of an inquiry project as an exercise in conducting research, it appears that their stance toward inquiry shifted toward their future careers. As previously noted, this is corroborated by a decrease in mention of insights related to particular topics and personal interests and an increase in responses related to acquiring a more holistic view of the teaching profession. The results suggest a shift from a more limited, student-oriented, immediate view of inquiry to a more holistic, professional, future-oriented view of inquiry. This indicates potential alignment with Barnatt et al.'s (2007) description of a stance toward inquiry that involves a general perspective rather than one moment or experience.

Although the evidence suggests a shift toward a more future-oriented view of inquiry, it also reveals some question about PSTs' confidence in taking on research-related leadership roles. Additionally, the PSTs seemed to have a clearer focus on classroom-level implications than on school-wide ones that might involve leadership roles. A plausible explanation for these findings is that the PSTs increasingly were becoming more grounded and aware of the realities of teaching—possibly as a result of participating in job interviews. Because the PSTs were preparing for their first professional classroom teaching positions, some ambivalence about taking on leadership roles may demonstrate realistic perspectives—perhaps explained as an understanding that they may need to focus on establishing themselves in their own classrooms before taking on leadership roles beyond the classroom.

Limitations

While this research provides an initial step investigating the influence of a specific TPP, including the requirement of completing an inquiry project, there consequently are several limitations to this study. Because this sample of PSTs was taken from a

five-year program with the final year occurring after student teaching, it may not be representative of PSTs from other programs that require inquiry-type projects and experiences; some teacher preparation programs offer a four-year undergraduate program while other PSTs complete an entry-level master's program. In a similar vein, the definition of and requirements for inquiry projects and associated experiences may differ from program to program, thus limiting the study's generalizability. For instance, the extent to which PSTs apply research-type articles may differ, as might the methodologies employed in their projects. This research did not employ a control group of PSTs who did not complete an inquiry project; therefore, we cannot claim that the inquiry project caused the increase in confidence. For example, it is plausible that this change in stance may be attributed, at least in part, to developmental changes. Nevertheless, because the inquiry project is the capstone experience in the TPP and a major endeavor, its impact should not be diminished. Finally, there are limitations resulting from the employed methods. As is the case with the implementation of any qualitative methods, the researchers realize that there could be other reasonable interpretations of the data. Relying on a written survey limited the analysis to what the PSTs addressed with each response; it was not possible to probe the PSTs to see if they had additional thoughts. The PEBD also was one measure; other instruments and methods could reveal yet other results.

Implications and Conclusions

In light of growing recommendations that teachers should base professional practices on evidence (e.g., Fallon, 2007) and that teachers should be involved in inquiry (e.g., Burnaford, et al., 2001; Cochran-Smith & Lytle, 1990, 1999; Hubbard & Power, 1999), we sought to examine how well the final year of our TPP enables our PSTs to develop a stance toward inquiry. This investigation represents the beginnings of this endeavor and suggests that there is a "proof of concept" with regards to the implementation of an inquiry theme that is accomplished primarily through the completion of an inquiry project. We used the PEBD instrument to examine changes in confidence and found moderate increases across all subscales as PSTs' average scores moved from "somewhat confident" towards and, in the case of confidence in using classroom- and school-level data, beyond "quite confident." The results of the open-ended items corroborated these findings and also added details specifically related to the inquiry project.

Further, although this research demonstrated that beginnings of a stance toward inquiry can occur prior to a formal inquiry experience (as indicated by the fall data), it also showed that there appears to be value added from the capstone experience. Therefore, we recommend that TPPs consider explicit attention to inquiry in order to promote lifelong learning (Hammerness et al., 2005), evidence-based practice (Fallon, 2007), and a stance toward inquiry (Bransford, Darling-Hammond, et al., 2005).

While this research provides beginnings of a quest for understanding how well teacher preparation programs may help future teachers develop a stance toward

inquiry, further research is warranted. Recalling that confidence is an indicator of self-efficacy, that self efficacy is an indicator of motivation and capabilities (Bandura, 1997), and that teacher efficacy is linked to positive teacher behavior and student performance (Henson, 2001; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998), the results of this research cautiously suggest potential impact on classroom practice. However, further investigation as to whether these tendencies persist as the PSTs move into their professional careers is warranted. For example, to understand the impact of the inquiry experience further, a follow-up study should be conducted to determine the influence that PSTs' increased confidence has on their stance towards inquiry as practicing teachers. It would be efficacious to measure the teachers' confidence beyond the initial teaching years when they may be less preoccupied with the daily nuances of teaching and are presented with more opportunities to engage as teacher leaders. More than likely, a greater number of teachers will have opportunities to work with class- and school-level data (second PEBD subscale) rather than using data beyond the district level (third subscale). They also might not see the need for reading educational research articles (first subscale) outside of their courses and may not use these to inform their teaching. Thus, it might be worthwhile to target PSTs who scored high in the factor representing confidence in using class- and school-level data to measure the impact of using these measures to improve instruction.

It would also be useful to analyze the PEBD data in light of different kinds of inquiry experiences. For example, how might increases in confidence differ across the subscales with different kinds of inquiry experiences? Although a variety of inquiry project experiences were represented in our TPP, the current research did not compare the specific experiences with the confidence subscales. These comparisons could be used to identify influences of specific inquiry experiences. Future research could also account for differences across programs that emphasize inquiry, including those that do and do not have PSTs complete an inquiry project.

For this study, the PEBD resulted in reliable scores, and therefore, with further validity evidence, it may provide a useful tool for teacher preparation programs that wish to gauge the effectiveness of experiences related to a stance toward inquiry, particularly when combined with qualitative evidence. For instance, it could be used by other teacher preparation programs that require the completion of an inquiry project or other research endeavor (e.g., Mule, 2006; Rich & Hannafin, 2008) to study changes in their students. Quantitatively and qualitatively comparing PSTs who do and do not complete an inquiry project would help us examine the growth in and level of PSTs' confidence and how these are impacted by the completion of an inquiry project, shedding more light on how fruitful it is to engage PSTs in completing such a project. In addition, such research may call attention to experiences other than the completion of inquiry projects that may help instill confidence in PSTs who are developing a stance toward inquiry and making evidence-based decisions. Furthermore, following PSTs who have and have not completed an inquiry

project after their initial teaching years and comparing how they use educational research and assessment data to inform their teaching would highlight the potential long-term benefits of this type of research project. The compilation of these studies could help support teacher education programs as they attempt to instill in PSTs the importance of adopting a stance toward inquiry to deal with the complexities of teaching.

Authors' Note

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Notes

[1] The instrument is available upon request from the authors. The PEBD Likert items are listed on the table in Appendix A, although they are not grouped by factor on the instrument.

[2] In the description of the results, we used a cut-off of 10-15% to determine prominent themes. Due to space limitations, the tables include only two or three of the most common themes per category.

[3] Each PST had a unique identification number that allowed us to track individual fall and spring data. For reporting purposes, the identifying numbers were simplified to PST#—for example, in the fall and spring, PST45 represents the same individual.

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Appendix A
The PEBD Items and their Standardized Factor Pattern Coefficients and Communalities

Item	*Factor[a] 1*	*Factor 2*	*Factor 3*	h^2
How confident are you in seeing the limitations and values of the conclusions of educational research articles to inform your teaching?	**.912**			.834
How confident are you in making sense of readings about educational research to inform your teaching?	**.873**			.827
How confident are you in seeing the limitations and values of journal articles written for practitioners (i.e. teachers) to inform your teaching?	**.841**	.122	.121	.792
How confident are you in making sense of the conclusions of educational research articles to inform your teaching?	**.821**			.818
How confident are you in seeing the limitations and values of journal articles written for researcher to inform your teaching?	**.796**		-.125	.811
How confident are you making sense of readings about how educational research data were analyzed to inform your teaching?	**.779**		-.161	.840
How confident are you in making sense of journal articles written for practitioners (i.e. teachers) to inform your teaching?	**.733**	.276	.231	.721
How confident are you in seeing the limitations and values of readings about educational research to inform your teaching?	**.698**	.114	-.200	.821
How confident are you seeing the limitations and values of readings about how educational research data were analyzed to inform your teaching?	**.691**		-.208	.741
How confident are you in making sense of journal articles written for researchers to inform your teaching?	**.683**	-.125		.636
How confident are you in seeing the limitations and values of the results of completed class assignments to inform your teaching?		**.864**		.799

Item	*Factor[a] 1*	*Factor 2*	*Factor 3*	h^2
How confident are you in making sense of a completed class set of homework papers to inform your teaching?		**.846**	.151	.723
How confident are you in making sense of the results of completed class assignments to inform your teaching?	-.100	**.779**		.690
How confident are you in making sense of the results of tests that you developed to inform your teaching?	-.102	**.739**		.734
How confident are you in seeing the limitations and values of classroom test results to inform your teaching?	.119	**.707**		.737
How confident are you in seeing the limitations and values of the results of tests that you developed to inform your teaching?		**.656**	-.148	.714
How confident are you in seeing the limitations and values of a completed class set of homework papers to inform your teaching?		**.636**		.656
How confident are you in making sense of classroom test results to inform your teaching?		**.549**	-.206	.644
How confident are you in making sense of students' academic records that represent multiple years of schooling to inform your teaching?		**.526**	-.204	.761
How confident are you in seeing the limitations and values of students' academic records that represent multiple years of schooling to inform your teaching?	.226	**.489**	-.166	.774
How confident are you in making sense of students' report cards to inform your teaching?	.128	**.447**	-.149	.637
How confident are you in seeing the limitations and values of students' report cards to inform your teaching?	.240	.388	-.214	.688
How confident are you in making sense of state test results to inform your teaching?			**-.841**	.790
How confident are you in making sense of the results of district-level tests to inform your teaching?	-.106	.146	**-.765**	.789

Item	*Factor*[a] *1*	*Factor 2*	*Factor 3*	h^2
How confident are you in seeing the limitations and values of the results of district level tests to inform your teaching?		.186	**-.758**	.808
How confident are you in seeing the limitations and values of state test results to inform your teaching?	.210		**-.710**	.743
How confident are you in seeing the limitations and values of national or international standardized test results to inform your teaching?	.219		**-.674**	.737
How confident are you in making sense of national or international standardized test results to inform your teaching?	.153	.110	**-.648**	.762

Notes. Boldface factor loadings have values of .40 or greater and signify items primarily with that factor. Values less than .1 were suppressed. *h2*=communalities of the measured variables.

[a] The three factors operationally define the following constructs: confidence using educational research and articles (Factor 1), confidence using class- and school-level data (Factor 2), and confidence using district-, state-, and national/international-level data (Factor 3).