Exploring teachers’ beliefs about teaching knowledge: Where does it come from? Does it change?

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Decision Letter

I am pleased to inform you that the revision of your manuscript entitled "Exploring teachers’ beliefs about teaching knowledge: Where does it come from? Does it change?" is accepted for publication in The Journal of Experimental Education pending minor revisions, as suggested by the reviewer whose comments appear below. I am particularly interested in your addressing the issue of inter-rater agreement and the relations of your findings to the controversy about naive versus advanced epistemic beliefs.

Once you have completed the suggested changes, please submit the revised version to me and I will review it and send you an official acceptance.

Thank you for your fine contribution. On behalf of the Editors of The Journal of Experimental Education, we look forward to your continued contributions to the Journal.

Sincerely,
Tamera Murdock, Ph.D.
Executive Editor, The Journal of Experimental Education
murdocktb@umkc.edu

Reviewer(s)' Comments to Author:
Consulting Editor/Reviewer: 1
Comments to the Author
I applaud the authors’ efforts in responding to the comments made by the reviewers and editor. I think that the manuscript is greatly improved and will certainly add to the field. Well done!
I have a few minor, but I think important, suggestions to polish off the manuscript that will not add greatly to its length.

Analyses
Do you have some inter-rater agreement results to report? For example, this would be helpful when you describe Stages 4 and 5 (p. 18-19) of your analyses. When you did your coding “independently” and found “differences” what was the extent of those differences before you “reached an agreement”?

Discussion
This section seems to start rather abruptly - maybe a very brief intro sentence or two/road map might be in order.

I was glad to see your inclusion of issues related to domain-specificity in the Intro and Discussion sections. As you discuss this on p. 32 and bring in several references, a few specific quotes/examples from your findings would really clarify this section.

Finally, and I think most importantly, there should be a brief discussion of how your results/study may speak to one of our most common problems currently in the field - how we deal with what is considered to be “naïve” and what is considered to be “advanced” epistemic beliefs and how this impacts our research and the implications of our work. As you accurately state on p. 38 a strict belief in authority reflects a naïve perspective while more constructivist views are taken to be more advanced. You also mention this on p. 39 as well (i.e., preservice teachers believing that all knowledge is relative/constantly changing so why bother with educational theory and/or anything new).

Currently, this dichotomy/continuum of epistemic beliefs does not seem to be of value either conceptually or in terms of how we should measure epistemic beliefs in the future. I think it would be valuable for the reader if the authors could say a bit more about this. You briefly mention some of the developmental theory in the field (e.g., Kuhn, King & Kitchener, Perry) in your literature review. For example, isn’t Kuhn’s evaluativism (i.e., the coordination of objective and subjective epistemic beliefs) helpful in understanding the greater complexity/variety of beliefs that you found in your study? I think that more discussion of this could add to your contribution and to the field. Good luck with your research!

Author Response

We are delighted that our manuscript, “Exploring teachers’ beliefs about teaching knowledge: Where does it come from? Does it change?," has been accepted to the Journal of Experimental Education pending minor revisions.

We appreciate the comments and suggestions raised by you and the reviewer. In particular, you asked that we address the issue of inter-rater agreement and how our findings relate to the literature on naïve versus
advanced epistemic beliefs. Reviewer 1 also raised these points and two additional points. We have pasted Reviewer 1’s comments and our responses below.

Reviewer 1 Comment:
“Do you have some inter rater agreement results to report? For example, this would be helpful when you describe Stages 4 and 5 (p. 18-19) of your analyses. When you did your coding “independently” and found “differences” what was the extent of those differences before you “reached an agreement”?”

Our Response:
We do not have inter-rater agreement results to report as inter-rater agreement was not calculated. In this investigation, we did not have a coding scheme that we were applying so as to quantify the data we collected. We were most interested in how we could represent what emerged from the data. That is, instead of focusing on the reliability of our coding, we focused on dependability (i.e., Guba & Lincoln, 1989; Mertens, 1998). We, the authors, both coded all of the data and attempted to be as transparent as possible so that our decisions could be tracked and inspected. For instance, we provide a detailed description of our data analysis steps and include direct quotations to support our claims. Additionally, we intentionally did not calculate nor present frequency data with respect to specific codes or themes. Our focus is on capturing the types of beliefs that emerged rather determining their prevalence, in which case consistency in coding would be more important.

In terms of Reviewer 1’s questions about Stages 4 and 5 of our data analysis, as described on pages 18-19, we separately sorted the codes we developed categories. We then compared our organizational schemes. Differences, therefore, were with respect to overall categories, not specific codes. We discussed such differences until we had a joint scheme that we were both comfortable with as a representation of the data. This is the organizational framework that we present.

We currently have not made any changes to the text with respect to inter-rater agreement. However, we would be happy to include a discussion for the lack of inter-rater agreement information if you would like.

Reviewer 1 Comment:
“This section [the discussion] seems to start rather abruptly – maybe a very brief intro sentence or two/road map might be in order.”

Our Response:
We have included a brief introductory paragraph for the discussion on page 29.

Reviewer 1 Comment:
“...and I think most importantly, there should be a brief discussion of how your results/study may speak to one of our most common problems currently in the field – how we deal with what is considered to be “naive” and what is considered to be “advanced” epistemic beliefs and how this impacts our research and the implications of our work. As you accurately state on p. 38 a strict belief in authority reflects a naive perspective while more constructivist views are taken to be more advanced. You also mention this on p. 39 as well (i.e., preservice teachers believing that all knowledge is relative/constantly changing so why bother with educational theory and/or anything new).

Currently, this dichotomy/continuum of epistemic beliefs does not seem to be of value either conceptually or in terms of how we should measure epistemic beliefs in the future. I think it would be valuable for the reader if the authors could say a bit more about this. You briefly mention some of the developmental theory in the field (e.g., Kuhn, King & Kitchener, Perry) in your literature review. For example, isn’t Kuhn’s evaluativism (i.e., the
coordination of objective and subjective epistemic beliefs) helpful in understanding the greater complexity/variety of beliefs that you found in your study? I think that more discussion of this could add to your contribution and to the field. Good luck with your research!”

Our Response:
We agree with this insight. We now include a discussion of our work in relation to the issue of naïve and advanced epistemic beliefs and incorporate Kuhn’s concept of evaluativism as suggested by Reviewer 1 (p. 38-40).

In addition to the specific changes listed above we also gave the manuscript a detailed editing and have corrected some minor grammatical and spelling errors. We also included our names where we previously had “Authors” so as to blind our identity from the reviewers.

We hope that with these changes the manuscript is now suitable for publication. We appreciate the time you and the reviewers have devoted to this work and look forward to hearing from you.

Sincerely,
Exploring teachers’ beliefs about teaching knowledge:

Where does it come from? Does it change?
Abstract

In this qualitative study, we analyzed the open-ended responses of preservice (n=53) and practicing (n=57) teachers for themes related to beliefs regarding the source and stability of teaching knowledge. Results indicate that participants hold a range of beliefs regarding these constructs. Six themes emerged related to the source of teaching knowledge (formal education, formalized bodies of knowledge, observational learning, collaboration with others, enactive experiences, and self-reflection). For beliefs about the stability of teaching knowledge, individuals expressed beliefs about the amount, direction, and quality of knowledge change with regard to various aspects of knowledge (e.g., content knowledge, use and integration of technology, knowledge of development and pedagogy). We relate our findings to the existing literature and discuss the implications of the identified beliefs for future research as well as teacher education, development, and practice.
Exploring teachers’ beliefs about the nature of teaching knowledge:

Where does it come from? Does it change?

Teachers’ beliefs lie “at the very heart of teaching” (Kagan, 1992, p. 85). Although these beliefs have been examined in relation to a wide array of topics (e.g., development, Buchanan, Eccles, Flanagan & Midgley, 1990; classroom management, Weinstein, 1998), some aspects of teachers’ belief systems are under-explored. In particular, there is a growing body of work related to individuals’ beliefs about the nature of knowledge and knowing (i.e., epistemic beliefs; Hofer & Pintrich, 1997; Hofer, 2002). This literature has focused primarily the nature and role of students’ beliefs. However, frameworks used to understand students’ beliefs about knowledge may also offer insight into teachers’ beliefs and their role in relation to teacher practices and development.

The purpose of this investigation was to extend the framework used to investigate students’ epistemic beliefs to preservice and practicing teachers’ beliefs about teaching knowledge (i.e., any knowledge used to facilitate the practice of teaching). Given the paucity of research in this area and calls for more qualitative work related to teachers’ beliefs (Brookhart & Freeman, 1992), we chose to examine preservice and practicing teachers’ responses to a series of open-ended questions in order to gain insight into their beliefs about the nature of teaching knowledge with a specific focus on beliefs about the source and stability of teaching knowledge.

*Issues in the Study of Epistemic Beliefs*

Since Perry’s initial work in the 1950s, various conceptualizations of individuals’ views of knowledge and knowing have been developed (e.g., King & Kitchener, 1994; Kuhn, 1991; Perry, 1970). More recently, epistemic beliefs have been conceptualized as a multidimensional and multilayered aspect of individuals’ belief systems (Buehl & Alexander, 2001; Schommer,
Learners are believed to possess distinct beliefs about different aspects of knowledge, such as where knowledge comes from (i.e., source of knowledge), whether knowledge is certain and unchanging or tentative and evolving (i.e., stability of knowledge), and whether knowledge is simplistic and isolated or complex and integrated (i.e., structure of knowledge; Schommer, 1990; Schraw, Bendixen, & Dunkle, 2002). Previous investigations have identified belief dimension in students of varying ages (e.g., elementary school students: Conely, Pintrich, Vekiri, & Harrison, 2004; high school students: Schommer, 1993; college students: Schraw et al., 2002) and examined them in relation to various aspects of learning (e.g., strategy use and academic performance; Hofer, 2000; Kardash & Howell, 2000). Additionally, students may possess beliefs about knowledge in general as well as beliefs about knowledge that vary depending on the domain under consideration (i.e., domain-specific beliefs; Buehl & Alexander, 2001, 2006; Muis, Bendixen, & Haerle, 2006). Studies suggest that students’ beliefs not only differentiate by domain but may also be differentially related to aspects of students’ learning (e.g., Buehl, Alexander, & Murphy, 2002; Buehl & Alexander, 2005). For instance, Hofer (2000) found that college students believed that authority figures and experts were the primary source of science knowledge more so than for psychology knowledge. In contrast, personal experience was more often used as the basis for knowledge justification in psychology than in science. Further, students’ beliefs about the certainty and simplicity of knowledge were negatively related to their psychology grade but the same relation was not significant for science. Recently, models have been proposed to represent the dual nature of beliefs (i.e., domain-general and domain-specific) as well as how individuals’ belief systems interact throughout the course of one’s development (e.g., Buehl & Alexander, 2006; Muis et al.,
2006). However, much of this work has focused on students’ beliefs about knowledge, be it domain-general or domain-specific knowledge.

Previous Studies of Teachers’ Epistemic Beliefs

The role of teachers’ epistemic beliefs with respect to teacher education and practice has been discussed (e.g., Hofer & Pintrich, 1997; Patrick & Pintrich, 2001; Woolfolk & Murphy, 2001), but relatively few empirical investigations have explored teachers’ beliefs about the nature of knowledge using the same multidimensional framework employed with students beliefs. Using interviews and or questionnaires, researchers have found that preservice and practicing teachers’ beliefs about knowledge a) are varied and may change depending on the context (e.g., Olafson & Schraw, 2006; White, 2000; Yadav & Koehler, 2007), b) can change as a result of instruction (e.g., Brownlee, Purdie, & Boulton-Lewis, 2001; Gill, Ashton, & Algina, 2004), c) may influence how and what they learn in teacher education classes (e.g., Ravindran, Greene, & Debacker, 2005), and d) may influence teaching practices (e.g., Sinatra & Kardash, 2004; Yadav & Koehler, 2007).

For instance, Ravindran et al. (2005) found that preservice teachers’ beliefs about the simplicity of knowledge were related to shallow levels of cognitive processing. With respect to teaching practices, Sinatra and Kardash (2004) found that preservice teachers’ beliefs about the complexity of knowledge and the speed of knowledge acquisition predicted their openness to a new metaphor for teaching. In another investigation, Yadav and Koehler (2007) found that preservice teachers’ selection and interpretation of effective video cases were reflective of their beliefs about the simplicity of knowledge and students’ ability to learn how to learn. However, Olafson and Schraw (2006) found that there are inconsistencies between the beliefs expressed by practicing teachers and their teaching practices.
Throughout this research there is acknowledgement that teachers’ beliefs are complex. That is, beliefs may not cleanly fall into discrete categories (e.g., Olafson & Schraw, 2006; White, 2000) and individuals may hold multiple beliefs that are both domain-general and domain specific. Further, Many, Howard, and Hoge (2002) found evidence that pre-service teachers hold different beliefs about knowledge depending on whether they are focused on teaching or learning (i.e., considering themselves in the role of the teacher in a classroom or considering themselves in the role of the learner in a teaching education program). Consequently, in assessing teachers’ beliefs it is essential to indicate the body of knowledge that should be considered.

In previous investigations, the target body of knowledge participants were to reference was either not specified (e.g., Ravindran et al., 2005), indicated in a vague manner (e.g., knowledge in relation to a “problematic classroom situation,” White, 2000), discussed in terms of students’ knowledge (e.g., Olafson & Schraw, 2006), or was particular to an academic domain (e.g., mathematics: Gill et al., 2004; science: Tsai, 2007). The ambiguity in assessment and or lack of attention to teacher-specific knowledge may account for some of the difficulty in classifying teachers’ beliefs and examining them in relation to practice. Teachers’ knowledge is complex and multidimensional as evidenced by the many classification schemes that have been proposed and discussed (see Elbaz, 1983; Grossman, 1990; Shulman, 1987 for examples). For instance, knowledge of how to teach (pedagogical knowledge) is specific to the teaching profession and beliefs about the nature of this knowledge may have implications for teacher education and development.

Given the discussion of the domain-specificity of beliefs and calls to assess beliefs at an appropriate level of specificity (e.g., Buehl & Alexander, 2006; Muis et al., 2006; Pajares, 1992), we propose that it is important to examine teacher’s beliefs about the nature of teaching
knowing where teaching knowledge is defined as all knowledge relevant to the practice of teaching. In a previous investigation, we explored pre-service and practicing teachers’ beliefs about the content of teaching knowledge (Fives & Buehl, 2004). Here we focus on pre-service and practicing teachers’ beliefs about the source and stability of teaching knowledge.

**Teacher Beliefs about the Source and Stability of Teaching Knowledge**

**Source.** The source of knowledge is a basic epistemic question that has been considered within the various models of epistemic development (e.g., Belenky, Clinchy, Goldberger, & Tarule, 1986; King & Kitchener, 1994; Kuhn, 1991; Perry, 1970). Schommer (1990) also included the source of knowledge as one of the five epistemological belief dimensions in her multidimensional conceptualization of beliefs. Although she (Schommer, 1990; 1993) did not identify source as a coherent factor when she factor analyzed data from her belief measure, other researchers have (e.g., Hofer, 2000; Jehng, Johnson, & Anderson, 1993; Schraw et al., 2002).

In these investigations, beliefs about the source of knowledge are conceptualized along a continuum. On one end of the continuum knowledge is viewed as originating and conveyed by authority figures and on the other end knowledge is viewed as actively constructed by the individual learner based on his or her personal experience and reason (e.g., Hofer, 2000, 2004; Schraw et al., 2002; Wood & Kardash, 2002). Beliefs about the source of knowledge have differed based on level of education of the participants (e.g., graduate students vs. undergraduate students; Jehng et al., 1993) as well as the academic discipline under consideration (e.g., Hofer, 2000; Jehng et al., 1993). Although beliefs about the source of knowledge have not been assessed and studied in relation to learning outcomes as extensively as some of the other belief dimensions (e.g., certainty and simplicity of knowledge), there is evidence that beliefs about the source of knowledge are important to learning outcomes and potentially teaching practice. In
particular, stronger belief in authority as the source of knowledge has been related to lower levels of motivation, more surface level strategy use, and lower levels of meaningful cognitive engagement (e.g., Buehl, 2003; Ravindran et al., 2005). If similar belief relations exist among preservice and practicing teachers, these individuals may be less likely to engage in reflective teaching practice and may be less likely to see themselves as knowledge contributors in their professional communities.

The role of beliefs about the source of knowledge is also acknowledged in the teacher education literature in empirical studies (e.g., Holt-Reynolds, 2000) and more conceptual and theoretical discussions. For example, Shulman (1987) provided a categorization of the knowledge base for teaching and presented a discussion of the four sources of this knowledge:

1. scholarship in the content disciplines,
2. the materials and settings of the institutionalized educational process,
3. research on schooling, social organizations, human learning, teaching and development,
4. the wisdom of practice itself. (Shulman, 1987, p. 8)

Shulman’s description articulates the source of teaching knowledge as external to the individual. While emphasis is given to craft knowledge or the “wisdom of practice,” recognizing the reasoning of practicing teachers, Shulman emphasized this as a vanishing source of knowledge that needs to be harnessed for future generations instead of recognizing the source of the knowledge itself in the practice of those teachers. In contrast, Richardson (1996) emphasized the role of experience in her categorization of influences on teaching knowledge and beliefs (i.e., personal experience, experience with schooling, and experience with formal knowledge).

Although we might expect the sources articulated by Shulman and Richardson to be common themes among individuals’ beliefs about the source of teaching knowledge, preservice and practicing teachers may also endorse additional sources of teaching knowledge. Further,
endorsement of different sources of knowledge may be related to different reactions to or perceptions of teacher education and development. In the current investigation, we wanted to uncover preservice and practicing teachers’ beliefs about the source of teaching knowledge in order to better understand how these varied beliefs may influence the experiences of learning to teach and classroom teaching.

Stability. Within the epistemic belief literature, researchers have also explored whether individuals believe that knowledge is certain and unchanging or tentative and evolving (i.e., beliefs about the stability or certainty of knowledge) and how these beliefs are related to learning processes and outcomes. For instance, students’ who believed that knowledge was more certain and stable tended to have lower grades (e.g., Hofer, 2000), demonstrated less conceptual change (e.g., Qian & Alvermann, 1995), and avoided argumentation (Nussbaum & Bendixen, 2003). In contrast, students who believed less in the certainty knowledge used more strategic processing (e.g., Kardash & Howell, 2000) and represented inconclusive text more accurately (e.g., Kardash & Scholes, 1996). Additionally, there are differences in perceptions of the stability of knowledge based on education level (e.g., graduate vs. undergraduate students; Jehng et al., 1993) and the discipline considered (e.g., Hofer, 2000; Paulsen & Wells, 1998).

However, in some investigations, beliefs about the stability of knowledge are closely associated with beliefs about the structure or simplicity of knowledge such that combined simplicity/certainty factors have been created and used in analyses (e.g., Hofer, 2000; Qian & Alvermann, 1995). This blurs the how these beliefs are related to learning outcomes. Further, teachers’ beliefs about the stability of teaching knowledge have not been explored extensively. Studies that have been conducted suggest that beliefs about the stability of knowledge may function differently in teachers than anticipated by researchers. For instance, Ravindran et al.
(2005) found that preservice teachers’ beliefs about the certainty of knowledge positively, but unexpectedly, predicted meaningful cognitive engagement in an applied learning situation.

The work of Alexander, Murphy, and Woods (1996) offers insight into how teachers may view teaching knowledge as constant and unchanging or variable and fluctuating. Specifically, Alexander et al. (1996) identified iterative trends in the field of education, referring to the repetitive or cyclical nature of some teaching innovations (e.g., discovery learning and direct instruction). Consequently, teachers may adopt the view that “there’s nothing new” in education. Others may perceive teaching knowledge as constantly changing, and whole-heartedly accept “new” approaches with little appreciation or understanding of previous implementations, or hold that knowledge of how to teach undergoes only minor changes to core teaching practices. Such beliefs have important implications for how preservice teachers respond instruction as well as how practicing teachers respond to new innovations, theories, and research findings presented in professional development experiences. Given the complexity of teacher knowledge, we wanted to explore how beliefs about the certainty of this body of knowledge are articulated by preservice and practicing teachers.

Purpose and Research Questions

The purpose of the current investigation was to examine preservice and practicing teachers’ beliefs about the source and stability, or certainty, of teaching knowledge. Specifically, two research questions framed this investigation:

1. What do preservice and practicing teachers perceive as the source or sources of teaching knowledge?

2. What are preservice and practicing teachers’ perceptions with respect to the stability (i.e., certainty) of teaching knowledge?
Method

Participants

Given the exploratory nature of this investigation and our desire to maximize the potential for the diversity of emergent beliefs, we chose to sample the beliefs preservice and practicing teachers with varying levels of experience from two geographic locations in the United States. Specifically, we wanted to gauge the various perspectives future and current educators may hold with respect to teaching knowledge. We felt that a greater variety of perspectives was more likely to emerge from individuals with varying levels of teaching experience (e.g., preservice, novice practicing, and experienced practicing teachers) and grade level experience (e.g., elementary, middle school, and high school) as well as from different geographic locations and teacher education programs in the United States. Our goal was not to quantify and compare the frequency of beliefs by group but to identify the types of beliefs preservice and practicing teachers may hold.

For this investigation, 53 preservice and 57 practicing teachers were recruited from education courses at two large, state universities, one in the southwest region of the United States and one in the mid-south region of the United States, and through professional contacts within specific schools in both regions. The preservice teachers were recruited from different cohorts in teacher education program classes from the respective universities (i.e., southwest: 30; mid-south: 23). The preservice teachers ranged in age from 20 to 53 with a mean age of 25.75 (SD=6.90), and they were primarily female (70%) and European American (70%). Other ethnicities represented in the sample included African American (24%), Asian American (2%), and Hispanic (2%). Although the majority of the preservice teachers were university juniors and seniors (43%), a few held a bachelor’s degree (6%), others held a bachelor’s degree and had
completed some additional coursework for licensure (40%) with a small percentage having already received a master’s degree (11%). These preservice teachers planned to teach at the elementary (34%), middle school (6%) and high school (28%) levels. Additionally, 32% of the participants did not report whether they wanted to teach at the elementary, middle school, or high school level.

The practicing teachers were recruited from advanced teacher education programs at the two universities as well as through professional contacts (i.e., southwest: 37; mid-south: 20). Those enrolled in education courses were recruited from different programs. The practicing teachers range in age from 21 to 60 with a mean age of 37.80 (SD=11.08). Further, their years of teaching experience ranged from .5 to 30 years (M=10.07; SD=7.49). The practicing teachers were also predominately female (79%) and European American (80%) with smaller percentages of individuals who reported themselves as African American (14%), Asian American (2%), Mexican American (4%), and Mixed Ethnicities or Other (2%). The majority of our practicing teachers (44%) had some education beyond their bachelor’s degree. A considerable number of teachers (35%) had completed course work at or beyond the master’s level, whereas only three teachers (7%) held only an undergraduate degree with no additional education. The practicing teachers in our sample taught at the elementary (35%), middle school (28%), and high school (16%) levels with 32% of the participants no reporting the grade level they were currently teaching.

Measure

The Open-Ended Teaching Belief Questionnaire (OTBQ) was developed by the authors to assess preservice and practicing teachers’ beliefs about the nature of teaching, as well as beliefs about the source, stability, and content of teachers’ teaching knowledge. This measure
consisted of 10 open-ended questions and two restricted response question (i.e., select a metaphor for teaching and rank order goals of teaching). A copy of the complete questionnaire can be found in Fives and Buehl (2004). For this investigation, we were particularly interested in individuals’ beliefs about the source and stability of teaching knowledge and subsequently focused our analysis on responses to a smaller subset of questions.

Specifically, item 7 (i.e., “Where does the knowledge of how to teach come from?”) was intended to address beliefs about the source of teaching knowledge. However, in examining individuals’ responses across the questions, we realized that beliefs about the source of teaching knowledge were also apparent in responses to items 2 and 9 which addressed beliefs about the ability to teach (i.e., “Is teaching a talent people are born with? Please explain.” and “Can someone learn how to be an effective teacher?”). Consequently, we analyzed individuals’ responses to items 2, 7, and 9 together but here only present findings relative to the source of teaching knowledge. An analysis of these items with respect to individuals’ beliefs about the ability to teach is presented by Fives and Buehl (2004).

To determine the extent to which individuals believed teaching knowledge would change or remain the same, we analyzed responses to two related questions. (i.e., 6a: “In the next 20 years, how much do you think the knowledge needed for effective teaching will change?” and 6b: “In the next 20 years, in what way(s) do you think the knowledge needed for teaching will change? Please provide specific examples.”).

Procedures

The OTBQ was administered to all participants as a written questionnaire in which participants wrote their responses to the questions. Responses were later transcribed by the authors into a spreadsheet. For participants recruited through university classes, course
instructors were contacted with a request to solicit participants during their scheduled class time. At the discretion of the course instructor, participants from the university classes wrote their responses to the OTBQ questions in a single sitting at the end of a scheduled class session or completed the questionnaire at home and returned it the next class to a graduate research assistant. None of these participants were students of the researchers nor did participants receive course credit or other forms of remuneration (e.g., money) for their participation. Practicing teachers not enrolled in university courses were recruited through professional contacts at their schools. Questionnaires were placed in the teachers’ school mailboxes with an invitation to participate. These teachers then completed the questionnaire and returned it to the school within a week. Practicing teachers recruited through professional contacts did not receive any form of compensation. Based on in-class observations and participants’ comments, participants took 15 minutes to one hour to respond to the questions.

Researchers’ Perspectives

Although we have made every effort to hold our personal perspectives on knowledge in abeyance throughout the data analysis process, these beliefs none the less influenced how we approached the data. As noted by Berg (2001)

“…all humans residing in and among social groups are the product of those socials groups. This means that various values, moral attitudes and beliefs orient people in a particular manner” (p. 140).

This orientation or perspective then infuses the research questions asked and, in qualitative research, the processes of analysis wherein the researcher is the tool of analysis. For instance, a researcher’s perspective on social groups influences the terms she uses in describing those groups (Berg, 2001; Hesse-Biber & Leavy, 2007). In the present investigation, our perspectives on the nature of knowledge and knowing as well as the field of education influenced the
selection of terms in our coding process. Thus, we recognize the importance of sharing this perspective with the reader (Berg, 2001; Denzin, 2001; Hesse-Biber & Leavy, 2007).

While we differ somewhat with regard to our personal perspectives and background experiences, there is also considerable overlap in our professional training and views of knowledge. For the purpose of this investigation, we negotiated, at the beginning of our data analysis process, an understanding of how we view the nature of knowledge and subsequently viewed the data from our participants. This perspective is informed by the existing research as well as our own teaching and life experiences. Specifically, we both believe that knowledge exists within the mind of an individual. That is, a book, the internet, or even the finest article in the *Journal of Experimental Education*, does not hold knowledge. These are merely stores of information that, at best, may be representations of someone else’s knowledge. Extending this, if knowledge exists within the mind of the individual than it must also be constructed or formed there as well. Further, knowledge is constructed by individuals engaged in interactions with the world that may be social or not, and involves an active process of meaning making. Additionally, we both view knowledge as changing, fluid, and, as such, remain open to alternative manifestations based on active interactions with the world.

*Data Analysis*

Data from the selected questions were analyzed using a modified grounded theory perspective (Glaser & Strauss, 1967) that employed the constant comparative method of data analysis (e.g., Bogdan & Biklen, 1998, Strauss & Corbin, 1998). Grounded theory is an inductive approach to research with the goal of developing theory *from* data rather than applying theory to data. Because we did not begin our research design or data analysis atheoretically, we consider the work presented here to be a modified version of grounded theory research.
Our analysis unfolded in a 6-stage coding and categorization process used in our prior research (Fives & Buehl, 2004) and described below. However, due to the nature of the questions and resulting data there were some differences in how data from questions 2, 7, and 9 (addressing the source of knowledge) were analyzed compared to how the data from questions 6a and 6b (addressing the stability of knowledge) were analyzed. The need for a differentiated approach emerged in stage 3 and is described below.

_Stage 1 and 2._ In the first stage of data analysis, all of the data were reviewed and general field notes were made with respect to possible codes or coding strategies as we transcribed the data into a spreadsheet. In stage 2, we read through all of the data to identify the questions that elicited the responses most related to the current research purpose and questions. For the current investigation, we chose to focus on questions 2, 7, and 9 with respect to the beliefs about the source of teaching knowledge and questions 6a and 6b with respect to the stability of teaching knowledge.

_Stage 3._ In stage 3, for each set of questions, we used the constant comparison method (e.g., Bogdan & Biklen, 1998; LeCompte & Prissle, 1993; Strauss & Corbin, 1998) to develop primary codes we felt best represented the data at the concept level. Thus, each complete idea unit relevant to the research questions was assigned a code that reflected the main idea of the concept. Instead of imposing a preconceived coding scheme on the data, we allowed themes to emerge organically from the data by developing exhaustive coding schemes to represent the concepts and ideas that emerged from participants’ responses. There were six steps in stage 3.

First (step 1), we organized the data into three lots with equal numbers of preservice and practicing teachers in each lot. Lot A included 20% of the data, Lots B and C each approximately 40% of the data. Second (step 2), we independently read and developed a primary coding scheme
for each set of questions based on the responses in Lot A. We then compared our individual coding schemes and collaboratively developed a general approach of coding the remaining data. It was at this point for items 2, 7, and 9, that we decided to continue to code at the concept level, such that, each complete idea, thought, or concept reported by participants received a code. We also recognized at this point that a similar approach was not valuable for the data gathered responding to items 6a and 6b.

Items 6a and 6b were presented as a two-part question in which 6a asked how much knowledge would change and 6b asked what aspects of knowledge would change. In the responses, individuals often responded similarly to both questions or gave a response under one of the questions that addressed both questions. Thus, coding these items individually at the concept level would lead to an overrepresentation of beliefs reported by the same individuals. In examining the responses from individuals in Lot A, we felt that individuals were actually addressing several issues in their responses. After considerable discussion and several trial iterations, we decided to code each response to items 6a and 6b holistically with respect to six different characteristics that emerged from our analysis of the data in Lot A. These characteristics and their related themes are outlined in Table 1. Specifically, for each person we identified the approach they took to their response (i.e., Did they report an expected change or hoped for change?). We also examined each response for reference to the topic or area of change (i.e., What changed?). Additionally, for each topic or area indicated we coded for the nature of change described. This included the amount of change, the direction of change, and the quality of the change. Finally, we coded responses that indicated a reason for the change.

In steps 3, 4, and 5 of Stage 3 we used an alternating and recursive schedule and that applied a more fine-grained set of codes to each lot of data. Through this process, we
alternatively coded and developed new codes based on one lot of data, shared those codes with the alternate coder who then applied them to the next lot of data and developed any additional necessary codes. That coder then applied the updated codes to the previous data log. Through this process, data from each question were examined at least twice, with the more finely tuned coding sheet applied each time.

Specifically, in step three for both sets of questions Researcher 1 applied the coding scheme developed in step 2 to Lot B of the data. At this time new codes were generated as necessary when the existing coding scheme failed to provide a meaningful code for some new piece of data. For items 2, 7, and 9 this was done at the individual concept level for each of the three items. For items 6a and 6b this was done across both items within the 6 categories identified. That is, new codes were generated as needed relative to each of the identified categories. This code list was then used to re-code Lot A. In the fourth step, Researcher 2 applied the elaborated codes to Lot C of the data and added new codes as necessary. She then applied the codes (with any newly added) to Lots A and B of the data. In the fifth step Researcher 1 applied the elaborated coding sheet to Lot C of the data.

In the sixth step of stage 3 of the data analysis, we compared the coding completed by both researchers and consolidated the two sets of codes such that the most fine-grained coding was maintained. Discussion of the number and contents of the codes and emergent themes is offered in the results and discussion section of this manuscript.

Stages 4 and 5. In stages 4 and 5, we employed analytic induction to independently and collaboratively group similar codes into themes and develop labels for those themes (Strauss & Corbin, 1998). Specifically, in stage 4, we independently conducted a physical sort of the codes developed for each question set into meaningful groupings. In stage 5, we shared and discussed
the rationales for our grouping schemes. Common categories were retained and all differences were discussed until we reached an agreement as to the category heading and included codes. Our pre-negotiated understanding of knowledge was used to guide us as we collapsed our initial or primary codes into more meaningful secondary codes.

Stage 6. In stage 6, we engaged in what we refer to as the “analytic selection process” in which we examined our emergent categories in relation to our research questions, our knowledge of epistemology and teacher knowledge research, and our perspectives on knowledge to identify the major emergent themes that best represented our participants’ views.

Results

Analyses indicate that preservice and practicing teachers possess varied beliefs about the source and stability of teaching knowledge. In this section, we discuss the general trends that emerged in the data analyzed for each of these areas of epistemology. Our goal in this research was to understand how preservice and practicing teachers articulate their beliefs about the sources of teaching knowledge and the stability of that knowledge in an effort to develop tools to assess these beliefs and determine their relations to other important constructs and processes. Thus, we focus on those themes that are most closely connected to our research questions. Our intention was not to make comparisons between subgroups of teachers.

Beliefs about the Source of Teaching Knowledge

Participants’ beliefs about the source of teaching knowledge were analyzed by exhaustively coding the ideas represented in each response to questions 2, 7, and 9 at the concept level. Through this analysis, we found that participants viewed teaching knowledge as coming from various sources. Specifically, the coding process resulted in 179 primary codes for questions 2, 7, and 9 collectively. However, only 54 of these codes were related to beliefs about
the source of teaching knowledge, with the remainder representing beliefs about the nature of teaching ability. From the 54 codes, six themes, described with sample responses in Table 2, emerged with respect to the origins of teaching knowledge. These themes included sources of knowledge that were external to the person, such as formal preparation and formalized bodies of information, as well as sources that required the person to be engaged in a process.

Source theme 1: Formal preparation. Responses related to the first two source themes (i.e., formal preparation and formal bodies of information) recognized external sources of teaching knowledge (Table 2). Within the formal preparation theme, participants described needing the “right” training, listed the importance of preservice college courses, and described staff or professional development as additional sources of knowledge about how to teach.

Source theme 2: Formal bodies of information. Similarly, participants articulated a variety of formal bodies of information that provide a source of knowledge. This included information stores, such as books, research articles, and the internet. Accumulated findings in education (i.e., the “research” that exists in educational psychology, human development, and understanding how people learn) were seen as another source of knowledge about how to teach.

Source theme 3: Observational and vicarious experiences. Observational learning and vicarious experience also emerged as a theme from our participants. Individuals felt that observing others teach, whether that teaching was considered to be done well or poorly, was itself an important source of knowledge about teaching (Table 2).

Source theme 4: Interactive and collaborative experiences with others. Our participants also reported that knowledge of how to teach came from interactive experiences or collaboration with others. In examining how individuals described such interactions and collaborations, we found that some focused on what was occurring (e.g., sharing, collaboration, discussion, and
support). We interpreted this to be a co-construction of meaning and grouped these responses as a subtheme (i.e., *meaning construction*, see Table 2 for examples). Others focused more on the individuals who played a role in such interactions. A variety of individuals were noted (e.g., colleagues, mentors, peers, as well as one’s own parents and family). These responses formed another subtheme within the Interactions and Collaboration theme (i.e., *learning to teach from/with...* see Table 2 for examples).

**Source theme 5: Enactive experiences.** Enactive experiences were also identified as an important source of teaching knowledge. We describe enactive experiences as the lived experiences of future and practicing teachers that afford them opportunities to construct meaning about the practice of teaching. Responses in this theme fell into three subcategories: personal life experiences, professional experiences, and other experiences (see Table 2). Within the subtheme of *personal life experiences*, we grouped responses that described learning to be a teacher as a life long process that begins when one is a student in the classroom. These life experiences include an individual’s own learning experiences, childhood upbringing, and general life experiences. Additionally, participants described the enactive experiences of actually teaching as an important source of knowledge on teaching (i.e., *professional experiences*). This knowledge is also acquired “on-the-job” by working with, observing, and listening to one’s own students. Participants also suggested that *other experience*, such as leadership opportunities may also serve as sources for knowledge on how to teach.

**Source theme 6: Self-reflection.** A distinct theme that emerged in our data is the importance of self and reflection. Participants in this study emphasized the importance of (a) *self processes*, such as knowledge of self and self-reflection, (b) the ability to *synthesize information and experiences*, for example, putting together observations with prior experiences, (c) a
willingness and capability to examine one’s shortcomings as a teacher and address these in a meaningful way, and (d) innate sources such as intuition or natural abilities (See Table 2).

Beliefs about the Stability of Teaching Knowledge

As previously indicated, the questions we designed to elicit beliefs about the stability of teaching knowledge (i.e., questions 6a and 6b) yielded much richer data than we initially anticipated. That is, in addition to indicating the types of knowledge that would change and the extent of this change, participants also offered other perspectives such as the quality of the change and why the changes would occur. Consequently, responses relative to the stability of knowledge were coded with a total of 136 primary codes organized into six categories (e.g., Approach to the question; Amount of change; Direction of change; Quality of change; Topics that will change; and Reason for change; Table 1). For instance, in response to 6a and 6b participant #201, a preservice teacher, indicated that:

I foresee only a greater need for computer/technology literacy. (6a response)…

Technology will be integrated into classrooms and the learning process at a root level, rather then being a modification to existing curricula. (6b response).

In this response, participant #201 took the approach of indicating what he expects will happen. The topic or content of the knowledge he referred to pertains to technology literacy knowledge as well as knowledge of how to integrate technology into instruction. Although he did not address the amount of change relative to these forms of knowledge, he did express that knowledge in these areas will increase (i.e., direction of change). Further, while he did not address the quality of the change for computer literacy knowledge he did indicate that knowledge of technology integration for instruction will become more complex and integrated (i.e., quality
of change). This preservice teacher did not explicitly indicate the underlying reasons for these changes.

In contrast, participant #202, a preservice teacher, suggested that the knowledge needed for teaching will change for specific reasons. That is, he stated that “[knowledge] will change somewhat simply due to technology in the world as a whole continuously growing.”

The major themes within the categories that emerged and examples of responses related to the nature of the change in knowledge, the topics addressed, and reasons for the changes are presented in Tables 3, 4, and 5 respectively.

**Approach to answering the question.** Most individuals expressed the changes they expected would occur with respect to teaching knowledge. However, some individuals reported what they hoped would happen or expressed a combination of expectations and hopes or desires with respect to changes for the future. Although we found such distinctions interesting, they were not prevalent, nor were they the focus of this investigation.

**Nature of the change in knowledge: Amount of change.** Individuals also took varied perspectives with respect to how knowledge would change. For example, in participants’ responses there were statements about the amount of change that would occur, as well as the direction, and quality of the change. With respect to the amount of change or stability of knowledge, some believed that knowledge would not change, whereas others expressed varying gradations of change including: little or not much change, a lot of change, and drastic changes. Examples of responses reflective of these perspectives are presented in Table 3.

**Nature of the change in knowledge: Direction of change.** Some individuals stated the direction of the change suggesting that for specific forms of the “knowledge needed for teaching” the amount of knowledge needed would increase or decrease, some did not specify a
direction, others stated that while some areas the knowledge needed would decrease (e.g., academics), in other areas (e.g., strategies) the knowledge needed would increase. Examples of responses reflecting each of these response themes are offered in Table 3.

Nature of the change in knowledge: Quality of change. Statements were also made about the quality of the change in knowledge. Four distinct themes emerged among the statements made regarding the quality of change. These themes included: 1) improvement or deterioration of knowledge, 2) changes in the structure of knowledge, 3) changes in the rate of knowledge change, and 4) fundamental knowledge shifts (Table 3). For the first quality theme, participants offered specific evaluative judgments as to whether they perceived the changes as an improvement or as a deterioration of quality. Overall, individuals tended to express that changes in knowledge will be improvements over the current state (see participant # 123’s response in Table 3,) but some indicated that the changes they expect to occur will be to the detriment of students’ learning (see participant # 423’s response in Table 3).

For the second quality theme that emerged, comments pertained to changes in the structure of knowledge (e.g., Schommer, 1990). This is another aspect of epistemic beliefs that was not directly assessed in this set of questions but that has been explored in the epistemic belief literature. That is, some participants indicated that over time knowledge would become more complex and well integrated whereas others believed that knowledge would become more simplified over time. In most cases, the notion of simplified knowledge was related to technology as a mechanism for simplification or integration (see sample responses in Table 3).

With respect to the third quality of change theme, participants referred to the rate of change describing the change as constant and continuous, gradual, or cyclical (Table 3 for sample responses). The fourth theme that emerged with respect to the quality of knowledge
change addressed qualitative shifts or differences in knowledge over time. For instance, some individuals simply described knowledge as becoming more current or being replaced with technology (e.g., participant #139’s response in Table 3) whereas others focused more on a shift in the focus of teaching knowledge from curriculum to learning processes (e.g., participant #414’s response in Table 3). These responses typically did not include value judgments about the nature of the change, simply that over time teaching knowledge would be different than what we know it to be today.

*Topic of change identified: Knowledge needed for teaching.* In addition to the variations in the nature of knowledge change, individuals also described different topics or areas for change (Table 4). Based on the questions we presented, we expected individuals to indicate different types of teaching knowledge that would change or remain the same. This expectation was confirmed. However, we did not anticipate the specific areas articulated by our participants. Three themes emerged with respect to the topic or content that was described as changing or remaining stable including: 1) knowledge needed, 2) teacher qualities and skills, and 3) non-knowledge changes.

The first of these themes, which was of most interest to us in light of our research questions, refers to a variety of knowledge topics described by participants. This theme included five topic areas outlined in Table 4 with sample statements from our participants. The five topic areas are: a) non-specific knowledge, b) content knowledge, c) pedagogy, d) technology, and e) current issues in schools. Many participants referred to changes in knowledge using non-specific indicators (e.g., “it,” or “the knowledge”). Based on the way the questions were phrased (i.e., “the knowledge needed for teaching”), we assumed they were referring to teaching knowledge but due to the written and anonymous nature of the data we cannot verify this.
In contrast, other individuals addressed how specific bodies or domains of content knowledge (e.g., mathematics, science) would or would not change over time, reflective of the domain-specific view of epistemic beliefs. Responses with respect to content knowledge were particularly interesting in the variations of change expressed. For instance, some individuals indicated how select domains would change whereas other domains would not. Other individuals stated that certain aspects of specific domains would remain the same (e.g., basic principles) while other aspects of knowledge in that same domain (e.g., new discoveries) would change. This perspective is best represented by the response from participant # 422, a practicing teacher.

Content will change drastically, but strategies will be added to and modified to meet the needs of the current learners. Although some content matter will remain stable and consistent (i.e., principles of math, some areas of science, English syntax-to a point), day to day changes in the discoveries and dynamics of the world around us will bring day to day change in the knowledge needed for effective teaching.

Further, some participants vaguely referred to “content” area changes but did not specify a specific domain.

Individuals also referred to various forms of what we consider aspects of pedagogy, referring to knowledge of: human development and learning, how to meet students needs, specific-pedagogical methods, and general pedagogical methods (see Table 4 for examples). For example, participant #124 a preservice teacher stated “The foundations for learning will remain the same, but the instruction/facilitation may change as does the population.” This statement describes different expectations for different types or aspects of teaching knowledge, knowledge of human development and learning (i.e., “foundations for learning”) and knowledge of general pedagogical methods (i.e., instruction/facilitation).
Additionally, within individuals’ responses there was a particularly strong reference to perceived change related to knowledge of technology which described different aspects of technological knowledge. For instance, some individuals referred to changes with respect to basic computer usage, literacy skills, and knowledge of how to access information using technology. Others focused on knowledge of how to integrate technology into classroom instruction, what we would view as a more advanced from of technological knowledge. Table 4 provides sample responses reflecting these varying perspectives.

Finally, with respect to the knowledge needed for teaching, some participants indicated that there would be increases in knowledge related to current issues in schools such as knowledge of gangs, school violence, and diseases (e.g., STDs and AIDS).

*Topic of change identified: Teacher qualities and skills.* Although we asked participants to discuss expected changes in teaching knowledge, similar to our findings in Fives and Buehl (2004), participants also referred to specific a) teacher qualities and b) skills that would change or remain the same over time. Teacher qualities such as caring, passion, and flexibility were seen as needed for teaching and were rarely described as needing change; rather, participants typically reported that these attributes will remain a constant need for teachers well into the future. One preservice teacher stated “I honestly do not think that the knowledge needed to teach effectively will change at all because the primary driving force of an effective teacher comes from the heart” (participant # 252a). Participants also identified specific skills that educators will need to develop or further refine. As seen in Table 4, these skills focused primarily on how to communicate at the personal (e.g., ability to read and write) and interpersonal (e.g., ability to work cooperatively with others) levels as well as how to communicate with the public (e.g., inform the public about assessment).
Topic of change identified: Non-knowledge changes. Another variation in the way individuals responded to the questions regarding knowledge change involved indications of expected or hoped for changes in non-knowledge related aspects of education: a) requirements of the profession and b) changes in teachers and schools. Numerous participants commented on expected or hoped for changes with respect to the requirements within teaching profession including references to changes in policy expectations and professional standards as well as changes in the amount and nature of the preparation teachers will receive before entering the classroom (see Table 4 for sample responses). Not surprisingly, there were mixed responses in this area. Some participants indicated that there would be a decline in standards, expectations, and preparations for teachers whereas other indicated that there would and or should be an increase in policy and preparation expectations. A small number of participants referred to general changes that would occur with respect to the role of teachers and schooling in general.

Reasons for change: Topic. In their responses to 6a and 6b, some participants identified various reasons why the different types of knowledge would change over time (Table 5). Such responses ranged from simply saying that change was needed to indicating very specific causes for knowledge change. In sorting the various reasons individuals offered as the reason for change, we identified two major themes: 1) changes in topics and 2) changes in the teacher’s ecological system. With respect to changes in topic, individuals indicated that the various types of knowledge needed for teaching would change because knowledge itself was changing. As presented in Table 5, participants attributed change to advancements in technology, new discoveries in science, and deeper understandings about how students learn and develop. In contrast, the individuals who indicated that knowledge would not change indicated that the lack of change was due to the static nature of content knowledge or that within the profession there
was already an understanding of teaching, development, and learning that would not need change over time (see Table 5). These distinctions are further indicators that while some individuals view knowledge as changing and evolving, other see it as a being certain and unchanging.

**Reasons for change: Ecological Systems.** In addition to changes in knowledge as a reason for change in teaching knowledge, participants also referred to various changes within the school environment and society (Table 5). As we examined the primary codes, we wanted a way to represent the various levels and types of changes individuals were citing. We identified Bronfenbrenner’s theory of ecological systems (1989) as a useful way to organize the various sources of change. Specifically, we placed the teacher at the center of the ecological system and grouped the cited reasons for change with respect to whether we perceived those reasons as: a) changes in the teacher’s immediate environment or microsystem (e.g., changes in the students and increasing classroom diversity), b) changes in related systems that affect the microsystem (i.e., mesosystem changes such as changes in the students’ families), c) changes in settings to which the teacher does not have direct access (i.e., exosystems changes and factors such as standards, policies, and the sources of such standards and policies—politicians), or d) global changes at the macrosystem level (e.g., changes in societal demands and expectations as well as general changes in the world as a whole; Table 5).

**Discussion**

In the results section, we identified various themes related to preservice and practicing teachers’ beliefs about the source and stability of teaching knowledge that emerged from our data analysis. Here, we address how these findings relate to and extend the literatures related to teacher education and epistemic beliefs.
Beliefs about the Source of Teaching Knowledge

In our analysis, various themes emerged with respect to the source of teaching knowledge and these themes are reflective of sources identified in teacher education literature. For instance, our source themes related to Formal Preparation and Formalized Bodies of Information reflect the two of sources of teaching knowledge articulated by Shulman (1996; i.e., 1) the materials and settings of the institutionalized educational process and 2) research on human development, teaching and learning) as well as the experience with formal schooling discussed by Richardson (1996). The emergence of these themes indicated that at least some of our participants recognized formal preparation in the context of colleges of education and professional development as well as educational research as potential sources of knowledge on teaching.

However, the majority of the sources articulated by our participants in response to questions 2, 7, and 9 were more informal. For instance, other source themes that emerged pertained to observational, collaborative, and enactive experiences as well as the importance of self-reflection. Our participants’ references to various enactive experiences are reflective of Richardson’s (1996) contention that personal experiences as well as experience with schooling and instruction are foundational to teachers’ knowledge and beliefs. Additionally, our experience themes and the theme related to self-reflection reflect Shulman’s (1996) notion of the wisdom of practice (i.e., the store of knowledge individual practitioners seem to hold based on their years of experience and repeated exposure to similar complex tasks over time).

Our study also extends the literature by providing evidence of how preservice and practicing teachers articulate their beliefs about the source of teaching knowledge. Participants expressed their beliefs about the source of teaching knowledge in very concrete terms (i.e., books, classes, observations). They did not fully articulate how individuals were acquiring or
constructing knowledge from these materials and experiences. Further, most participants indicated multiple sources of teaching knowledge. Consequently, although the concept level of analysis is useful in teasing apart the various potential sources, it may have also lead to a more simplified understanding of source than what is actually reflective of how individuals perceive the source of knowledge about how to teach. This issue of teaching knowledge originating from multiple sources is an important one that requires additional consideration with respect to the assessment of beliefs and their role in teacher education and development.

An additional point to consider with respect to the source of teaching knowledge pertains to the differences in how individuals responded to questions 2, 7, and 9 compared to questions 6a and 6b. We viewed questions 2, 7, and 9 as offering insight into beliefs about the source of teaching knowledge. However, in analyzing the responses to 6a and 6b (i.e., what we viewed as more stability of knowledge related questions) we noted that when participants cited reasons for knowledge change, they focused almost exclusively on external factors (e.g., change in technology, content; Table 5). This is in contrast to the large number of internal and social factors cited as the sources of where the “knowledge of how to teach” comes from. Although this distinction may be an artifact of the way the questions were phrased, it may be also reflect a distinction between beliefs about one’s personal knowledge and the information that is available or needed by the profession as a whole. This finding underscores how the nature of the questions influence how individuals respond and perhaps sheds some insights onto some of the problems with existing measures of epistemic beliefs that have attempted to assess beliefs about the source of knowledge. That is, perhaps participants in those investigations were unclear on whether items were addressing the source of their personal knowledge or the general knowledge available in the field, what we personally would consider information, not knowledge.
Beliefs about the Stability of Teaching Knowledge

Our participants’ responses related to the stability of teaching knowledge were much richer and more nuanced than we anticipated. As expected, we found evidence that some individuals viewed knowledge as more static or stable where as others viewed teaching knowledge as changing and evolving. Domain-specificity was also evidenced when participants indicated specific aspects or bodies of teaching knowledge that would or would not change over time. These findings are reflective of the current epistemic belief literature with respect to identifying beliefs related to changes in knowledge (e.g., Hofer, 2000, 2004; Kuhn, 1991; King & Kitchener, 1994; Schommer, 1990) and domain-specificity (e.g., Buehl & Alexander, 2001, 2006; Muis et al., 2006). Additionally, some participants’ statements were reflective of the various trends in education described by Alexander and colleagues (1996). Specifically, while some areas of understanding demonstrate constant and exponential growth, others are more gradual, or demonstrate a regular recycling of ideas in varied iterations.

Further, as found in previous investigations (e.g., Hofer, 2000; Qian & Alvermann, 1995), beliefs about the stability of knowledge appear to be closely related to beliefs about the structure or simplicity of knowledge. For instance, when asked to discuss changes in knowledge, some individuals referred to knowledge becoming simpler or more complex over time.

Unexpected responses from our participants offer insight into how individuals structure their knowledge and thinking about teaching. For instance, references to changes in the knowledge, qualities, and skills needed for teaching are reflective of aspects of teaching knowledge discussed in the literature (e.g., Shulman, 1987) and the themes previously identified in a different aspect of the same data set (i.e., Fives & Buehl, 2004). However, although these responses did address our interest in the extent to which teaching knowledge will change, we
found it interesting that individuals confused the requirements and preparation needed to become a teacher with the actual knowledge that is needed to facilitate classroom instruction. Perhaps this is reflective of a larger problem that preservice and practicing teachers do not recognize or value the specific knowledge that is unique and needed within the teaching profession, a theme that emerged in our first analysis of different items in this data set (Fives & Buehl, 2004).

Conclusions and Implications

In this investigation, we sought to explore preservice and practicing teachers’ beliefs about the source and stability of teaching knowledge. As with most research, this study is not without limitations. For instance, we chose to analyze preservice and practicing teachers’ written responses to specific questions. Consequently, although we obtained data from a relatively large and diverse sample, we were not able to probe individuals’ responses, as would have been possible with individual interviews. Additionally, our data collection and analysis focused solely on individuals’ beliefs. We did not collect information related to individuals’ performance on tasks in their respective teacher education courses or actual classroom practices. Further, we sampled individuals with a range of teacher experiences from two regions of the United States. Some may view this as a limitation due to the number of variables (e.g., experience level, grade level, region) that are crossed with each other. However, given our interest in maximum differentiation in beliefs, we view the diversity in our sample as a strength of this work.

Despite the limitations of our investigation, the themes that emerged from participants’ open-ended responses provide insight into what preservice and practicing teachers’ believe about the nature of teaching knowledge. Based on these findings, we provide a rough framework and offer suggestions for consideration in developing a measure of pedagogical epistemic beliefs as well as discussion implications for teacher education, development, and practice.
Assessment of Beliefs and Measure Development

The participants in this investigation noted various sources of teaching knowledge. Although specific formal preparation, external bodies of information, and authority figures were cited as potential sources of knowledge, our findings revealed that individuals also viewed teaching knowledge as coming from individual and social experiences and interactions. Within the existing literature, items designed to assess beliefs about the source of knowledge have tended to focus on the role of authority as a source of knowledge (e.g., Jehng et al., 1993; Schraw et al., 2002). Our findings suggest that more varied sources of information need to be considered and represented when attempting to ascertain beliefs within the domain of teaching knowledge. That is, individuals who do not believe that knowledge comes from an authority figure may still differ as to whether they view their knowledge as individually constructed (e.g., from personal enactive experiences) or socially constructed through interactions with others (e.g., sharing and collaboration).

Additionally, the variation of sources listed both within and across responses suggests that individuals may differ with respect to the weight they give to the different perceived sources. We did not ask participants to identify the source of specific aspects of teaching knowledge (e.g., classroom management, child development, or specific teaching strategies), instead our questions were phrased rather broadly (e.g., the “knowledge needed for teaching”). However, individuals may view different aspects of teaching knowledge as coming from different sources (e.g., knowledge of child development is learned from books and classes but knowledge of classroom management is learned through experience).

We propose that in developing a future measure to assess beliefs about the source of teaching knowledge at a large scale, several issues need to be taken into consideration. First, the
measure needs to be both conceptually meaningful and reflective of concrete belief statements. The measure should represent that knowledge may come from an external source, individual construction of knowledge, or social construction of knowledge, but the items should be stated in concrete terms reflective of these perspectives.

Second, there needs to be a way to represent that there may be multiple sources of teaching knowledge that exist simultaneously and that there may be variation with respect to how much weight or consideration the different sources of knowledge are given. For instance, an individual may view teaching knowledge as coming from both books and experience (e.g., participant #123, a practicing teacher, stated “[t]he knowledge of how to teach comes from a number of places: observation, trial and error, education classes, books”) but view knowledge gained from experience as more valid than knowledge for books (e.g., participant # 206, a preservice teacher, “Training - before; Personal - most important; On the job - during; Continuing education”).

Third, individuals may have different beliefs about the source of teaching knowledge relative to the aspect of teaching knowledge under consideration (e.g., classroom management, child development, or specific teaching strategies). Thus, all statements should be reflective of specific aspects of individuals’ teaching knowledge. An additional issue not addressed in this investigation that may be explored in future investigations is whether within particular aspects of teaching knowledge (e.g., classroom management), if individuals distinguish between the different types of knowledge (i.e., you can learn the “what” of classroom management from books, the “how” from observations, but you’ll only know the “when” through experience).

Fourth, in this investigation, individuals held various perspectives as to the stability of the “knowledge needed for teaching.” These perspectives differed with respect to the types of
knowledge individuals believed would change or remain the same over time as well as the nature and quality of the expected changes. Further, we identified individuals who held mixed views as to the certain or tentative nature of knowledge such that some aspects of knowledge were believed to be more tentative whereas others would remain relatively constant. This finding highlights the domain-specificity of knowledge beliefs and underscores the necessity of specifying the type of knowledge under consideration when assessing beliefs about knowledge.

In developing a measure to assess beliefs about the stability of teaching knowledge, the aspect of teaching knowledge under consideration should be explicitly indicated. For instance, in this investigation and our previous investigation (Fives & Buehl, 2004) individuals referred to knowledge of 1) classroom management, 2) theories of learning and human development, 3) instructional practices, and 4) content and pedagogical content knowledge. We propose that a new measure should address some of these same areas.

Fifth, a measure used to assess beliefs about teaching knowledge should distinguish between the knowledge held by individuals and the information available in the field. Our participants indicated that the source of teaching knowledge frequently came from more internal sources such as personal experience, observation, collaboration, and reflection. However, when asked about changes in knowledge over time reasons related to external changes in knowledge were offered. It seems for these participants, their personal knowledge of how to teach is distinct from “knowledge” generated within the larger professional field. Thus, a measure attempting to tap into beliefs about knowledge should be situated at the level of interest to the researchers.

The development of a new measure of preservice and practicing teachers’ beliefs about the nature of teaching knowledge would allow for the exploration of these beliefs in relation to other constructs. For instance, there may be developmental differences with respect to preservice
and practicing teachers’ beliefs about the source or stability of teaching knowledge as well as how these beliefs relate to their practices. Additionally, such a measure may be used as a tool to examine the coherence or lack of coherence of an individual’s belief system at different levels and to explore the implications for practice and development.

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This investigation and line of research also have practical implications. Specifically, preservice and practicing teachers’ beliefs about the source and stability of knowledge may influence their actions in a number of ways. For instance, individuals who view teaching knowledge as changing may demonstrate greater awareness and openness to new teaching methods and techniques. Alternatively, as Ravindran et al. (2005) found, greater belief in the certainty of knowledge may lead to more meaningful processing of information. This may be particularly true if one is first learning how to teach novices to the field may perceive certain knowledge as more attainable. Further, beliefs about the source of knowledge may influence where, who, or how individuals seek out such information (e.g., professional journals, inservice opportunities, colleagues, or one’s own creativity). Consequently, preservice and practicing teachers may hold beliefs about the source and stability of knowledge that are more or less adaptive for their professional development and classroom practice.

The results of this investigation provide insight into the beliefs that preservice and practicing teachers may hold. Teacher educators, school administrators, or other parties interested in changing how teachers think and behave can use the results of this investigation to understand the perspective of preservice and practicing teachers. Further, understanding individuals’ beliefs can facilitate the development of learning experiences to expand preservice and practicing teachers’ knowledge and support conceptual change when needed.
For instance, if individuals view actual teaching experience as the only legitimate source of teaching knowledge or believe that there is nothing new in teaching, they will be less likely to attend to, process, or implement the new information or techniques that are presented through workshops, courses, or reading. In particular, preservice teachers may decide that they will learn what they really need to know when they student teach or enter their own classrooms. Teacher educators who are aware of such beliefs may choose to incorporate specific course-related experiences in which preservice teachers gain personal experience designing and implementing lessons. Alternatively, or simultaneously, teacher educators may specifically address individuals’ beliefs about the source of teaching knowledge so as to broaden the perceived sources of teaching knowledge. In this way, teacher educators can build upon or specifically target these beliefs prior to sending students to observe in the field or engage in more literature based research projects.

In considering the beliefs to foster in preservice and practicing teachers, it is important to be mindful of the configuration of an individual’s beliefs (i.e., how the various aspects of an individual’s belief system relate to one another). In particular, within the epistemic literature, a belief in authority as the source of knowledge is often viewed as a naïve perspective whereas belief in personal experience and reason as the source of knowledge is viewed as more sophisticated. With respect to the certainty of knowledge, a belief that knowledge is certain and unchanging is viewed as a naïve belief whereas a belief in that knowledge is tentative and changing is viewed as more sophisticated. We found evidence of these perspectives in our data. For instance, in our investigation, belief in authority figures was evidenced by references to formal education and formalized bodies of information whereas the more personal sources of knowledge were recognized in the various types of experiences and forms of self-reflection.
Participants also expressed more certain and more tentative views of the stability of teaching knowledge.

However, as others have noted (e.g., Schommer-Aikins, 2002; Muis, 2004), such naïve/sophisticated views of epistemic beliefs may not be meaningful with respect to conceptualizing or measuring the beliefs that are most adaptive in learning contexts. That is, preservice teachers need to recognize that answers to teaching problems are not solely held in books or by professors but too much of a focus on experience and unchecked self-reflection may lead to the dangers of overly relativistic perspectives. Similarly, an over emphasis on constant and drastic change may lead individuals to conclude that it is not worth learning anything new as everything will soon change. Alternatively, a belief that nothing changes may lead individuals to not seek new information, particularly once they begin to reach a comfortable level of success in the classroom.

Instead of dichotomizing beliefs as naïve or sophisticated or even viewing them along a continuum, an alternative approach is needed. In particular, it may be most advantageous for preservice and practicing teachers to take more of an evaluative stance (e.g., King & Kitchener, 1994; Kuhn, 1991) toward teaching knowledge in which they learn to coordinate various epistemic beliefs. Evaluativists recognize that knowledge is neither absolutely certain, nor are all claims equally acceptable or uncertain. Instead expert knowledge is recognized as being more certain and emphasis is placed on individuals evaluating the validity of changes to the existing knowledge base and conflicting views based on the context and available evidence (e.g., Hofer & Pintrich, 1997; Kuhn, 1991; Perry, 1970). To foster such a perspective, teacher educators would need to provide experiences in which preservice teachers can practice justifying their developing knowledge and evaluating the appropriateness of evidence available to them, be it the research
literature or personal experience. Additionally, preservice and practicing teachers would need
guidance on how to stay abreast of changes in the field as well as experience in how alternative
and “new” information can be evaluated in light of existing theory, research, and practice.

Evidence from prior research suggests in addition to source and stability beliefs, other
beliefs should also be considered. For instance, Yadav and Koehler (2007) noted that preservice
teachers interpreted segments of classroom videocases differently depending on their beliefs
about the simplicity of knowledge (i.e., individuals with more simplistic views of knowledge
focused more on teachers correcting students’ mistakes without explaining the rules of grammar
in a video clip whereas individuals who viewed knowledge as more complex focused more on
how the teacher encouraged students to correct their own mistakes when viewing the same video
clip). Thus, the configuration of source and stability beliefs within an individual (e.g., knowledge
of child development comes from formal education and is changing) may be limited by other
beliefs the individual holds about knowledge and learning. Combined with our results, such
findings provide support for Schommer-Aikins’ (2004) proposal for an embedded belief system
in which epistemic beliefs do not operate in a vacuum but influence thoughts, actions, and
motivation through their interactions with other aspects of individuals’ beliefs.

Future Research

The present investigation has offered support and exposed the need for future research in
this area. In particular, studies examining differences in beliefs about the source and stability of
teaching knowledge related to professional level—preservice, novice (1-3 years), and
experienced practicing—may provide insight into how these beliefs evolve as engagement in the
profession becomes more enactive. Further examination of these beliefs in relation to other
important influences on learning to teach and teaching practices, such as stress, commitment,
sense of efficacy, and value may provide information as to the adaptability of particular belief composites for teachers at different points in their development and as such may afford university teacher educators, school-based mentors, and school administrators a better understanding of how these beliefs may influence practice.

The relations between beliefs about the source and stability of teaching knowledge and actual outcomes rooted to practice also need to be explored. Such outcomes should include actual teaching practice, engagement in professional development activities, the types of professional development sought, and the extent to which teachers reflect on their practice for improvement. In some settings, it may be possible to examine how these beliefs are related to teachers’ responses to educational reform efforts.

If work related to the previous two suggestions indicates that some beliefs about teaching knowledge are more or less adaptive at different developmental points in one’s career then it may be important to identify the types of experiences that facilitate the development of adaptive knowledge beliefs. Understanding preservice and practicing teachers’ beliefs about knowledge will ultimately allow teacher educators to specifically address misconceptions and naïve beliefs that may hinder the development of effective teaching practices. In particular, as participant #420 articulated, “[w]e will need to understand knowledge is emergent; ever changing and growing” and teacher educators need to provide opportunities to facilitate and support such understanding.
References


Table 1
Coding Framework for Responses Related to the Stability of Teaching Knowledge (i.e., Questions 6a and 6b)

<table>
<thead>
<tr>
<th>Category</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach</td>
<td>How the participant approached the question as an expectation versus a hope.</td>
</tr>
<tr>
<td>Amount</td>
<td>Amount of change the participant expects to occur in the next 20 yrs.</td>
</tr>
<tr>
<td>Direction</td>
<td>Direction, if any, the participant expects knowledge to change.</td>
</tr>
<tr>
<td>Quality</td>
<td>How participant reported knowledge changing.</td>
</tr>
<tr>
<td>Topic</td>
<td>General topic that is expected to change or remain the same over time.</td>
</tr>
<tr>
<td>Reason</td>
<td>Rationalization or explanation for why the described change (or lack thereof) will (or will not) occur.</td>
</tr>
</tbody>
</table>
Table 2
Themes Related to the Source of Teaching Knowledge

<table>
<thead>
<tr>
<th>Theme</th>
<th>Participant Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Formal Preparation</strong></td>
<td>I believe knowledge of how to teach comes from <em>the education classes one has to take</em>, classes taken in your content area, personal experience, and mastering effective listening skills and basic skills. (id: 405, preservice)</td>
</tr>
<tr>
<td>College course work, professional workshops, conferences, and content area classes.</td>
<td>Sharing with colleagues, <em>staff development</em>, professional literature, <em>conferences, course work, studies</em>, etc. (id: 408, practicing)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>2. Formal Bodies of Information</strong></th>
<th>Internet, workshops for professional [development], colleagues. (id: 257, preservice)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Stores</td>
<td>Trial and error; other people; experience; <em>books/journals/literature</em>; education (not necessarily in this order). (id: 422; practicing)</td>
</tr>
<tr>
<td>Books, literature, the internet.</td>
<td>Brain, other teachers, <em>reading and keeping up with latest research</em>. (id: 428, practicing)</td>
</tr>
</tbody>
</table>

| Accumulated Findings               | This knowledge comes from *so many fields*: psychology, medicine, neurology, social science, child development, and nutritional experts. They all have something important to tell us about the learner. (id: 235, practicing) |
| Educational research (e.g., development, educational psychology). | |
### Table 2 cont’d

<table>
<thead>
<tr>
<th>3. <strong>Observational / Vicarious Learning</strong></th>
<th>How to teach comes from both education courses in college and <strong>modeling during student teaching and field observations</strong>. (id: 113, preservice)</th>
<th>Partially from personality. <strong>Partially from observations of the teaching styles of others.</strong> Partially from formal pedagogy training. (id: 202, preservice)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Formal and informal observations of good and bad teaching.</strong></td>
<td>From learning and <strong>collaborating with experienced teachers</strong>. (id: 424, practicing)</td>
<td>Education, <strong>sharing experiences</strong>, heart. (id: 122, practicing)</td>
</tr>
<tr>
<td><strong>Meaning Construction</strong></td>
<td><strong>Co-construction of meaning through sharing, collaboration, discussion, support.</strong></td>
<td>It comes from one's own ideas, learning and experiences and from the <strong>influences of people that one has known</strong> (id: 401, preservice)</td>
</tr>
<tr>
<td><strong>Learn to teach from/with…</strong></td>
<td><strong>Experts, parents, peers, colleagues, etc.</strong></td>
<td><strong>From other teachers, mentors, parents, brothers</strong> and it comes from yourself. (id: 215, preservice)</td>
</tr>
<tr>
<td><strong>Learn to teach from/with…</strong></td>
<td><strong>Experts, parents, peers, colleagues, etc.</strong></td>
<td><strong>From other teachers, mentors, parents, brothers</strong> and it comes from yourself. (id: 215, preservice)</td>
</tr>
<tr>
<td>**5. <strong>Enactive Experiences</strong></td>
<td><strong>Throughout life and own schooling, the way the individual learned, time spent in schools as a student.</strong></td>
<td><strong>Life experiences</strong> and teacher training. (id: 136, practicing)</td>
</tr>
<tr>
<td><strong>Personal, life experiences</strong></td>
<td><strong>It is obtained over time starting with the first day of kindergarten.</strong> (id: 116, preservice)</td>
<td>It is taught at the college level some but mostly by getting in there and teaching - I learned best just doing it. (id: 411, practicing)</td>
</tr>
<tr>
<td><strong>Professional Experiences</strong></td>
<td><strong>On-the-job, actual teaching practice, listening to one’s own students.</strong></td>
<td><strong>It is taught at the college level some but mostly by getting in there and teaching - I learned best just doing it.</strong> (id: 411, practicing)</td>
</tr>
<tr>
<td><strong>Other Experiences</strong></td>
<td><strong>Past personal history, leadership experiences.</strong></td>
<td>Knowledge of effective teaching is <strong>produced by experience</strong>. (id: 429, practicing)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
### Table 2 cont’d

<table>
<thead>
<tr>
<th>6. Self – Reflection</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Self-processes</strong></td>
<td>Self-awareness and the processes of knowing oneself.</td>
<td>It comes from <em>yourself</em>, peers, colleagues, teachers, parents, society. (id: 212, preservice)</td>
</tr>
<tr>
<td><strong>Synthesizing Information-Experiences</strong></td>
<td>Putting information from personal experiences and observations together in a meaningful way.</td>
<td>The knowledge of how to teach comes from experience. It comes from <em>synthesizing everything you've learned</em> and spitting it back into your environment. (id: 117, preservice)</td>
</tr>
<tr>
<td><strong>Examination of Shortcomings</strong></td>
<td>Willingness to examine and address personal faults and accept criticism, adaptation.</td>
<td>Yes, [one can learn to be an effective teacher], by <em>examining your short comings and trying to improve your faults when dealing with youths</em>. (id: 253, practicing, item 9)</td>
</tr>
<tr>
<td><strong>Innate Sources</strong></td>
<td>Intuition, natural abilities, something within.</td>
<td>It is something you are born with, <em>something that you have internalized</em>. It can also be modeled. (id: 418, practicing)</td>
</tr>
</tbody>
</table>

Note: Bold italics indicate the portion (concept/idea unit) of the response reflecting the specific theme or subtheme. Participants’ quotes were given in response to item 7 unless otherwise noted.
### Table 3

Nature of Change Themes Emerging from Questions 6a and 6b

<table>
<thead>
<tr>
<th>Category</th>
<th>Theme</th>
<th>Description (if needed)</th>
<th>Sample Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Change</td>
<td></td>
<td>As long as teachers or future teachers are in schools and in the classrooms getting to know students, understanding how to be an effective teacher will <strong>pretty much stay the same</strong> (id: 205, preservice)</td>
<td></td>
</tr>
<tr>
<td>Little Change</td>
<td></td>
<td>I think most of the essential knowledge is already out there, <strong>so I don’t think it will change much</strong>. (id: 416, practicing)</td>
<td></td>
</tr>
<tr>
<td>A Lot of Change</td>
<td></td>
<td><strong>A lot</strong>, because as the years pass through teaching people will see what’s needed to be an effective teacher. (id: 112, preservice)</td>
<td></td>
</tr>
<tr>
<td>Drastic Change</td>
<td></td>
<td><strong>Drastically</strong> - content matter in most fields will stay the same while others are continually evolving. And as times change so do the life applications that teachers include in the classroom. (id: 251, preservice)</td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td></td>
<td><strong>It will increase</strong> twofold because of standards and accountability (id: 206, preservice)</td>
<td></td>
</tr>
<tr>
<td>Decrease</td>
<td></td>
<td>I feel that in the next twenty years technology will play a bigger factor in the classroom, <strong>reducing the amount that the teacher actually has to know</strong> (id: 206, preservice)</td>
<td></td>
</tr>
<tr>
<td>Change</td>
<td></td>
<td><strong>I think it will change</strong>. Anything can happen in 20 years that could change the whole education system. (id: 154, practicing)</td>
<td></td>
</tr>
<tr>
<td>Increase and Decrease</td>
<td></td>
<td>I feel like <strong>there will be less and less</strong> that teachers’ are going to be responsible for as far as academics go, and <strong>more and more</strong> about strategies, classroom management, and once again technological advancement. (id: 120, preservice)</td>
<td></td>
</tr>
</tbody>
</table>
Table 3 cont’d

<table>
<thead>
<tr>
<th>Better-Worse-Mix</th>
<th>Knowledge might improve, degenerate, or do both.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I think the knowledge needed for effective teaching will continue to improve. I don’t think there will be major changes. (id: 123, practicing)</td>
</tr>
<tr>
<td></td>
<td>Teachers will have to begin teaching to a national curriculum—this will not be positive for education (emphasis in original; id: 423, practicing)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Simplicity-Complexity</th>
<th>Knowledge may become more or less complex with time.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I know it will change, everything does. I think it will get simplified with technology. It is already easier for my generation than my mother’s with the massive amounts of lesson plans, rubrics etc. [available] on the internet. (id: 108, preservice)</td>
</tr>
<tr>
<td></td>
<td>By integrating technology knowledge will change (Not a whole lot.). (id: 247, preservice)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality</th>
<th>Rate</th>
<th>Rate of knowledge change (e.g. constant, gradual cyclical).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I think it will be constantly changing—I hope it never becomes stagnant! It should always be re-evaluated and adjusted to meet the needs of a common good. (id: 259, preservice)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A lot [of change], but it is going to do it in small steps instead of rapid change and then one day we are going to look back and say wow! (id: 426, practicing)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The knowledge for effective teaching changes everyday and in 20 years it will have done a complete circle. (id: 174, practicing)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Qualitative Shifts</th>
<th>Shifts in the knowledge base (e.g., keeping current).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I think there will be a change from acquiring the knowledge of how to teach to knowing what buttons to push to find the needed information (id: 139, practicing)</td>
</tr>
<tr>
<td></td>
<td>I believe it will become less focused on curriculum and more focused on learning styles and techniques. (id: 414, practicing)</td>
</tr>
</tbody>
</table>

Note: Bold italics indicate the portion (concept/idea unit) of the response reflecting the specific theme or subtheme.
<table>
<thead>
<tr>
<th>Theme</th>
<th>Topic</th>
<th>Subthemes (if applicable)</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowledge Needed</td>
<td>a. Non-specific</td>
<td>I think knowledge for effective teaching will change a great deal in the next 20 years. (id: 155a preservice)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Content</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mathematics: is a constant up to date; Science: is constant up to date; Social Studies: because this is such a broad area, always this is an area to stay abreast of; Reading/English - this will need to change as we don’t need to lose the art of writing and what is to be gained from the masters. (id: 236a, practicing)</td>
<td>Content – not specified</td>
<td>Content area may change quite a bit – classes offered will change some – both the core skill to be a good teacher – passion, ability to work and collaborate with students and peers, classroom management – will not change much. (id: 423a practicing)</td>
</tr>
<tr>
<td></td>
<td>Human Development and Learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Since I received my B.A. over 20 years ago a lot has changed. There is a lot more research concerning how we learn; how the brain works, etc. I can only imagine that we will have so much more information about these processes [in another 20 years]. (id: 425a, practicing)</td>
<td>Meet students needs</td>
<td>I think a lot more emphasis will be on technology and techniques for working with autistic students. I see autism as a rapidly diagnosed disability. There will be more issues with students and even further break down of home and family. (id: 426ab, practicing).</td>
</tr>
<tr>
<td></td>
<td>Specific Pedagogical Methods</td>
<td>Understanding behaviors of adolescents and classroom management. (id: 257a, preservice).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Methods</td>
<td>I think it will change quite a bit because as time progresses, new, innovative ways are needed to make sure students are grasping and learning new information. (id: 153a, practicing)</td>
<td></td>
</tr>
</tbody>
</table>
### Table 4 cont’d

<table>
<thead>
<tr>
<th>Literacy – Use</th>
<th>Integrated for Instruction</th>
<th>Accessing/selecting information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers will need a <strong>greater technological background and a good knowledge of software</strong>. I’m not sure what type of technological training because this area changes rapidly. (id: 421b, practicing).</td>
<td><strong>All areas</strong> [referring to content areas] will need to <strong>incorporate computers</strong> to keep up with the changing knowledge and ways of presenting information. (id: 236b, practicing).</td>
<td>There will be a greater need for <strong>information technology management</strong>. Students will need to learn how to access information and <strong>teachers must be trained in this area as well</strong>. (id: 136ab, practicing)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>d. Technology</th>
<th>e. Current issues in schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology, <strong>gang information, terrorism, school violence</strong>. (id: 243b, practicing)</td>
<td></td>
</tr>
</tbody>
</table>

2. **Teacher Qualities and Communication Skills**

<table>
<thead>
<tr>
<th>a. Qualities</th>
<th>b. Communication Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am sure that teachers need to constantly be educating themselves on what is happening in the world. <strong>Teachers need to be helpful and flexible: flexibility will be key as students’ lives change</strong>. (id: 241, preservice)</td>
<td>Development of adolescence. <strong>Classroom interaction</strong>. “Computer” stuff knowledge. (id: 257b, preservice).</td>
</tr>
<tr>
<td><strong>Interpersonal</strong></td>
<td><strong>Personal</strong></td>
</tr>
<tr>
<td>Technology skill will increase and <strong>the skills of communication as well as our basic skills of reading and writing</strong>. (id: 118b, preservice)</td>
<td>I think we’ll know more about the brain. Hopefully, we will become more accepting of other cultures and be willing to work with them. I imagine we will cycle through the testing issues again. <strong>Hopefully, we will do a better job at educating the public about assessment</strong>. (id: 425b, practicing).</td>
</tr>
<tr>
<td><strong>Public</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 4 cont’d

### 3. Changes that will Occur – Not Knowledge

<table>
<thead>
<tr>
<th>Requirement of the Profession</th>
<th>Policy Expectations</th>
<th>Preparation Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a. Requirements of the Profession</strong></td>
<td>I do believe that the knowledge needed for teaching will be raised to a <strong>level of standards that are equal for all seeking a career in education. As the standards are raised for students so will the standards for the professionals.</strong> (id: 124b, preservice)</td>
<td>I think that there won’t be such a thing as non-licensure teachers. I think that they’re going to require more field hours. I think that more general educations classes will be required. (id: 109b, preservice)</td>
</tr>
<tr>
<td><strong>b. Teachers and Schools</strong></td>
<td>I think it will change a great deal. I feel that our education will be at the hands of technology. <strong>I feel that the role of a teacher will become less and less important.</strong> (id: 120a, preservice).</td>
<td>With the explosion of technology and information about the ways the brain functions, <strong>I’m certain school in 20 years will not even resemble education as we now know it.</strong> (id: 235a, practicing)</td>
</tr>
</tbody>
</table>

Note: Bold italics indicate the portion (concept/idea unit) of the response reflecting the specific theme or subtheme.
Table 5

Reason for Change Themes Emerging from Questions 6a and 6b

<table>
<thead>
<tr>
<th>Theme Category</th>
<th>Description</th>
<th>Sample Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Changing</strong></td>
<td>Technology</td>
<td>It will change drastically, primarily due to technology and kids will also change in terms of morals and values. (id: 171a, practicing)</td>
</tr>
<tr>
<td><strong>Stable</strong></td>
<td>Content</td>
<td>Teachers will need to know more as new things are being discovered and ideas change. (id: 107a, preservice)</td>
</tr>
<tr>
<td><strong>Changing</strong></td>
<td>Teaching Development &amp; Learning</td>
<td>I think most of the essential knowledge is already out there, so I don’t think it will change much. (id: 416a, practicing)</td>
</tr>
<tr>
<td><strong>Stable</strong></td>
<td>Teaching Development &amp; Learning</td>
<td>a. I think the basic necessary knowledge will be the same (except for the area of technology), but we may have more research that gives us better insights into methods and pedagogy (so that we can do it better). b. I think more research about the brain and the learning process is forth coming. I think teachers are going to have to be more aware of available technology and I hope and pray that research uncovers enough knowledge to persuade our federal and state governments to stop interfering in education. (id: 419, practicing)</td>
</tr>
</tbody>
</table>
Table 5 cont’d

<table>
<thead>
<tr>
<th>Ecological Systems as Source of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stable</strong></td>
</tr>
<tr>
<td>Cognitive abilities, teacher student interactions, will not change – we already know this.</td>
</tr>
<tr>
<td>It won’t change because a youth’s mind is not different from generation to generation, the only change is the world that surrounds them, and no matter what world it is a child’s perception is the same. (id: 253b, preservice)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Microsystem</strong></th>
<th>Changes related to the immediate environment of the teacher including the role of the teacher and changes in students.</th>
<th>Due to diversity teachers will need more knowledge of special education, ESL strategies and other cultural impacts. (id: 172b, practicing)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mesosystem</strong></td>
<td>Change due to shifts in overlapping Microsystems, such as student’</td>
<td>[Teachers] will need to become more computer literate, will have to [have] more knowledge of subject matter, will have to serve as support system for children due to increase[s] in drug abuse by parents or parent. (id: 171b, practicing)</td>
</tr>
<tr>
<td><strong>Exosystem</strong></td>
<td>Changes or decisions made where teachers’ are not present but which influences them directly</td>
<td>I don’t think that the knowledge needed will change because with the new law being passed in Texas (anybody can teach if they pass a test). Based on that there are going to be many people who are not going to know effective pedagogy skills lack basic education [on] instructional approaches, and other knowledge about teaching to our students. They are going to lack many skills. (id: 405b, preservice)</td>
</tr>
<tr>
<td><strong>Macrosystem</strong></td>
<td>Changes occurring as the societal/cultural level</td>
<td>The knowledge of effective teaching will change as our world and society change. As a teacher you have to adapt to the society and provided the knowledge to your students as it related to our world. (id: 403a, preservice)</td>
</tr>
</tbody>
</table>