

EPISTEMOLOGICAL BELIEFS: DIFFERENCES AMONG EDUCATORS

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EPISTEMOLOGICAL BELIEFS: DIFFERENCES AMONG EDUCATORS

The following faculty members have examined the final copy of this thesis for form and content, and recommend that it be accepted in partial fulfillment of the requirement for the degree of Master of Education with a major in Educational Psychology.

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ABSTRACT

Epistemological beliefs are personal beliefs about learning and knowledge. Epistemological beliefs have been found to have important implications for learning, for example epistemological beliefs have been found to predict academic achievement (Schommer, Calvert, Gargliette, & Bajaj, 1997), and may predict teaching practices (White 2001). This study examined the epistemological beliefs of 83 (M= 16, F = 67) practicing teachers, 62 of whom were enrolled in a graduate teacher education program. This study utilized the Epistemic Beliefs Inventory (EBI) (Schraw, Bendixen, & Dunkle, 2002) and the four-quadrant method (Schraw & Olafson, 2008) to measure participants' epistemological beliefs. Differences were found among educators based on education level, education program, gender, age, licensure type, and order in which participants received the instruments. The four-quadrant method was found to have small correlations with the EBI. Limitations and implications are discussed.

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CHAPTER 1

THE PROBLEM

Fostering critical thinking and exploring the nature of knowledge with students are ways teachers can create the right environment to enhance the development of students' epistemological beliefs (Hofer, 2001). The teacher can only explore the nature of knowledge and foster critical thinking if the instructor values epistemological development and possesses sophisticated epistemological beliefs themselves (Olafson & Schraw, 2006). Research has indicated that epistemological beliefs are important to student learning. Schoenfeld (1992), (cited in De Corte, Op 'T Eynde, & Verchaffel, 2002) has concluded that epistemological beliefs are important predictors of mathematics and problem solving skill. Epistemological beliefs have also been linked with reading comprehension (Schommer, 1990; Schommer, Crouse, & Rhodes, 1992), academic goal setting (Braten & Stromso, 2004) attitudes toward school (Schommer & Walker, 1997), and grade-point average (Schommer, Calvert, Gargliette, & Bajaj, 1997). Some studies (e.g., Levitt, 2001) have indicated that teachers tend to engage in simplistic teaching practices that do not enhance epistemological belief development in their students and may reflect naïve epistemological beliefs in the teachers themselves.

One question in determining teachers' epistemological beliefs may be to address their educational level. Evidence (e.g., Lehman, Lempert, & Nisbett, 1988) suggests that graduate-level education advances epistemological beliefs in students to be more sophisticated and less naïve. Before addressing the purpose of this study, definitions relevant to this study will be explained.

Definitions

Epistemological beliefs are defined as beliefs about the nature and acquisition of knowledge (Bruning, Schraw, Norby, & Ronning, 2004). Schommer (1994) pioneered an epistemological beliefs system of five more or less independent beliefs, which are: *stability of knowledge, structure of knowledge, source of knowledge, control of knowledge acquisition* and the *speed of knowledge acquisition*. Each dimension ranges from simplistic, naïve beliefs to more sophisticated and complex beliefs. For instance, within the dimension of structure of knowledge, a naïve belief would be that knowledge is best described as isolated facts, while a more sophisticated belief would be that knowledge can be better explained as integrated and connected theories.

Schraw and Olafson (2008) adapted the study of epistemological beliefs to be dimensions that can be represented on a scale. One extreme of the scale is labeled Epistemological Realist (representing more naïve beliefs), describing a belief that there is an objective body of knowledge that must be acquired. The other extreme of this scale is labeled Epistemological Relativist (representing more sophisticated beliefs), encapsulating a belief that would describe curriculum as changing and student-centered. Schraw and Olafson also incorporated Ontology into the study of epistemological beliefs. Ontology is the study of beliefs about the nature of reality and can also be represented on a scale. One end of the scale is labeled Ontological Realist, which describes assumptions that there is one underlying reality that is the same for everyone. The opposite end of the scale is labeled Ontological Relativist, which characterizes beliefs relating to people having their own reality and the existence of multiple realities.

Historical Background

Schommer-Aikins (2002) provided a historical perspective of the evolution of the study of epistemological beliefs. The following brief review of this history is taken from her work. The study of epistemological beliefs began in 1968, when Perry examined the beliefs of Harvard undergraduates using interviews and questionnaires. Perry concluded that the subjects in the early years of college tended to believe in simple, certain knowledge that is handed down by authority. Nearing the end of their college experience, most students believed in more tentative, complex knowledge that is derived from their reason and observation. Following Perry, Ryan (1984) linked epistemological beliefs to comprehension monitoring. Ryan found that those with naïve epistemological beliefs were more likely to monitor comprehension by reciting facts rather than reporting context-oriented conceptions. Kitchener and King (1981) introduced the Reflective Judgment Model, proposing that learners move from beliefs of absolute and concrete knowledge that is validated by authority to the final stage of the belief that knowledge is tentative and justified by reason.

Schommer-Aikins (2002) further cited Dweck and Bempechat (1983), who concluded that children hold beliefs about the ability to learn, and those beliefs influence their behavior during a learning task. Children who believe that learning ability is fixed at birth will give up on a problem faster than children who believe that the ability to learn can be improved. Schoenfeld (1983, 1985) found evidence that seemed to show that students with poor mathematics problem-solving skills tended to believe that

mathematics knowledge was handed down by an omniscient authority and that mathematics problem solving should occur quickly.

A Belief System

Schommer (1994) developed the notion of epistemology into a belief system that included five different domains: (a) certainty of knowledge, (b) structure of knowledge, (c) source of knowledge, (d) control of knowledge acquisition, and (e) speed of knowledge acquisition. Certainty of knowledge belief ranges from personal beliefs that knowledge is static throughout time to the view that knowledge is tentative and changes over time. The structure of knowledge belief ranges from beliefs that knowledge is simply facts to the belief that knowledge is better represented as complex theories. Source of knowledge beliefs are the beliefs that people hold regarding where knowledge comes from: Whether it comes from those in authority to something that can be discovered and learned by anyone. The control of knowledge belief relates to the beliefs individuals hold about the ability to learn, ranging from the belief that ability to learn is fixed at birth or that the ability to learn changes throughout an individual's life. The speed of knowledge acquisition belief refers to the belief in how quickly knowledge can be acquired. Individuals hold beliefs that range from the perception that knowledge will only be learned in a small amount of time or it won't be learned at all to the belief that most things can be learned by most people if enough time is dedicated. These domains are proposed to be more or less independent of each other, suggesting that an individual can hold sophisticated beliefs in one domain and more naïve beliefs in another.

In contrast to Schommer (1994), Hofer and Pintrich (1997) indicated that some of Schommer's (1994) dimensions are outside of the definition of epistemological beliefs. The authors stated that fixed ability and quick learning do not fall into the construct of epistemological beliefs because they do not purely concern beliefs about knowledge but also address learning and learning ability.

This work will assume the definition of epistemological beliefs as beliefs about the nature and acquisition of knowledge (Bruning et al., 2004) and include the five domains suggested by Schommer (1994).

Purpose

Because epistemological beliefs are important to student learning and teachers must be epistemologically sophisticated before they can engage in teaching practices that encourage the development of epistemological beliefs among students, teachers' epistemological beliefs should be assessed to determine their level of epistemological sophistication. The educational programs that may have led to the development of these beliefs among teachers should be examined to determine if differing educational programs and levels of education affect epistemological beliefs in teachers.

Overview

Chapter two of this thesis details research on students in teacher education programs, (who are also called pre-service teachers). Research on practicing teachers was also presented. Ontology and its relation to education was shown, and Shraw's (2008) four-quadrant scale was exhibited. Literature explaining the effect education has on reasoning and epistemological beliefs was discussed. Chapter three discusses the

methods, participants, instruments and procedure of study. Chapter four describes the results of the data analysis, chapter five presents the discussion.

CHAPTER 2

REVIEW OF THE LITERATURE

Chapter two of this thesis presents evidence of the importance of these beliefs regarding students. Recent inquiries of epistemological beliefs among pre-service teachers are detailed, as well as investigations of current teacher epistemological beliefs and their connection to teaching practices. The effect of graduate education on teachers' epistemological beliefs will be discussed, and the notion of ontology will be introduced.

Epistemological beliefs have visible importance to student learning. Epistemological beliefs have been linked with comprehension (e.g., Schommer, 1990; Schommer, Crouse, & Rhodes, 1992), mathematics understanding (Schoenfeld, 1992, cited in De Corte, et al., 2002), attitudes toward school (Schommer & Walker (1997), academic goal setting (Braten & Stromso, 2004) and grade-point average (Schommer et al. (1997).

Epistemological beliefs have been found to be related to academic major (Jehng, Johnson, & Anderson, 1993) and levels of education (Schommer, 1998). As students progress through college and graduate school, epistemological beliefs become more sophisticated. Similar findings have been made about reasoning abilities, level of education, and type of education (Lehman et. al, 1988).

Literature Review

Whereas the importance and meaning for examining the epistemological beliefs of students has been established (e.g., Broten & Stromso, 2004; Schommer et al., 1992; Schommer, 1990), a more recent exploration of epistemological beliefs has begun in two

areas. First, a number of studies have been conducted using students in a teacher education program, also called pre-service teachers.

Pre-Service Teachers and Epistemological Beliefs

White's (2000) line of inquiry explored the beliefs of pre-service teachers in the context of problematic classroom situations. Specifically, White wanted to find out what beliefs pre-service teachers held about the certainty of knowledge, how pre-service teachers view problematic classroom situations, what source of knowledge the pre-service teachers would use to make their choice of a solution to follow in a problematic classroom situation, and how pre-service teachers would justify their choice of action in a problematic classroom situation. White introduced students throughout the semester to case studies of first-year teachers. The students then discussed and gave individual written responses to the case studies. These written responses were what White then used as a framework for interviews that were conducted individually at the end of the semester. The participants in White's study were 20 members of the teacher education program at a mid-western university and were categorized based on their responses during the interview according to King and Kitchener's stages of Reflective Judgment, which is a seven-stage model that judges responses according to expressed certainty of knowledge and use of evidence in responses (King & Kitchener, 1994; cited in White, 2000). Of these participants, two were judged by White to be in the departing absolutist category, which is the category that describes the most naïve beliefs. The final stage, called the reflected relative, is the stage that describes the most sophisticated beliefs. Three pre-service teachers were judged to be in this category. The majority of

participants were found to be in the second most naïve category. From this study, White concluded that pre-service teachers have wide differences in epistemological beliefs; these beliefs do not develop in a stage-like manner and are interconnected in a web-like fashion.

Recognizing the importance of developing the epistemological beliefs of pre-service teachers, Gill, Ashton, and Algina (2004) created and performed a study that provided pre-service teachers with instructional intervention. The purpose of this study was to determine how pre-service teachers would adopt the philosophy of the National Council of Teachers of Mathematics. This council encourages teachers to have a general epistemological belief that knowledge is uncertain and complex, and that mathematics knowledge is learned in a constructivist manner by actively constructing knowledge during problem solving. One hundred sixty-one elementary education students participated in this study. To assess the epistemological beliefs of the pre-service teachers, the researchers used three measures of epistemological beliefs. The first measure was the Cognitively Guided Instruction Belief Survey (CGI) that measured the students' explicitly held epistemological beliefs about mathematics. Second, participants were administered a revised version (Quain & Alverman, 1995, cited in Gill et al., 2004) of Schommer's (1990) Epistemological Beliefs Questionnaire (EBQ). This measured the participants' general epistemological beliefs. Third, to measure the implicit epistemological beliefs the students held about mathematics, the researchers used mathematics teaching scenarios that were intended to reveal the underlying epistemological beliefs these pre-service teachers had about teaching mathematics. The

participants were divided into a control and experimental group; the experimental group received a treatment of a text that explained how and why a constructivist teacher would teach a mathematics class and how a procedural teacher would teach the class and believed reasons a teacher would teach that way. Results of this study provided support for the use of persuasive text to foster the development of epistemological beliefs. Differences in experimental and control group were statistically significant for all three of the epistemological belief measures.

Sinatra and Kardash (2004) examined epistemological beliefs and their relation to the views pre-service teachers had about *teaching as persuasion*. Teaching as persuasion can be defined as a metaphor for teaching in which teachers acknowledge that students have (a) knowledge or beliefs that conflict with classroom content; (b) alternative points of views are worth considering; (c) messages can be structured to influence students' understanding; and (d) learning results from a change in students' knowledge and beliefs. However, the term *persuasion* often has a negative connotation. The purpose of this study was to determine if pre-service teachers would be open to change and learning about teaching as persuasion. One hundred eighty-two college education students were administered two scales from the Epistemological Beliefs Survey (EBS) (Kardash & Wood, 2002; Wood & Kardash, 2002; cited in Sinatra & Kardash, 2004). The two scales were the *Speed of Knowledge Acquisition* and the *Knowledge Construction and Modification* scale. The Speed of Knowledge scale measures students' beliefs about how quickly and how complicated learning is. The Knowledge Construction and Modification scale seems to measure beliefs about the certainty of knowledge, the integration of

knowledge from various sources, and the degree to which knowledge is actively constructed. The study found that epistemological beliefs among pre-service teachers were significantly and positively correlated with openness to teaching as persuasion.

Further study of the epistemological beliefs of teacher education students was conducted by Chan and Elliot (2004). This study utilized 385 teacher education students from a post-secondary institution in Hong Kong. The purpose of this study was to determine if there were any relationships between explicit epistemological beliefs and explicit teaching beliefs. Schommer's EBQ (1990) was administered as well as the Teaching and Learning Conceptions Questionnaire (TCCQ) (Chan & Elliot, 2004). This measure was developed by the authors to capture a conception of teaching, either traditional or constructivist. The Traditional Conception views teaching as a non-problematic transfer of knowledge from an expert to a novice. The constructivist conception sees learning as the acquisition of knowledge by the learner through reasoning and justification, and teaching is the facilitation of the learning process rather than the transmission of knowledge. The TCCQ asked participants to respond via a Likert-type scale to statements such as "it is important that a teacher understands the feelings of the students" and "during the lesson, it is important to keep students confined to the textbooks and the desks." The results of the EBQ and the TCCQ were correlated. The Traditional Conception of teaching was positively and significantly correlated with three dimensions of the EBQ: Innate/Fixed Ability, Authority/Expert Knowledge and Certainty of Knowledge. The Constructivist Conception was found also to be correlated with Authority/Expert Knowledge and Certainty of Knowledge but to a lesser degree than the

Traditional Conception. Learning Effort/Process was negatively related to the Constructivist Conception.

Teachers and Epistemological Beliefs

Another area of research has addressed the epistemological beliefs of teachers and how these beliefs are related to various forms of teacher behavior. Levitt (2001) studied the beliefs teachers had about teaching and learning science among elementary school science teachers. The purpose of the study was to ascertain how consistent teachers' beliefs were with current reform standards in science education. This reform attempted to transform teaching practices from the dominant practice of positivism, which can be generally described as the learning of answers, memorizing facts, and reading text, to the practice of constructivism, which can be described as investigating questions, thinking critically, and making arguments to explore science. Levitt explained that the success of any reform depended on teachers incorporating the new philosophies of the reform into their own teaching practices and philosophies. Teachers from two different school districts (10 from each district) were observed during the teaching of a science lesson. The teachers were then interviewed based on what the researcher had seen during the observations. Levitt found that eight of the teachers fell in a transitional range that was somewhere between a positivist teacher and a constructivist teacher. There were five teachers whose beliefs were traditional, and three whose beliefs were transformational. As a whole, Levitt believed that the teachers who were sampled appeared to be in an incomplete stage to full reform (Levitt 2001).

In another study on the epistemological beliefs of teachers, Olafson and Schraw (2006) determined the epistemological beliefs of elementary teachers and then attempted to look for a correlation between their epistemological beliefs and their actual teaching practices. The researchers used vignettes that described what they called *epistemological world views*. These were called *realist*, *contextualist*, and *relativist* world views. Realists were described as believers of a fixed, core body of knowledge that is learned by transmission from an expert to a novice. Students in a realist teacher's classroom would experience an active teacher and would be expected to learn passively. Contextualists posit that students must construct their own knowledge and that the teacher serves as a facilitator for this collaborative, shared construction of knowledge. Relativists also indicate that students need to construct their own knowledge and teachers should build an environment where students construct their knowledge and learn to think independently.

Olafson and Schraw divided their research into two phases. Phase I of the study utilized 24 elementary school teachers who were enrolled in a graduate course in curriculum. These teachers were administered the Epistemic Belief Inventory (Schraw, Bendixen, & Dunkle, 2002). The researchers focused on simple knowledge (how simple or complex knowledge is), certain knowledge (to what degree is knowledge tentative), and omniscient authority (to what degree) subscales of the instrument. The participants then completed the Need for Cognition Scale (Cacioppo, Petty, Feinstein, & Jarvis, 1996, cited in Olafson & Schraw, 2006), measuring the participants' preference for complex thinking. The elementary teachers were also administered a Motivation for Teaching Scale (Schraw & Olafson, 2002, cited in Olafson & Schraw, 2006), that measured

intrinsic and extrinsic motivation for teaching. The participants were then read the epistemological world views vignettes and were categorized into a world view based on an interview conducted after the reading of the vignettes. Teachers were then interviewed regarding their teaching practices, specifically their selection of curriculum. The authors reported that 95% of participants identified with the contextualist position, 85% disagreed with the realist position, and 30% gave support to the relativist world view. All of the teachers used the curriculum the school district provided; however, there was large variability in how much the teachers relied on the district-provided curriculum. Teachers who relied heavily on the district curriculum had less student-centered classrooms than those who often strayed from the curriculum.

In Phase II of the study, participants completed the same three scales as Phase I participants. Phase II teachers were then asked to create a storyboard of a recent memorable teaching experience. Using PowerPoint, teachers made the storyboard that included digital photographs of the classroom during teaching, descriptions of curricular objectives, and instructional strategies. The Phase II participants also submitted a reflection paper of their beliefs and the relationship of their beliefs to their practices. Phase II results were similar to participants in Phase I; that is, Phase II participants had similar epistemological beliefs to participants in Phase I. The results of this study indicated that epistemological beliefs and worldviews are correlated. The contextualist and relativist worldviews were correlated with more sophisticated epistemological beliefs. Also, more sophisticated epistemological beliefs were correlated with more intrinsic motivation. The authors also noted that, according to the Phase II teachers'

storyboards and reflection papers, epistemological beliefs and worldviews are not closely aligned with teaching practices. Of the nine storyboards and reflection papers that were submitted, 59% were contextualist, 36% were realist, and 5% were relativist. This is in contrast to the Phase II teachers' reported world view beliefs, where 89% gave support to contextualist position, 55% gave support for the relativist, and no teacher gave support to the realist position.

Ontology and Epistemological Beliefs

Most recently, the study of beliefs and their effects on learning has expanded to include the notion of ontology, the study of the beliefs about the nature of reality. Slotta and Chi (2006) explored the conceptualizations that students hold about physics concepts. The authors hypothesized that students have difficulty learning about topics such as heat, light and electricity because students consider these concepts to be *material substances* rather than *emergent processes*. This incorrect classification results from an incorrect ontological attribution, or an incorrect assumption about the nature and characteristics of *emergent processes*. Participants (n=24) were undergraduate students and were equally divided into an experimental group and a control group, the experimental group receiving training from the emergent process ontology training module while the control group received training on the same computer and on the same topic as the experimental group but without the focus on emergent processes. Both groups completed a pre-test and a post-test before and after their training session.

The participants were then given an electricity pre-test, followed by an electricity text to read and then an electricity post-test. These tests contained prompts for the

participants to expound on their answers. The results of this study indicated that the students who received emergent processes training reduced their errors on the electricity post-test by 20% more than the control group. Also, experimental participants' responses to the prompts to elaborate on their answers to the post-test were judged to be more conceptually correct than control group participants.

Continuing the investigation of ontological beliefs, Schraw and Olafson (2008) proposed a simple measurement instrument that attempts to identify ontological and epistemological beliefs. Schraw and Olafson contended that epistemological and ontological beliefs can be measured on a four-quadrant scale. After reading a set of instructions on how to rate their epistemological and ontological beliefs on the four-quadrant scale, participants (24 graduate education students) read descriptions of ontological and epistemological positions. The participants made their mark on the four-quadrant scale where they believed their epistemological and ontological views were best represented. The participants were then asked to give written justification for their mark. Results of this study showed that approximately 45% of the participants rated themselves as epistemological realists to some degree. Contrastingly, approximately 92% rated themselves as ontological relativists. The authors also noted that the content of participants' written justifications of their marks on the four-quadrant scale showed alignment.

Graduate Education

One area that may be related to epistemological and ontological beliefs is education. Advancing education requires individuals to think in more complex ways and deal with areas of knowledge that are less certain. Different graduate programs have been shown to elicit different reasoning skills and methods of thinking (Lehman, Lempert, & Nisbett, 1988). These authors investigated the reasoning abilities of 213 first-year law students, 127 medical students, 25 psychology students, and 31 chemistry students in the areas of statistics, methodology, conditional reasoning, and verbal reasoning. Third year students in the same disciplines were given the same instrument to measure their reasoning in the same areas as the first year students, with 50 law students, 48 medical students, 33 psychology students and 26 chemistry students. Lehman and colleagues also used a longitudinal design to explore the reasoning abilities of students. Students were utilized both in their first year and third year, with 77 law students, 87 medical students, 24 psychology students, and 18 chemistry students. The results of the study showed that in the first year of the students' programs, their reasoning abilities differed only marginally. Third-year students had considerable differences in all conditions except verbal reasoning. Medical students and psychology students improved greatly in statistical and methodological reasoning, psychology students seeing the most improvement. The law and chemistry students improved marginally. Conditional reasoning saw considerable improvement for third year law, medicine, and psychology students. Chemistry students saw little gain.

Jehng et al. (1993) provided additional evidence that academic major and year in school are related to epistemological beliefs. The authors modified Schommer's (1990) Epistemological beliefs questionnaire to be used in Chinese and substituted a dimension of "Orderly Processes" for Schommer's (1990) dimension of Simple Knowledge. This modified questionnaire was administered to a large number of graduate and undergraduate students at a university in China. An analysis of 398 questionnaires showed that academic field of study and level of education were related to epistemological beliefs. Academic field was found to show differing epistemological beliefs whereas year in school was found to be related to increasingly sophisticated epistemological beliefs (Jehng et al. 1993).

To further explore the effect different variables have on epistemological beliefs, Schommer sought to determine what relationship age has with the development of epistemological beliefs (Schommer, 1998). Schommer surveyed the epistemological beliefs of 418 adults from 170 occupations, including farmers, firefighters, executives, waitresses, and lawyers. Schommer's sample of 418 adults were composed of approximately one-third of the adults having a high school education only, one-third possessing a bachelor's degree only, and one-third having graduate education. Results showed that age and level of education affect epistemological beliefs in their own ways. Education was related to beliefs about structure and the stability of knowledge whereas age was related to beliefs about the ability to learn (Schommer, 1998).

Summary

Researchers in the field of epistemological beliefs began studying the beliefs of undergraduates. Research has spread to examine the beliefs of secondary students, graduate students, teacher education students, and various practicing professionals, most prominently, practicing teachers. Personal beliefs about knowledge and learning have shown their importance in how, and how much, individuals learn. Research using practicing teachers as participants has shown that epistemological beliefs are related to teaching practices. Epistemological beliefs have been shown to reach greater development with continued education. However, different education programs show differing levels of epistemological sophistication, as well as age showing a unique relationship with epistemological beliefs.

Because the inquiry about epistemological beliefs among teachers is a recent endeavor, more studies and data need to be collected to further assess the beliefs of practicing teachers. Ontological beliefs have only recently been incorporated with epistemological beliefs and so further study is needed to determine their relevance to teacher beliefs. The four quadrant scale method for assessing epistemological and ontological beliefs is a recently constructed measure that has not established any forms of reliability. Also, effects of graduate education have not been specifically assessed regarding special education teachers and the effects of specific graduate programs within the field of special education.

It stands to reason that in order for teachers to foster epistemological beliefs within their students, the teachers must hold sophisticated epistemological beliefs themselves and value their importance.

This literature review suggests that both academic major and level of education are related to epistemological beliefs. The questions for this study will be:

1. Will there be differences in educators based on their level of education?
2. Will a relationship between ontological beliefs and epistemological beliefs be found?
3. Will there be replication of earlier results (Schraw & Olafson, 2008) regarding the four quadrant scale method of measuring ontological and epistemological beliefs?

CHAPTER 3

METHOD

Participants

Participants in this study consisted of students that were either in a graduate teacher education program at Wichita State University or teachers that were contacted via email. There were 233 teachers who were emailed the consent form and EBI. After two follow-up emails, 21 teachers responded, giving a response rate of 9%. There were 52 students in graduate courses in the college of education who also participated in this study. There were 83 total participants in the study (M= 16, F= 67). Gender differences in this study reflect the general male to female ratio in elementary education (“Education Reporter”, 2007) Participants’ ethnicities was collected, 73 reported themselves as White or Caucasian, 2 as African American, 3 as Native American, 2 as Asian, 2 listed “other” and 1 did not provide ethnic information. Age information was collected on 70 of the participants. Ages ranged from 23-62 (m=38). The number of participants whose educational level was less than a Master’s degree was 59. The number of participants who had Master’s degrees or higher education was 22. Teaching position was provided by 79 participants. The number of special education teachers was 33, the number of gifted teachers was 11, and the number of general education teachers was 35. The type of licensure held by the teachers was provided by 81 participants. The number of teachers with provisional licenses was 24, the number of teachers with conditional licenses was 3, and the number of teachers with full licensure was 54.

Instruments

The Four-Quadrant Scale. The four-quadrant scale (Schraw & Olafson, 2008) consists of a four quadrant scale, labeled *epistemological realist* to *epistemological relativist* on the x axis and *ontological realist* to *ontological relativist* on the y axis. This study utilized a modified version of this scale (see Appendix C). Numbered grid lines were added to give a frame of reference for participants and make scoring of the instrument quicker for the researcher. The grid was numbered from 0 to 10 on both the x and y axis, 0 beginning on the realist end of the scales and 10 labeling the most relativistic end of the scales. Participants were given descriptions of ontological and epistemological realist and relativist positions (see Appendix C). Participants were then asked to make their mark on the four-quadrant scale. The instrument measures epistemological beliefs by the distance the participants' mark is from the origin of the four quadrant scale. The instrument was scored by recording the coordinates of the participant's mark. There is no known reliability or validity for this measure.

Epistemic Belief Inventory. The participants were administered the Epistemic Belief Inventory (Schraw, Bendixen, & Dunkle, 2002) (see Appendix D). This 28 item 5 point Likert scale questionnaire has yielded Cronbach Alphas for items ranging from .58 to .68. Teachers will respond to the 28 items with a 1 corresponding to 'strongly disagree' to a 5 corresponding to 'strongly agree' (See appendix D). Items are totaled, and a mean score for each of the five factors is computed, resulting in a minimum score of 1 to a maximum score of 5. Items 2, 6, 19, 24, and 28 are reversed scored (G. Schraw,

personal communication, January 15, 2009). Higher scores are meant to represent more naïve epistemological beliefs. The Epistemological Beliefs Inventory (EBI) uses the five factors proposed by Schommer (1990). There are seven items measuring simple knowledge, five items measuring certain knowledge, five items measuring omniscient authority, six items measuring innate ability, and five items measuring quick learning (G. Schraw, personal communication, January 15, 2009). Unlike Schommer (1990) the EBI indicates evidence of loadings of the omniscient authority dimension. This may be due to unique items that were developed by Schraw, Dunkle, and Bendixen (1995). Schraw, Dunkle, and Bendixen suggested that this is evidence of the existence of the omniscient authority dimension. The EBI has shown predictive validity. College students who showed stronger beliefs in certain knowledge and omniscient authority predicted performance on an ill-structured problem and stronger beliefs in quick learning predicted performance on a well-structured problem (Duell & Schommer-Aikins, 2001).

Demographic questionnaire. Participants were given a brief demographic questionnaire that will assess: sex, age, teaching experience, current teaching assignment, and academic background (See Appendix E).

Procedure

Each school district's superintendent was contacted to obtain permission to email participants. The school districts of Valley Center and Maize granted permission for the researcher to email teachers. The Director of the Sedgwick County Area Educational Services Interlocal cooperative (SCAESIC) was contacted and granted permission for the researcher to email all special education teachers employed by the SCAESIC. Teachers'

email addresses were obtained via each school district's website and the website of the SCAESIC. Teachers were then given an email from the researcher. In the body of this email (Appendix A) were brief directions for completing the study, a consent form and an internet link to an online version of the EBI and demographics questionnaire. After reading the consent form, participants signified their consent to participate in this study by opening an internet link to the online versions of the EBI and demographics questionnaire. GoogleDocs™ was used to create and administer the online versions of the EBI and demographics questionnaire. A total of 233 teachers were emailed the study. Two follow-up emails were given to participants who had not yet participated in the study. Because so few of the teachers responded, the sample size was supplemented by requesting graduate students to participate in the study. To answer the research questions regarding the four-quadrant method, students in graduate teacher education programs at Wichita State University were surveyed. Three instructors were asked permission for the researcher to come to their classes before instruction began. All instructors granted permission to the researcher. The researcher then prepared packets for participants containing paper copies of the consent form (Appendix B), EBI, four quadrant scale, and demographics questionnaire (Appendix E). The order of the copies of EBI and four-quadrant scale was alternated, so half of the class received the EBI first in their packet while the other half received the four-quadrant scale first. The order in which the EBI and the four quadrant method was given in the packet was recorded in 33 of the participants. The researcher gave a brief explanation of the study and provided the packet to students

who volunteered their participation. Further explanation of the four-quadrant scale was given to participants who had questions about how to complete the four-quadrant method.

CHAPTER 4

RESULTS

The results of the data analysis are presented in this chapter. The research addressed the following research questions: (a) Will there be differences in educators based on their level of education? (b) Will a relationship between ontological beliefs and epistemological beliefs be found? (c) Will there be replication of earlier results (Schraw & Olafson, 2008) regarding the four quadrant scale method of measuring ontological and epistemological beliefs?

Descriptive Analysis

Before presenting the statistical analysis, Table 1 presents means and standard deviations for the 5 EBI dimensions, results of 4-quadrant scale, based on the independent variables of Gender, Age, Education level, Instrument Order, Teaching Licensure, and Program of Study. Participants were divided by age into four age groups: 22-28, 29-37, 38-45, and 46 and older (Levinson, Darrow, Klein, Levinson & McKeel, 1976; Roberts & Newton, 1987). Levinson, et al. indicate that these age groupings typify specific developmental tasks that need to be accomplished during that time frame and therefore mark natural age divisions in adulthood. Participants were grouped by Education level by degree and credit hours earned. Bachelor's degree and credit hours earned up to a Master's degree was one group, Master's degree and credits and degrees earned post-Master's was the second group. Participants were grouped in the Instrument Order variable according to which instrument in the study the participants completed first. The Program of Study variable categorized participants by their chosen educational

field, if they are in a program to earn a special education degree or general education degree.

Table 1.

Means, Standard Deviations, Numbers for Gender, Age Groups, Educational Level, Instrument Order, Licensure, and Program of Study

Variable	Gender			Age Groups				Educational Level			
	Male (n=16) M (sd)	Female (n=67) M (sd)	Total (N=83) M (sd)	22-28 (n=22) M (sd)	29-37 (n=15) M (sd)	38-45 (n=11) M (sd)	46+ (n=22) M (sd)	Total (N=70) M (sd)	BS+ (n=59) M (sd)	MEd+ (n=22) M (sd)	Total (N=81) M (sd)
EBI											
Dimension											
Innate Ability	2.8(.3)	2.9(.4)	2.9(.4)	2.9(.5)	3.0(.4)	2.8(.4)	2.9(.3)	2.9(.4)	2.9(.4)	2.9(.3)	2.9(.4)
Simple Know.	3.0(.4)	2.9(.5)	2.9(.5)	3.1(.6)	2.9(.6)	2.9(.3)	2.9(.5)	3.0(.5)	3.0(.5)	2.8(.4)	3.0(.5)
Certain	2.5(.6)	2.7(.6)	2.6(.6)	2.8(.7)	2.5(.6)	2.7(.5)	2.4(.6)	2.6(.6)	2.7(.6)	2.5(.6)	2.6(.6)
Know.											
Omniscient	2.9(.4)	3.3(.6)	3.2(.6)	3.5(.6)	3.0(.4)	3.1(.5)	3.0(.6)	3.2(.6)	3.3(.5)	2.9(.6)	3.2(.6)
Auth											
Quick	1.7(.4)	1.8(.5)	1.8(.4)	1.8(.5)	1.6(.4)	1.7(.3)	1.8(.4)	1.7(.4)	1.7(.5)	1.8(.4)	1.8(.4)
Learning											
Quadrant											
Scale											
Epistemology	6.3(2.6)	7.9(2.8)	7.6(2.8)	7.6(2.3)	8.4(2.1)	7.6(2.8)	8.5(3.4)	8.1(2.7)	7.0(2.5)	9.4(2.8)	7.6(2.8)
Ontology	6.8(2.6)	8.5(2.4)	8.2(2.5)	8.4(2.2)	8.1(2.6)	8.0(2.6)	9.0(2.7)	8.5(2.5)	7.7(2.3)	9.6(2.6)	8.2(2.5)
		Order	Total	Licensure			Program of Study				
	Four-	EBI	Total	Full	Prov	Cond.	Total	Sp. Ed.	Gen.	Total	
	quadrant	first	(N=33)	(n=54)	(n=24)	(n=3)	(N=81)	(n=36)	Ed.	(N=62)	
	first(n=18)	(n=15)	M (sd)	M (sd)	M (sd)	M (sd)	M (sd)	M (sd)	(n=26)	M (sd)	
	M (sd)	M (sd)							M (sd)		
EBI											
Dimension											
Innate Ability	2.7(.5)	3.0(.4)	2.9(.4)	2.9(.3)	2.8(.5)	3.1(.6)	2.9(.4)	2.9(.4)	2.9(.4)	2.9(.4)	
Simple Know.	3.1(.6)	3.0(.3)	3.0(.5)	3.0(.5)	2.8(.5)	3.0(.7)	2.9(.5)	2.9(.4)	3.1(.5)	3.0(.5)	
Certain	2.6(.7)	2.6(.6)	2.6(.6)	2.6(.6)	2.7(.6)	2.2(.2)	2.6(.6)	2.6(.6)	2.7(.7)	2.7(.6)	
Know.											
Omniscient	3.2(.5)	3.4(.6)	3.3(.6)	3.1(.6)	3.4(.5)	3.5(.8)	3.2(.6)	3.2(.6)	3.4(.5)	3.3(.5)	
Auth											
Quick	1.6(.3)	1.9(.4)	1.7(.4)	1.8(.4)	1.7(.4)	1.4(0)	1.8(.4)	1.8(.5)	1.7(.4)	1.8(.5)	
Learning											
Quadrant											
Scale											
Epistemology	7.6(2.3)	6.1(2.1)	6.9(2.3)	8.1(2.9)	7.1(2.3)	6.3(1.1)	7.7(2.7)	6.1(2.3)	7.0(2.2)	6.4(2.3)	
Ontology	8.0(2.1)	7.2(2.1)	7.6(2.1)	8.6(2.5)	6.7(2.1)	5.7(1.1)	8.3(2.4)	6.9(2.2)	7.7(2.1)	7.2(2.2)	

Statistical Analyses

To answer the first research question (will there be differences in the 5 dimensions of the EBI and 2 measures of the four-quadrant scale between educators based on their level of education), MANOVA was used. Table 2 presents the *F* values of the MANOVA.

Table 2.

MANOVA for Education Level

Source	df	F	η	Sig.
Innate Ability	1	0.01	0.00	0.90
Simple Knowledge	1	3.90*	0.05	0.05
Certain Knowledge	1	1.59	0.02	0.21
Omniscient Authority	1	7.82**	0.09	0.01
Quick Learning	1	0.29	0.00	0.59
Epistemology	1	14.53**	0.16	0.00
Ontology	1	10.16**	0.11	0.00

Significant *F* values were found for the Simple Knowledge and Omniscient Authority dimensions of the EBI, and for both measures of the four-quadrant scale, indicating that participants with a master's degree or higher education were less likely to believe in Omniscient Authority and more likely to believe in complex knowledge.

Because the issue of teaching assignment was a relevant variable (gifted and special education teachers would be more likely to have masters' degrees), a MANOVA was also conducted to determine if there was significant differences between EBI dimensions and teaching position. There were no significant differences found.

To answer the second research question regarding a relationship between ontological beliefs and epistemological beliefs, correlational analysis was conducted

Table 3

Zero-Order Correlations of EBI dimensions and four quadrant scale dimensions

	Innate Ability	Simple Knowledge	Certain Knowledge	Omniscient Authority	Quick Learning	Epistemology	Ontology
Innate Ability	1.00						
Simple Knowledge	.19	1.00					
Certain Knowledge	.25*	-.01	1.00				
Omniscient Authority	.22*	.16	.47**	1.00			
Quick Learning	.29*	.35**	-.01	.04	1.00		
Epistemology	.06	-.06	-.04	-.04	-.03	1.00	
Ontology	-.03	-.12	.08	-.04	-.12	.76**	1.00

* $p < .05$

** $p < .01$

among the five dimensions of the EBI and both of the measures of the four-quadrant scale. Zero-order correlations of the 5 dimensions of the EBI and the two measures of the four-quadrant scale are presented in Table 3. Significant relationships were found among Innate Ability and Certain Knowledge, Omniscient Authority, and Quick Learning. Certain Knowledge was related to Omniscient authority, and Quick Learning and Simple Knowledge had a significant relationship.

A significant relationship between the Ontology and Epistemology measures of the four quadrant scale was found, $r = .76, p < .01$.

To determine if replication of earlier results of the four-quadrant scale (Schraw & Olafson, 2008) were found (research question 3), percentages of participants' self ratings on the four quadrant scale were calculated. Of the participants, 24% (n=58) classified

themselves as epistemological realists, 76% as epistemological relativists, 12% as ontological realists, and 88 % as ontological relativists. This compares to Shraw & Olafson’s results of 45% of participants rating themselves as epistemological realists and 92% rating themselves as ontological relativists.

Ancillary Analysis

Differences in EBI and Four-quadrant scale scores were also analyzed using differences in teacher’s graduate program of study, gender, licensure type, and age. Table 4 presents the *F* values of the Graduate program of study MANOVA. Table 5 presents the *F* values from MANOVA using Gender as the independent variable. Table 6 shows the *F* values of MANOVA with Licensure Type as the independent variable. Table 7 presents the *F* values of MANOVA based on age categories. Table 8 presents the *F* values of MANOVA of Instrument order.

Table 4.

MANOVA for Program of Study

Source	df	F	η	Sig.
Innate Ability	1	0.01	0.00	0.94
Simple Knowledge	1	4.34*	0.07	0.04
Certain Knowledge	1	0.74	0.01	0.39
Omniscient Authority	1	2.72	0.04	0.10
Quick Learning	1	1.82	0.03	0.18
Epistemology	1	2.57	0.04	0.11
Ontology	1	2.38	0.04	0.13

Graduate program of study was found to have significant difference in the EBI dimension of Simple Knowledge, indicating that students in masters' degree program for general education were more likely to believe in simple knowledge than students in the special education program. Although not significant, there is a trend suggesting that students in general education are also more likely to have stronger beliefs in omniscient authority.

Table 5.

MANOVA for Gender

Source	Df	F	η	Sig.
Innate Ability	1	2.27	0.03	0.14
Simple Knowledge	1	0.32	0.00	0.57
Certain Knowledge	1	1.13	0.01	0.29
Omniscient Authority	1	8.68**	0.10	0.00
Quick Learning	1	0.34	0.00	0.56
Epistemology	1	4.10*	0.05	0.05
Ontology	1	6.70**	0.08	0.01

Gender differences were found to be significant for both measures of the four quadrant scale and the Omniscient Authority dimension of the EBI. Females are more likely to believe in omniscient authority; however, females are also more likely to have more relativistic beliefs in ontology and epistemology as measured by the four quadrant scale.

Table 6.

MANOVA for Licensure Type

Source	df	F	η	Sig.
Innate Ability	2	0.85	0.02	0.43
Simple Knowledge	2	0.89	0.02	0.42
Certain Knowledge	2	0.79	0.02	0.46
Omniscient Authority	2	1.37	0.03	0.26
Quick Learning	2	1.46	0.04	0.24
Epistemology	2	1.49	0.04	0.23
Ontology	2	3.12*	0.07	0.05

The only significant difference found for licensure type was with the ontology measure of the four-quadrant scale. Participants who had full licensure were more likely to have relativistic views of ontology.

Table 7.

MANOVA for Age Category

	df	F	η	Sig.
Innate Ability	3	0.33	0.01	0.80
Simple Knowledge	3	0.83	0.04	0.48
Certain Knowledge	3	1.74	0.07	0.17
Omniscient Authority	3	3.44*	0.14	0.02
Quick Learning	3	0.49	0.02	0.69
Epistemology	3	0.58	0.03	0.63
Ontology	3	0.58	0.03	0.63

Significant differences were found between mean scores of the EBI dimension of omniscient authority. The youngest age group was less likely to endorse beliefs in omniscient authority.

Table 8.

MANOVA for Instrument order

	df	F	η	Sig.
Innate Ability	1	2.97	0.09	0.09
Simple Knowledge	1	0.57	0.02	0.45
Certain Knowledge	1	0.04	0.00	0.85
Omniscient Authority	1	1.67	0.05	0.21
Quick Learning	1	4.93*	0.14	0.03
Epistemology	1	3.52	0.10	0.07
Ontology	1	1.30	0.04	0.26

Significant differences were found in the EBI dimension of quick learning. Participants who completed the four-quadrant method first were more likely to have lower EBI scores in the quick learning dimension.

Concurrent Validity of Four-Quadrant Scale

Correlational analysis was also employed to investigate if replication of earlier results (Schraw & Olafson, 2008) were found and to investigate the concurrent validity of the Four-quadrant scale by determining the correlation between the EBI dimensions and the Four-quadrant scale. See Table 3.

CHAPTER 5

DISCUSSION

The purpose of this study was to examine teacher's epistemological beliefs and the factors that may have contributed to the development of those beliefs. The first research question (Will there be differences in educators based on their level of education?) indicated that there were indeed differences among educators. In the EBI dimensions of Simple Knowledge and Omniscient Authority, teachers with more education were more likely to have more sophisticated epistemological beliefs.

The second research question (Will a relationship between ontological beliefs and epistemological beliefs be found?) was investigated. Schraw & Olafson (2008) reported a correlation of $r = .45$ between the epistemological and ontological measures of the four-quadrant scale. As reported in this study, a correlation of $r = .76$ was found between the two measures of the scale (see table 3). This evidence could support the existence of a relationship between epistemological and ontological beliefs but probably more accurately describes a relationship between the measures of the four-quadrant scale. This relationship cannot be generalized due to the correlations that were found between the EBI and the four-quadrant scale. As reported in table 3, the epistemology measure of the four-quadrant scale had negative correlations with Simple Knowledge, Certain Knowledge, Omniscient Authority, and Quick Learning. Negative correlations would support a positive relationship between the EBI and the four-quadrant scale because a low EBI score supports sophisticated epistemological beliefs and a high four quadrant scale score is intended to represent sophisticated epistemological and ontological beliefs.

The epistemology measure of the four-quadrant scale was found to have a positive correlation with the Innate Ability dimension of the EBI. The ontological scale of the four-quadrant method was found to have slight, negative correlations between the Innate Ability, Simple Knowledge, Omniscient Authority, and Quick Learning dimensions of the EBI. The ontological measure had a positive correlation with Certain Knowledge. These findings indicated a weak relationship between the four-quadrant method and the EBI and did not support a relationship between ontological and epistemological beliefs.

The third research question asked if earlier results (Schraw & Olafson, 2008) would be found regarding the four quadrant scale method of measuring ontological and epistemological beliefs. Similar results were found in this study. Schraw & Olafson's (2008) reported that 45% of participants (n= 24) rated themselves as epistemological realists, 55% as epistemological relativists, 8% as ontological relativists, and 92% rated themselves as ontological relativists. Similarly in this study, 24% of participants (n=58) classified themselves as epistemological realists, 76% as epistemological relativists, 12% as ontological realists, and 88 % as ontological relativists. Schraw & Olafson (2008) reported a correlation of $r=.45$. A significant relationship between the Ontology and Epistemology measures of the four quadrant scale was replicated, $r =.76$.

Based on results of earlier research, ancillary analyses were conducted on other independent variables. It was expected for Gender, Age, and Level of Education to have effects on epistemological beliefs. Schommer (1998) found Age to affect beliefs about the ability to learn and Level of Education to affect beliefs about the stability and structure of knowledge. In this study, Level of Education had an effect on the Simple

Knowledge and Omniscient Authority dimensions of the EBI. This evidence supports Schommer's previous finding that Level of Education affects epistemological beliefs. In this study, Age was found to have an affect on the Omniscient Authority dimension of the EBI. While this study did not find evidence to support that Age affected beliefs about the ability to learn, it did show that Age affected epistemological beliefs in different ways than Level of Education. Age only affected the Omniscient Authority dimension the EBI, while Level of Education had an affect on both the Omniscient Authority and the Simple Knowledge dimensions.

Gender differences were expected to be found based on previous findings. Schommer, (1990) found females to be more likely to believe in gradual learning rather than quick learning. Braten & Stromso, (2004) found female teachers to be more likely to use mastery goals rather than performance goals. This study did not replicate previous findings but did find significant differences in beliefs in omniscient authority, with women more likely to endorse beliefs in omniscient authority.

Educational Program was also found to have a significant affect on one of the dimensions of the EBI. Simple Knowledge was found to be more sophisticated in participants whose chosen field of study would gain them a degree in special education, including gifted education. Educational program was known to affect epistemological beliefs (e.g. Jehng, et. al, (1993), and reasoning skills (Lehman, Lempert & Nisbett, 1988) but it was a somewhat surprising finding in this study due to the perceived similarity between the educational programs that were surveyed.

Licensure type was found to have an effect on scores on the Ontology measure of the four quadrant scale, Teachers with full licensure were more likely to have higher scores on the ontological measure. Due to the lack of concurrent validity between the four quadrant scale and the EBI, conclusions cannot be drawn by this finding until concurrent validity is established.

Limitations

This study was limited in various ways. Low response rate from the online survey led this study to have a small sample size. Trends in differences in mean EBI and four-quadrant scale scores could possibly be reported as statistically significant if a larger sample size would have been obtained. The sample also did not have equal numbers of participants based on gender, making conclusions about gender differences found in this study very tentative. Modifications made to the four-quadrant scale limit the conclusions that can be drawn about the reliability and validity of the instrument. Further limiting the conclusions that can be drawn about the four-quadrant scale is the small sample of participants who completed the measure. This researcher discovered no practical way for the four-quadrant scale to be administered electronically, and so the measure was not sent out to online participants. The four-quadrant scale was also confusing to some participants. Some participants required further explanation about the measure before they were able to complete it.

Implications for future research

Epistemological beliefs have again been shown to be advanced with advancing education. This is evidence of the importance of advanced education for educators.

Educators with advanced education and in general, more sophisticated epistemological beliefs should naturally have teaching practices that support and promote sophisticated epistemological beliefs. Teachers with more sophisticated epistemological beliefs should more readily support constructivist activities and discussions that promote beliefs in the complexity and tentativeness of knowledge and the possibility for anyone to obtain it. However, Olafson and Schraw (2006) did not find epistemological beliefs to be closely aligned with actual teaching practices when teachers self reported classroom activities, teaching strategies, and instructional objectives. Future research should further examine the relationship between teaching practices and epistemological beliefs.

This study found that there were differences in educators based on the type of graduate education program they were seeking degrees in. Because participants in this study were all involved in classes that were about teaching, this study suggests that even small differences in the type of education or subject matter can affect epistemological beliefs. Future research should address factors within different graduate education programs that may affect epistemological beliefs.

Women in this study were found to endorse beliefs in omniscient authority more so than men. This could support the idea that women are socialized in Western culture to obey rules and follow authority more so than men. Due to the small sample of men in this study and the lack of this finding reported by earlier researchers, future research should examine gender differences with a more equal sample size.

The Four-quadrant method, as modified by this researcher, was found to be confusing to some participants and did not show strong concurrent validity with the EBI.

Conclusions about the Four-quadrant method cannot be made due to the modifications made by this researcher. It may be the case that future research of the Four-quadrant method may require more explanation of the measure in order for participants to better understand the instrument. This may lead to better concurrent validity.

Participants who completed the Four-quadrant method prior to the EBI were less likely to score high on the Quick Learning dimension of the EBI. This may show that reading the descriptions of epistemological and ontological realists and relativists found in the Four-quadrant method influenced participants' answers on the EBI. Participants may have detected from the Four-quadrant method descriptions that relativists teachers are more effective and desirable teachers and so their true quick learning beliefs were not reported. Future research should keep in mind this effect of the four-quadrant method or any other descriptions or definitions given before the administration of the EBI.

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APPENDICES

Appendix A

Wichita State University *Department of Curriculum and Instruction*

Spring 2009

Dear Educator:

You are invited to participate in this study about personal knowledge beliefs. We hope to learn more about factors that contribute to the development of these beliefs. You were selected as a possible participant in this study because of your occupation as an elementary school teacher. You are in a group of approximately 55 teachers participating in this study.

If you decide to participate, you will proceed by opening the link below in this email message. You will then follow a set of directions within the link that will guide you through a set of 28 questions to assess your personal beliefs about knowledge. An example item is: "The best ideas are often the most simple." There are no anticipated discomforts or risks involved with this study. Your participation will require approximately 15 minutes.

The completion of this research will benefit society by increase understanding of how personal knowledge beliefs are developed. Any information obtained in this study in which you can be identified will remain confidential and will be disclosed only with your permission. If you would like, results of this study may be provided to you at your request. Participation in this study is entirely voluntary. Your decision whether or not to participate will not affect your future relations with Wichita State University or your school employer. If you agree to participate in this study, you are free to withdraw from the study at any time without penalty.

If you have any questions about this research, you can contact Ben Walter, benywalt@gmail.com, 316-217-4709 or Dr. Linda Bakken, 151 Corbin Education Center, 1845 Fairmount, Box 28 Wichita, Kansas 67260-0028, (316) 978-3322.

If you have questions pertaining to your rights as a research subject, or about research-related injury, you can contact the Office of Research Administration at Wichita State University, Wichita, KS 67260-0007, telephone (316) 978-3285.

You are under no obligation to participate in this study. To participate in this study, open the link contained in this email and follow the directions within the link. By opening the link, you signify that you have read the information provided above and have voluntarily decided to participate.

<iframe
src="<http://spreadsheets.google.com/embeddedform?key=pWW3C6oCVDNH9zIF48IslSw>"
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marginwidth="0">Loading...</iframe>

You will be given a copy of this consent form to keep upon request.

Thank you,

Ben Walter

Appendix B

Wichita State University

Department of Curriculum and Instruction

Spring 2009

Dear Graduate Students:

You are invited to participate in this study about personal knowledge beliefs. We hope to learn more about factors that contribute to the development of these beliefs. You were selected as a possible participant in this study because of your occupation as an educator and your graduate education. You are in a group of approximately 40 graduate students participating in this study.

If you decide to participate, continue by following the provided directions that will guide you through a set of 29 questions that will assess your personal beliefs about knowledge. A sample item is: "The best ideas are often the most simple." There are no anticipated discomforts or risks involved with this study. Your participation will require approximately 15 minutes.

The completion of this research will benefit society by increasing the understanding of how personal knowledge beliefs are developed. Any information obtained in this study in which you can be identified will remain confidential and will be disclosed only with your permission. If you would like, results of this study may be provided to you at your request. Participation in this study is entirely voluntary. Your decision whether or not to participate will not affect your future relations with Wichita State University or your school employment. If you agree to participate in this study, you are free to withdraw from the study at any time without penalty.

If you have any questions about this research, you can contact Ben Walter, benywalt@gmail.com, 316-217-4709 or Dr. Linda Bakken, 151 Corbin Education Center, 1845 Fairmount, Box 28 Wichita, Kansas 67260-0028, (316) 978-3322,

If you have questions pertaining to your rights as a research subject, or about research-related injury, you can contact the Office of Research Administration at Wichita State University, Wichita, KS 67260-0007, telephone (316) 978-3285.

You are under no obligation to participate in this study. Your signature on this consent form indicates that you have read the information above and voluntarily agree to participate in this study. You will be given a copy of this consent form to keep.

Appendix C

We want you to rate and explain your epistemological and ontological worldviews. Please read the following descriptions of terms used in this study. Then indicate where you would place yourself in the four quadrants by moving the oval from the center of the axes to where your ratings intersect on the epistemology and ontology dimensions.

Descriptions: Please note that the following descriptions represent endpoints on each of the scales. Your own beliefs may lie anywhere between these two endpoints. You may use any part of the four quadrant area.

Epistemology

Epistemology is the study of what can be counted as knowledge, where knowledge is located, and how knowledge increases. The personal epistemology of teachers is characterized by a set of beliefs about learning and the acquisition of knowledge that drives classroom instruction.

Epistemological Realist

An epistemological realist would believe that there is an objective body of knowledge that must be acquired. From a teacher's perspective, this position would hold that curriculum is fixed and permanent and focuses on fact-based subject matter. An epistemological realist might believe the following:

There are certain things that students simply need to know.

I am teaching information that requires memorization and mastery.

There are specific basic skills that need to be mastered.

Epistemological Relativist

An epistemological relativist would describe curriculum as changing and student-centered. Problem-based or inquiry curricula are examples at the other end of the continuum for a perspective of a one-size-fits-all curriculums. One of the central features of curriculum from this position is the notion that curriculum is not fixed and permanent. An epistemological relativist might agree with the following statements:

The things we teach need to change along with the world.

The content of the curriculum should be responsive to the needs of the community.

It is useful for students to engage in tasks in which there is no indisputably correct answer. Students design their own problems to solve.

Ontology

Ontology is the study of beliefs about the nature of reality. The personal ontology of teachers is characterized by a set of beliefs regarding whether students share a common reality and what a classroom reality should look like.

Ontological Realist

A teacher who is an ontological realist assumes one underlying reality that is the same for everyone. Instructionally, this means that all children should receive the same type of instruction at the same time regardless of their individual circumstances and context. An ontological realist would agree with the following:

Student assignments should always be done individually.

It is more practical to give the whole class the same assignment.

The teacher must decide on what activities are to be done.

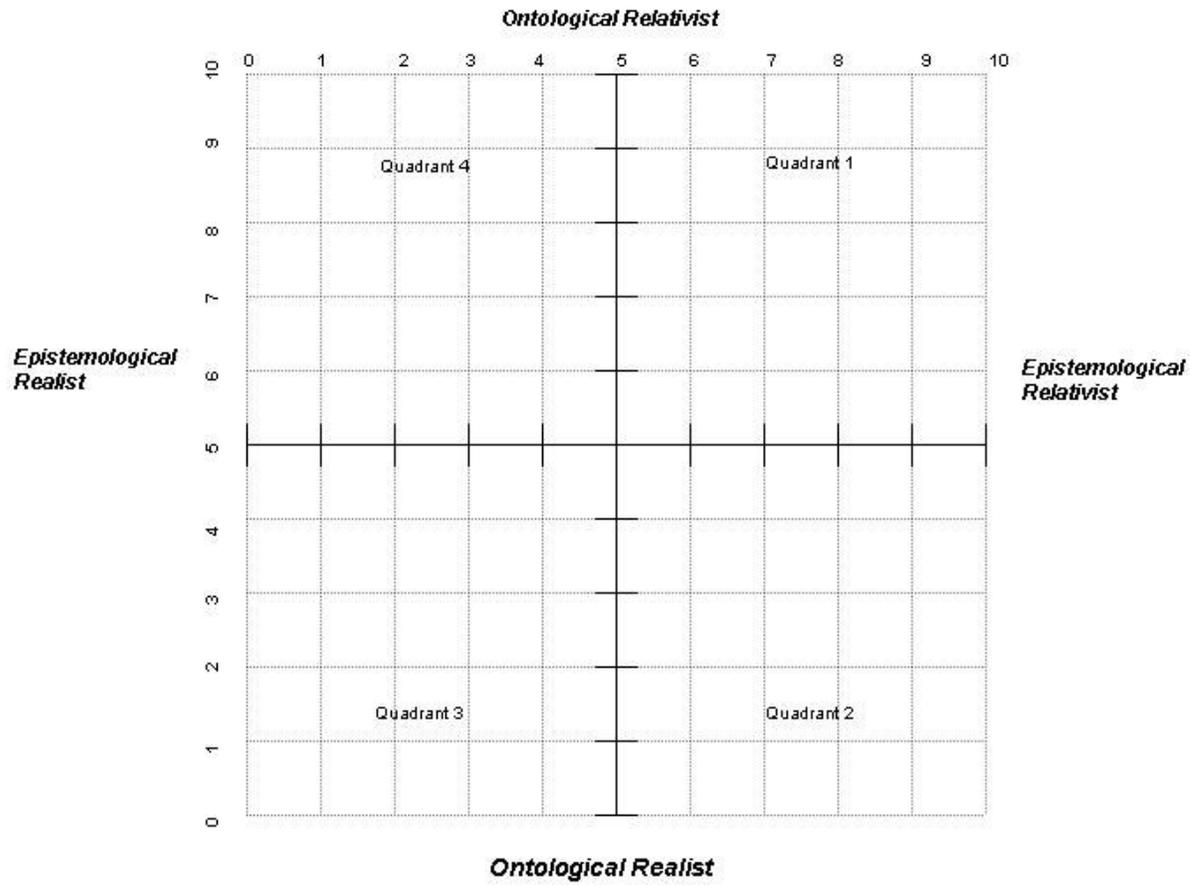
Ontological Relativist

An ontological relativist assumes that different people have different realities. From an instructional perspective, teachers are seen as collaborators, co-participants, and facilitators of learning who work to meet the individual needs of students. Instructional practices are less teacher-directed, such as:

Students need to be involved in actively learning through discussions, projects, and presentations.

Students work together in small groups to complete an assignment as a team.

Schraw, G. J. & Olafson, L.J. (2008). Assessing teachers' epistemological and ontological worldviews. In M.S. Khine (ed.) *Knowing, knowledge, and beliefs: Epistemological studies across diverse cultures* (25-44). Netherlands: Springer.



Appendix D

1. Most things worth knowing are easy to understand.
2. What is true is a matter of opinion.
3. Students who learn things quickly are the most successful.
4. People should always obey the law.
5. People's intellectual potential is fixed at birth.
6. Absolute moral truth does not exist.
7. Parents should teach their children all there is to know about life.
8. Really smart students don't have to work as hard to do well in school.
9. If a person tries too hard to understand a problem, they will most likely end up being confused.
10. Too many theories just complicate things.
11. The best ideas are often the most simple.
12. Instructors should focus on facts instead of theories.
13. Some people are born with special gifts and talents.
14. How well you do in school depends on how smart you are.
15. If you don't learn something quickly, you won't ever learn it.
16. Some people just have a knack for learning and others don't.
17. Things are simpler than most professors would have you believe.
18. If two people are arguing about something, at least one of them must be wrong.
19. Children should be allowed to question their parents' authority.
20. If you haven't understood a chapter the first time through, going back over it won't help.
21. Science is easy to understand because it contains so many facts.

22. The more you know about a topic, the more there is to know.
23. What is true today will be true tomorrow.
24. Smart people are born that way.
25. When someone in authority tells me what to do, I usually do it.
26. People shouldn't question authority.
27. Working on a problem with no quick solution is a waste of time.
28. Sometimes there are no right answers to life's big problems.

Appendix E

Thank you for completing the questionnaire. Please briefly provide the following demographic information:

Sex:

Age:

Ethnicity:

Years of Teaching Experience:

Current Teaching Position: Special Education Gifted General Education

Grade level(s) you teach:

School District:

Education Level:

Bachelor's More than Bachelors Master's degree