

WAYS OF KNOWING: THEIR ASSOCIATION WITH GENDER AND
HIGHER ORDER THINKING

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I 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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If you love learning, you love the discipline that goes with it...

Proverbs 12:1

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ABSTRACT

The study of people's beliefs about the nature of knowledge and learning, or epistemological beliefs, has been under intense investigation since the 1990s. Much of the research following this conception has found multiple links between epistemological beliefs and learning.

Research examining women's personal epistemology found two beliefs that tend to be gender related, connected knowing and separate knowing. Connected knowing is characterized by empathizing and placing oneself within another person's situation to see from the inside out. Separate knowing, while not the opposite of connected knowing, is characterized by detaching oneself from a situation to analyze and be objective in an argument. Both ways of knowing have been hypothesized to support higher order thinking.

The purpose of this study is to test this hypothesis by examining the relationship between ways of knowing and the established epistemological beliefs, as well as, the relationship between ways of knowing and need for cognition.

The concept of an individual's need for cognition has been described as one's tendencies to "engage in and enjoy thinking" (Cacioppo & Petty, 1982, p. 116). They determined that an individual may have either a high or low need for cognition.

The participants for this study were 457 undergraduate and graduate college students who completed questionnaires assessing their epistemological beliefs (i.e. Certainty of Knowledge, Structure of Knowledge, Source of Knowledge, Control of Knowledge Acquisition, and Speed of Knowledge Acquisition), ways of knowing (separate and connected) and need for cognition. The relationships among these variables were examined.

Results of the data analyses show that there were significant relationships among the ways of knowing and individual epistemological beliefs. Additionally, in the relationship between ways of knowing and need for cognition, the data show that individuals with higher scores for connected knowing or separate knowing had correspondingly higher scores for need for cognition.

The gender relationship found in respect to ways of knowing supported the hypothesis of women being stronger connected knowers and men being stronger separate knowers.

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Chapter 1: Introduction

Education is a fundamental building block of an individual's future.

Whether or not an individual's formal education ends after high school, with the completion of an Associate's, Bachelor's, or graduate degree, the foundation that is set within that individual will have an impact on the rest of their lives. However, it is not the formal curriculum-based instruction that is the basis for this foundation. An individual's epistemology, way of knowing (separate and/or connected), and need for cognition (degree of engaging in and enjoying thinking) each play pivotal roles in the deepening of the learning process for that individual.

Epistemological beliefs, an individual's beliefs about the nature of knowledge and learning, have been studied by several individuals beginning with William Perry, Jr. (1968). He focused on the nature and origin of knowledge and administered his Checklist of Educational Values to the male students of Harvard and Radcliffe Universities. The research question that Perry asked was how students' thoughts, beliefs and values about education change as they are educated. In 1990, Schommer proposed her theory of personal epistemology. Her view that epistemological beliefs are basically complex, independent dimensions best seen as frequency distributions is contrary to Perry's conception that personal epistemology is a dichotomous continuum between relativism and dualism.

The precise definition notwithstanding, epistemological beliefs have been shown to have direct and indirect effects on learning (Schommer, 2002). The most obvious effects would be from the direct influences of epistemology. However, the more significant effects on learning are made from indirect influences on an individual's foundation of learning. Perry and Schommer agree with the idea that one's epistemological beliefs can change over time and with varying levels of experience that an individual has.

Another form of personal epistemology that has not received as much attention from the educational community is a conception from Belenky, Clinchy, Goldberger, and Tarule (1986). Belenky et al. took note that Perry's work was predominately based on men. They chose to focus on women's epistemological beliefs and engaged in lengthy personal interviews with women. What began as an effort to expand on Perry's work became another area of epistemological beliefs investigation. Belenky et al. found that procedural knowledge is made up of two different factors, connected knowing (CK) and separate knowing (SK). The two are not opposites, but are independent of one another. Blythe McVicker Clinchy, one of the original researchers with Belenky states that "Connected Knowers are primarily interested in understanding the object of attention" (Hofer & Pintrich, 2002, p. 74). Additionally, "Separate Knowers are primarily oriented toward its validity" (p. 74). Both types of Knowers exhibit objectivity leading to the assumption that both types of knowing support higher order thinking. The purpose of the present research study was to test the hypothesis that both ways

of knowing support higher order thinking. This will be tested by linking ways of knowing to the already established epistemological beliefs about knowledge and learning and the concept of need for cognition.

The concept of an individual's need for cognition was studied in the 1950s by Cohen, Stotland, and Wolfe (1955) to determine if increased frustration would lead to efforts to restructure a situation and increase one's understanding. In the early 1980s, Cacioppo and Petty looked to discern individuals' tendencies to "engage in and enjoy thinking" (1982, p. 116). They determined that an individual may have either a high or low need for cognition. Both high and low need individuals are able to problem solve and derive meaning in a situation, but differ in the route taken to get to the final result. Cacioppo, Petty, Feinstein, and Jarvis (1996) determined that a high need for cognition individual will more likely use empirical information and rational considerations as a basis for his/her judgments and beliefs.

Therefore, the following study will test the following hypotheses:

1) To replicate the findings of Gallotti, Clinchy, Ainsworth, Lavin, and Mansfield in their 1999 research, that men have a higher propensity to display separate knowing, whereas women are more likely to display connected knowing

2) To test the implicit hypothesis of Gallotti et al. (1999) that both ways of knowing (separate and connected) support higher order thinking. If this is true, then ways of knowing should be positively associated with sophisticated epistemological beliefs and higher need for cognition.

Chapter 2: Literature Review

Epistemological Beliefs

If researchers and educators are to influence learning, it is important to recognize the impact that epistemological beliefs, that is, beliefs about knowledge and learning, have on the educational process. For example, students who believe that the ability to learn is inherent and fixed at birth will likely be less inclined to persevere at learning if they experience difficulties early on in their educational experience. If students believe that a lack of educational success is inevitable, they clearly will not be as motivated to apply themselves to their studies. In order to facilitate the acquisition of knowledge, or learning, one must take into consideration a person's underlying epistemological beliefs.

Research in epistemological beliefs has become a research entity independent of other issues. There is a great deal of disagreement over how epistemological beliefs are defined, measured, studied and applied. "Defining the construct based on existing research is problematic, as there are discrepancies in naming the construct as well as in defining the construct, to the extent that it is sometimes unclear to what degree researchers are discussing the same intellectual territory" (Hofer & Pintrich, 1997, p.111).

Early research on the importance of beliefs. William Perry, Jr. (1968) was the first researcher to bring the importance of beliefs about the nature of knowledge to the forefront of educational research. Perry developed an instrument, the Checklist of Educational Values (CLEV), which focused on the

nature and origin of knowledge. The CLEV was administered by Perry and his associates to undergraduate students at Harvard and Radcliffe Universities. According to Perry, “the intent of this report was to assess the validity of a developmental scheme representing an evolution in the form of thought and of values abstracted from students’ reports of their experiences in the college years” (p. 1). The question was posed as to how students’ thoughts, beliefs and values about education change as they are educated. Perry approached his research with a Piagetian framework already in place detailing how he theorized college students would develop throughout their academic life. Based on analysis of the open ended reports of the students’ undergraduate experiences, Perry concluded that students evolve through nine positions or stages. This developmental process was characterized by a passage from simple dualistic views of knowledge to more complex relativistic views. In the early stages of their college careers, students held that knowledge was clear cut; right or wrong and was handed down by authority figures. They believed that professors held the answers and were the dispensers of knowledge.

As students progressed, they encountered cognitive conflict and began to recognize that there is more than one viewpoint and embraced what Perry termed multiplicity. Again, students continued to develop in their beliefs about knowledge and eventually came to recognize that knowledge is often dependent on the context in which it is found. Thus, students became relativistic in their

attitudes. What holds true in one situation may not necessarily apply in another situation, even if they are similar. The final developmental stage is characterized by a personal commitment to some ideas, with the understanding that these ideas are still relative. In other words, the students orient themselves in a world seen as relativistic in knowledge and values (Perry, 1968).

This developmental conceptualization of beliefs about the nature of knowledge put forth by Perry led to some early attempts to link epistemological beliefs to comprehension monitoring by Ryan (1984). Ryan developed a seven item scale based on Perry's original survey. Ryan concluded that dualists were more likely to report comprehension monitoring based on the simple recitation of facts whereas relativists had a context oriented conception of knowledge. Unfortunately, Ryan's results have not always been replicated (Glenberg & Epstein, 1987).

Schommer's theory. Recognizing the importance of epistemological beliefs, Schommer began a line of research prompted by Perry's theory. Schommer's theory of personal epistemology, initially proposed in 1990, has several main components. She stated that the "underlying assumptions of this line of work are that individuals have an unconscious system of beliefs about what knowledge is and how it is acquired" (1994a, p. 26). Schommer (1990; 1994a; 1994b; 2002) proposed that epistemological beliefs are a system of more or less independent dimensions that are best described as frequency distributions rather than as single points on a dichotomous continuum between

relativism and dualism, which was the stance of Perry and Ryan. Schommer also posited that an individual's beliefs were affected by experience, in contrast to an inborn part of one's personality. Schommer theorized that epistemological beliefs are too complex to be defined by a single dualistic/relativistic dimension. She proposed five independent dimensions: Certainty of Knowledge, Structure of Knowledge, Source of Knowledge, Control of Knowledge Acquisition, and Speed of Knowledge Acquisition. Schommer defined each of these dimensions in terms of a range of values:

“Certainty of Knowledge, ranging from knowledge is absolute to knowledge is tentative; the Structure of Knowledge, ranging from knowledge is organized as isolated bits and pieces to knowledge is organized as highly interwoven concepts; the Source of Knowledge, ranging from knowledge is handed down by authority to knowledge is derived by reason; the Control of Knowledge Acquisition, ranging from the ability to learn is fixed at birth to the ability to learn can be changed; and the Speed of Knowledge Acquisition, ranging from knowledge is acquired quickly or not at all to knowledge is acquired gradually” (1994a, p. 28).

In 1990, Schommer developed a questionnaire to assess these hypothesized dimensions. A factor analysis of the results supported the existence of four of the five proposed dimensions: Certainty of Knowledge; Structure of Knowledge; Control of Knowledge Acquisition and Speed of Knowledge Acquisition. Schommer re-labeled these four factors as: Certain Knowledge, Simple Knowledge, Innate Ability, and Quick Learning. Thus, she found evidence of all dimensions proposed except for Source of Knowledge. These findings have been replicated by many researchers (e.g., Hofer, 2000;

Jehng, Johnson, & Anderson, 1993; Schommer, Crouse & Rhodes, 1992; Schraw, Bendixen, & Dunkle, 2002).

In 1993, Jehng et al. developed an epistemological questionnaire based on Schommer's questionnaire and research, which they administered to 398 college students. Their analysis resulted in evidence for five distinct dimensions: Certainty of Knowledge, Omniscient Authority, Orderly Process, Innate Ability, and Quick Learning, which are clearly based upon Schommer's original five proposed dimensions. Hofer (2000) also designed an epistemological beliefs questionnaire based on Schommer's theory. Her results found support for four dimensions: Certainty of Knowledge; Simplicity of Knowledge; Source of Knowledge; and Justification for Knowing. Similarly, Schraw et al. (2002) developed their own epistemological beliefs survey. Their Epistemological Beliefs Inventory (EBI) found evidence of all five of Schommer's hypothesized dimensions. While the exact dimensions validated or the manner in which the dimensions were defined varied somewhat from researcher to researcher, Schommer's contention that epistemological beliefs are multi-dimensional has strong support.

Schommer also proposed that epistemological beliefs are best described as frequency distributions. This contrasts with earlier conceptualizations of a single continuum between dualism and relativism. Rather than simply leaning more towards one extreme pole or another, the frequency distribution allows for a wide amount of variation in beliefs. Describing beliefs in terms of frequency

distributions allows for students to lean more towards the sophisticated side of a particular dimension, while allowing for flexibility. For example, an individual may hold reasonably sophisticated views on the Structure of Knowledge, generally believing that knowledge is complex but in certain situations or topic areas, believe that knowledge is simple and best described in terms of isolated bits of information. It is not an unlikely scenario to believe that many individuals with sophisticated beliefs about the structure of knowledge may revert to simpler belief systems in certain subject areas, such as math or vocabulary, depending on memorization and contextual cues for learning. The difference between a naïve and a sophisticated set of epistemological beliefs is the proportion of views held along the distribution levels.

Somewhat related to the frequency distribution aspect of Schommer's theory is the independent dimensionality of these beliefs. By defining the dimensions as more or less independent, Schommer again allows for variation within an individual, this time relative to different, dimensions. Independence means that the dimensions do not necessarily develop in synchrony. Some individuals may be sophisticated on some dimensions while holding naïve beliefs in other areas. For example, a student may believe that knowledge is certain (naïve Certainty of Knowledge) yet believe that knowledge is best derived by reason (sophisticated Source of Knowledge). This individual would believe that there is absolute truth and have little use for the tentative nature much of learning has, yet believe that knowledge is best acquired by reason and experience

instead of from an authority figure. This individual would likely be resistant to any information or evidence provided by anyone that his beliefs may be unfounded, yet be sophisticated enough to not take the word of an expert at face value. By adding the more or less independent dimension facet to her theory, Schommer has truly provided an explanation to the variance seen within individuals on separate dimensions. Coupled with the frequency distribution component which also allows for variance within individuals on particular dimensions, Schommer's theory has the potential to capture the wide spectrum of beliefs evident in learners.

Schommer hypothesized that epistemological beliefs have direct and indirect effects on learning (Schommer, 2002). This is the aspect of the beliefs about the nature of knowledge and learning that should be of most interest to educators. The theoretical background and basis of epistemological research is important and interesting, but for practical purposes, the results or behaviors exhibited by learners due to the underlying epistemological beliefs are what matters. Direct influences are the most obvious effects of epistemological beliefs. A student who has a naïve orientation to Speed of Learning will be less likely to persist on a task he is unable to solve quickly. This clearly would be of concern to educators. To really impact an individual's persistence on a task, educators must first understand the belief system impacting individuals' motivation to work at that task.

Effects of beliefs on learning. The indirect effects of epistemological beliefs, while more difficult to identify, are more likely the significant factors in learning. Epistemological beliefs seem to provide the foundation on which learning occurs. Schommer (2002) notes that the indirect effects of epistemological beliefs mediate learning. These direct and indirect effects of epistemological beliefs have been examined in a variety of manners by a multitude of researchers (e.g., Bendixen, Dunkle & Schraw, 1994; Cole, Goetz, & Wilson, 2000; Paulsen & Feldman, 1999; Schommer, 1990; Schommer, Clavert, Gariglietti, & Bajaj, 1997; Schommer, Crouse, & Rhodes, 1992) Typically, researchers have administered an epistemological beliefs measure to determine individuals' beliefs on one or more dimensions. They then look for relationships to some aspect of learning and the measured system or systems of beliefs.

Schommer (1990) examined the effects epistemological beliefs have on comprehension. She administered the Epistemological Beliefs Questionnaire (EBQ) to a group of junior college and university students enrolled in an introductory psychology class, an introductory educational psychology class, or a physics class. Half of these students then read a passage from the social sciences (psychology) while the other half read a passage from the physical sciences (nutrition). These passages either provided inconclusive evidence or required the integration of several plausible ideas. The concluding paragraphs to each passage were omitted. The participants were then given a mastery test to

assess their comprehension as well as asked to write their own conclusions to the passages read. These conclusions were then rated for simplicity or complexity on a dichotomous scale. Oversimplified conclusions were defined as exhibiting a single point of view or avoiding drawing any conclusion at all. Elaboration and integration were the key aspects to a conclusion termed complex. Using multiple regression analysis, Schommer found that naïve beliefs on the Speed of Learning scale (Quick Learning) predicted over-simplified conclusions and that beliefs in Certain Knowledge predicted inappropriately absolute conclusions.

Other researchers have also found evidence for the impact that naïve beliefs in Certain Knowledge have on the simplified interpretations made on inconclusive text (Kardash & Scholes, 1996). Beliefs in Quick Learning were also found by Schommer to predict the participants' performance on the mastery test. The more they believed in quick, all or none learning, the more poorly the students performed on the mastery test. In addition, beliefs in Quick Learning were found to predict the participants' overestimation of their understanding of the passage. Schommer concluded that epistemological beliefs have clear effects on comprehension and learning.

In another line of study, Paulsen & Feldman (1999) administered Schommer's EBQ and the Motivated Strategies for Learning Questionnaire to college students to assess the relationship between epistemological beliefs and self regulated learning. Self regulated learning "includes elements of the 'skill'

and 'will' to learn" (Garcia & Pintrich, 1993, as cited in Paulsen & Feldman, 1999, p. 83). Self regulated learning refers specifically to an individual's use of cognitive and volitional control strategies as well as motivational beliefs and strategies (Paulsen & Feldman, 1999). Paulsen found that students with more sophisticated epistemological beliefs were less likely to rely on surface processing strategies and to use deeper processing strategies. This finding again supports the very real importance of epistemological beliefs on learning, particularly in an indirect fashion. If Paulsen's findings can be replicated, it could be posited that epistemological beliefs affect learning strategies; without question an essential component of effective teaching and learning.

In an interesting effort to link epistemological beliefs to a fundamental, yet often overlooked area, Schommer and Walker (1997) carried out a study to look at relationships between epistemological beliefs and high school students' attitudes towards learning and school. The EBQ was administered to high school students who were also provided with a short story about a fictional character that had some difficulties facing him as he considered attending college. The students were then asked to answer open ended questions about the fictional student designed to determine the participants' feelings in three key areas: appreciating the value of education, persistence in pursuing education in the face of adversity, and tenacity in studying. Schommer and Walker found that beliefs in fixed ability were the strongest predictors of valuing education, while beliefs in quick learning and certain knowledge were also significant. It could be argued

then, that understanding students' beliefs in their ability to learn (fixed or can be improved) is essential to any effort to make education a priority in the life of those students. If students are struggling and believe they are doing as well as they are capable of, that they cannot learn any more effectively than they are right now, then the students are likely to give up and subsequently de-value education in general.

Other researchers have found evidence for the relationships between epistemological beliefs and cognitive processing strategies used (Kardash & Howell, 2000); between epistemological beliefs and reflective judgment (Bendixen, Dunkle, & Schraw, 1994); and epistemological beliefs and mathematical text comprehension (Schommer, Crouse, & Rhodes, 1992). Schommer et al. (1997) even linked beliefs in quick learning to grade point averages. As research in epistemological beliefs continues, it can be expected that relationships will be uncovered with almost every facet of learning. Whether the effects are direct or indirect, an individual's beliefs about the nature of knowledge and learning are intimately tied to numerous aspects of learning, including academic success.

Epistemological beliefs and experience. Another important aspect of the current conceptualization of epistemological beliefs is that these beliefs are influenced by experiences. Research has supported claims regarding the influence experience has on epistemological beliefs (Jehng, et al., 1993).

Cole, Goetz & Wilson (2000) assessed the epistemological beliefs of undergraduates at the beginning and end of a study skills course designed to improve the success of under-prepared students. These researchers found that the epistemological beliefs of under-prepared undergraduates tended to be naïve and that these beliefs changed during their college experience. Oddly, some of the beliefs moved towards sophistication while others shifted towards more naïve beliefs. These findings do, however, support the contention that experience impacts epistemological beliefs.

In a longitudinal study of high school students, researchers (Schommer et al., 1997) found that beliefs in the fixed ability to learn, simple knowledge, quick learning and certain knowledge changed over the course of the high school experience. In contrast to Cole et al.'s (2000) findings, Schommer et al. (1997) found that all four dimensions of epistemological beliefs moved towards sophistication as the students progressed through high school. More research is needed to understand what effects experience has on epistemological beliefs and how experience manifests itself, but research has indicated that a person's life and educational experiences do impact fundamental beliefs about knowledge and learning.

The difficulty surrounding the study of epistemological beliefs goes far beyond its conception as does the issue of how to assess epistemological beliefs. Measuring a person's beliefs is much more difficult than measuring blood pressure or even IQ. Pajares (1992) wrote extensively on the difficulty inherent in

attempting to measure beliefs, noting that “distinguishing knowledge from belief is a daunting undertaking” (p. 309).

Although much research in the field of epistemological beliefs has a strong base with Perry’s research, there was some discussion as to how the research would generalize across a larger population. The basis of this argument was the fact that a majority of Perry’s participants were men and very few women. In 1986, Belenky et al. began their research of these beliefs through an interview process. What made this research different was that all of the participants were women. The interview process provided the researchers with a deeper understanding of the reasoning behind their beliefs. The drawback to this type of research is the inability to assess beliefs from large groups of individuals at the same time.

Ways of Knowing

In order to compensate for the time constraints faced by Belenky et al., Galotti et al. (1999) introduced a pencil and paper instrument. The Attitudes Toward Thinking and Learning Survey (ATTLS) uses a Likert-scale to assess each individual’s beliefs. This proved an easier and quicker way to quantify results for many participants in a shorter time frame. Belenky et al. (1986) found the two different factors of procedural knowledge to be connected (CK) and separate knowing (SK). Galotti et al. (1999) confirmed this finding with their research done during the inception of their instrument. It is important to note that “separate knowing is not the opposite of connected knowing but, rather, a style of

thinking that is independent of connected knowing” (Galotti, 1998, p. 282). Galotti et al. (1999) reported that “males had significantly higher SK scores than females, and females had significantly higher CK scores than males” (p. 752). However, Clinchy (2002) noted that the two ways of knowing “may be gender-related, but not gender exclusive” (p. 79).

Connected knowers place themselves within another person’s situation to see from the inside out. Taking another person’s observations and looking for why that person may be correct in their thinking is a founding characteristic. Understanding a situation and other points of view within that situation overpower and overcome the need to evaluate and prove wrong any points of view that oppose their own.

Separate knowers detach themselves from situations and the points of view of other participants. Separate knowing involves the analytical and objective side of an argument. A common characteristic of a separate knower is to play the devil’s advocate and fight an argument with facts instead of feelings and beliefs (Galotti et al., 1999). Belenky et al. (1986) describe separate knowers as “suspicious of ideas that feel right; they feel a special obligation to examine such ideas critically, whether the ideas originate in their own heads or come from someone else” (1997, p. 104).

The important point to remember is that Belenky et al. (1986) and Galotti et al. (1999) hypothesized that both ways of knowing support higher order thinking. This is a hypothesis that needs to be confirmed with empirical

evidence. The purpose of the study being reported is to test this hypothesis by examining the relationship between ways of knowing and epistemological beliefs that have already been established and linked to higher order thinking. In addition, the relationship between need for cognition and ways of knowing will be examined.

History of Need for Cognition Research

The initial concept of need for cognition (NFC) was a gestaltic view of tendencies to control or structure the environment (Witkin, Dyk, Faterson, Goodenough, & Karp, 1962). In 1955, Cohen et al. empirically studied NFC with a small sample of undergraduate students. They came to conceptually postulate that an individual's increased tension arising from frustration would lead to "active efforts to structure the situation and increase understanding" (p. 291).

In 1982, Cacioppo and Petty reengineered the study of need for cognition by focusing on the flipside of the issue, the "differences among individuals in their tendency to engage in and enjoy thinking" (p. 116). In their definition, Cacioppo and Petty noted that "*need* is used in a statistical (i.e., likelihood or tendency) rather than biological (i.e., tissue deprivation) sense" (p. 118). In the first study, the introduction of their own need for cognition instrument, the survey was given to two diverse groups to act as the statistical norms. The participants considered to be high in need for cognition were a group of university-level professors and the participants in the low need for cognition group were various factory assembly line workers. After many other uses of this assessment to determine

both face and inter-item validity and reliability, the scale was reduced from the original 45 items to the now 18-item short version scale. The scale to measure need for cognition has been found to show no gender effects (Cacioppo & Petty, 1982; Sadowski, 1993; Tanaka, Panter, & Winborne, 1988). This shows that men and women did not differ on need for cognition.

It is not to be said that individuals who fall on the lower end of the need for cognition continuum are not aware of the environment that is around them for that is not the case. Both types of individuals (high and low need for cognition) are very capable of solving problems, deriving meaning, and adopting strong opinions, the route that they take in doing so is what differentiates them. For an individual with high need for cognition, seeking out new ideas and ways of doing things, desiring to know others opinions before shaping their own, and reflection is the natural way of dealing with outside stimuli. When faced with a wide variety of problems to solve, the high need for cognition individual tends to expend more effort to acquire more information and while reasoning out that information, finding an appropriate solution for those problems.

The attitude of an individual is also another trait that has been studied and identified to be a difference between both types of individuals. With a less positive attitude towards mental reasoning tasks and problem solving, low, in comparison to high, need for cognition individuals do not enjoy frequent experiences with technology or other resources that require effortful thinking or reasoning. Having a high level of need for cognition tends to lead to a “richer

behavioral history of cognitively effortful endeavors and effective problem solving” (Cacioppo, Petty, Feinstein, & Jarvis, 1996, p. 198). Individuals who have a high need for cognition are found to have attitudes that are more long range and lead themselves to follow them to a greater extent over longer periods of time than do their counterparts (Haugtvedt & Petty, 1992).

Having the ability to effectively make a decision and also persuade others of their position is another attribute of a high need for cognition individual.

Shestowsky, Wegener, and Fabrigar (1998) studied the ability of a low and a high need for cognition individual to make a dyadic decision. Their findings were conclusive that the team members who had a high need for cognition were seen by their peers as well as themselves to have more effective persuasion techniques and more arguments to support their views when called to make a dyadic decision (1998). The high need for cognition individual is more likely to “base their judgments and beliefs on empirical information and rational considerations” (Cacioppo et al., 1996, p. 216).

An individual’s amount and quality of prior knowledge recall affects how quickly an individual expresses an attitude or opinion towards a subject. If a high need for cognition individual has a high prior knowledge about a topic, he/she is more likely to respond quickly with an attitude or opinion on the topic. The opposite is also true. Elias and Loomis (2002) looked for a trend in prediction of academic success. Their hypothesis that need for cognition could predict this success was supported, but the idea of self-efficacy was a stronger predictor.

They came to the conclusion that “when individuals enjoy a task to the extent that they actively seek it out, it seems only natural that performance on that task should improve” (p. 1697).

Watt and Blanchard (1994) found a correlation between an individual’s score on the Boredom Proneness Scale and the Need for Cognition Scale. Their findings revealed that the lower the score achieved on the Need for Cognition Scale, placing the individual in the low need for cognition group, resulted in a higher score achieved on the Boredom Proneness Scale, showing a greater tendency toward experiencing boredom as well as the negative effects of boredom. Maroldo (1986) showed a greater tendency for individuals rating high on the Boredom Proneness Scale to have lower academic grades and diminished academic achievement. Therefore, if an individual shows a low need for cognition, chances are that he/she will also have lower levels of academic achievement. If an educator would have the ability to assess an individual’s need for cognition as well as have an understanding of epistemological beliefs, beliefs about the nature of knowledge and learning, the educational process for these students could be changed.

Epistemological Beliefs and Need for Cognition

In their 1996 study examining the relationship between need for cognition (NFC) and epistemological beliefs, Kardash and Scholes examined an individual’s interpretation of controversial evidence. After reading a text focusing on the relationship between HIV and AIDS, each student was to write a

concluding paragraph. The more sophisticated belief one had that knowledge is certain, the less likely the controversy would be acknowledged. On the other side of the continuum, the students with a higher NFC discussed the controversial evidence. Kardash and Scholes' study brought to light the connections between epistemological beliefs and need for cognition.

In summary, the most important points to remember about this literature review are: a) that certain epistemological beliefs support higher order learning, and others do not, b) that either way of knowing is hypothesized to be associated with higher order learning, and c) that higher need for cognition has been related to higher order learning. Furthermore, Galotti et al. (1999) had suggested that there may be a propensity for men to be separate knowers and women to be connected knowers.

What has not been done in the research to this point is an investigation looking at the relationship of all three areas, and the role that gender plays in these areas. Hence, the study being reported had the following purposes:

1) To replicate the findings of Gallotti et al. in their 1999 research, that men have a higher propensity to display separate knowing, whereas women are more likely to display connected knowing

2) To test the implicit hypothesis of Gallotti et al. (1999) that both ways of knowing (separate and connected) support higher order thinking. If this is true, then ways of knowing should be positively associated with sophisticated epistemological beliefs and higher need for cognition.

Chapter 3: Methodology

Participants

Participants in this study were college students of various majors attending either a community college or a university in a Midwestern city and its suburbs. The pool of participants was compiled by selecting classes from the current course schedule of each institution and contacting the instructor of the class to assist in selection of participants. A cooperation rate of 55% of classes yielded 124 men (27.1%) and 319 women (69.8%) and 14 participants unresponsive to gender information for a total of 457 participants. The range in age was 17 to 62 years old, with the mean age being 28.6 years. The remainder of the descriptive statistics can be found in Tables 1 and 2.

Instruments

Booklets were prepared for group administration containing the following: (a) an epistemological beliefs questionnaire (Wood & Kardash, 2002); (b) Need for Cognition scale (NFC) (Cacioppo, Petty, & Kao, 1984); (c) the Attitudes Toward Thinking and Learning Survey (ATTLS) (Galotti et al., 1999); (d) demographic information survey; and (e) two filler tasks.

There were three variations of the booklet order to decrease any possible order effect. A complete sample booklet is shown in Appendix A. The filler tasks were used to keep students who had finished the questionnaires early occupied.

Table 1

Gender and Ethnicity Demographic Statistics of Participants

Demographic Characteristic	Frequency	Percent
Gender		
Male	124	27.1
Female	319	69.8
Unknown	14	3.1
Ethnicity		
African-American	22	4.8
American Indian	8	1.8
Asian	12	2.6
Caucasian	371	81.2
Hispanic	14	3.1
Multicultural	13	2.8
Other	11	2.4
Unknown	6	1.3

Table 2

Academic Demographic Statistics of Participants

Demographic Characteristic	Frequency	Percent
University		
State	243	53.1
Community College	106	23.2
Private	105	23.0
Unknown	3	.7
Year		
Freshman	91	19.9
Sophomore	62	13.6
Junior	86	18.8
Senior	82	17.9
Graduate Student	133	29.1
Unknown	3	.7

The epistemological beliefs measure designed by Kardash (Wood & Kardash, 2002) was utilized for this study. Overall alpha reliability of this instrument is reported to be .86 with subscale reliabilities of: Speed of Knowledge Acquisition, .74; Structure of Knowledge, .72; Knowledge Construction and Modification, .66; Characteristics of Successful Students, .58; and Attainability of

Objective Truth, .54. The questionnaire has a total of 38 items, each rated on a five point Likert type scale. Wood and Kardash (2002) provide predictive validity evidence by demonstrating that their measure uncovers gender and academic level differences. In addition, responses on the measure were predictive of self reported GPA and ACT scores. Similar measures have been shown to predict GPA (Schommer, Calvert, Gargliette, & Bajas, 1997); attitudes toward school (Schommer & Walker, 1997); self regulated learning (Paulsen & Feldman, 1999); text interpretation (Kardash & Scholes, 1996) and comprehension (Schommer, 1990), among other aspects of learning and education.

Need for cognition assessment has evolved over time and through a series of studies, Cacioppo and Petty and others developed a shortened 18-item NFC scale (Cacioppo, Petty, & Kao, 1984). This shortened version of the NFC scale has repeatedly shown alpha reliability levels of $\geq .85$ (e.g., Berzonsky & Sullivan, 1992; Kernis, Grannemann, & Barclay, 1992; Sadowski, 1993). Test-retest reliability of the NFC Scale has been reported at .88 (Sadowski & Gulgoz, 1992).

Tolentino, Curry, and Leak (1990) found a convergent coefficient alpha validity of .95 when comparing the short and full versions of the NFC Scale and “a reliability *theta* score of .90” (p. 321). Concurrently, Waters and Zakrajsek (1990) found alpha reliability values in two different studies of the short NFC form to equal .88 and .84. Watt and Blanchard (1994) also

found the coefficient alpha of the short form to be .90 when used with the Boredom Proneness Scale.

The ATTLS instrument developed by Galotti et al. (1999) has predicted gender differences in beliefs about connected knowing (CK) and separate knowing (SK). Alpha reliability for SK was reported at .83 and CK reliability reached .76. Galotti et al. shortened the original version of their instrument from 45 items to just 20 items and found the shortened subscales had alpha reliabilities of .83 for CK and a .77 for SK.

A vocabulary test (Word Break) (French, Ekstrom & Price, 1963) was included to measure the students' verbal ability. It was to serve as covariate and function as a filler between the main surveys.

Booklet Preparation

The construction of the packets was designed to vary the order of both the pertinent tasks and the filler tasks. Each packet was constructed as follows: directions page, questionnaire, filler task or demographics page, questionnaire, filler task or demographics page, questionnaire, final filler task. The directions page was a different color on each type of packet. Packets were then stacked in piles of alternating colors, and participants were asked to take the packet on the top so that the packets would be evenly distributed. Instruments in the packets were in varied orders to counterbalance and avoid an order effect.

Procedure

After obtaining permission from the necessary teachers and professors as well as the universities' institutional review boards, researchers went into several classrooms at local community colleges and universities to administer the questionnaire booklets. Directions were read aloud to the students, consent was obtained, and the students were given time to complete the questionnaires. Most students were able to finish the task in 30 minutes. After all data were collected from each classroom, a two-week interval was used before the debriefing. Debriefing consisted of a one page letter sent to the instructors of each class that participated. The letter gave a brief discussion about the study and the educational purposes it served.

Analysis

After data collection was completed, data were entered into a computer using the Statistical Package for Social Sciences (SPSS) and analyzed. Initially, a multivariate analysis of variance (MANOVA) was run for epistemological beliefs and for the ATTLS scale, and an analysis of variance (ANOVA) was used for the need for cognition scale. Next, several descriptive statistics were generated. Two MANOVAs were conducted to determine differences of ways of knowing and epistemological beliefs. Finally, zero-order Pearson correlations were carried out to determine relationships between need for cognition and epistemological beliefs.

Chapter 4: Results

The purpose of the following analyses was to look at the relationships among ways of knowing, epistemological beliefs, and need for cognition. First, descriptive statistics were generated followed by two MANOVAs and a follow-up examination of zero-order correlations.

Descriptive statistics for scores on the ATTLS, NFC Scale, and the five epistemological beliefs are shown in Table 3. As can be seen, responses vary, however, skewness remains within acceptable limits, less than 1.00.

In order to test that ways of knowing are gender related, i.e. that men have a propensity to display separate knowing, whereas women are more likely to display connected knowing, a MANOVA was conducted with gender as the independent variable and dependent variables being separate and connected knowing scores. The multivariate statistic of Wilks' Lambda was significant: $F(2, 425) = 35.40, p < .01, \text{partial } \eta^2 = .143$. Follow-up univariate analyses indicated statistically significant gender differences for both connected knowing [$F(1,426) = 25.08, p < .01, \text{partial } \eta^2 = .06$] and separate knowing [$F(1,426) = 22.85, p < .01, \text{partial } \eta^2 = .05$]. Group means demonstrate that women ($M = 53.70, SD = .47$) have a stronger belief in connected knowing than men ($M = 49.26, SD = .75$) and that men ($M = 46.14, SD = .78$) have a stronger belief in separate knowing than women ($M = 41.75, SD = .49$).

Table 3

Descriptive Statistics for ATTLS, Need for Cognition, and Epistemological Beliefs

Variable	Mean	SD	Minimum	Maximum	Skewness
ATTLS					
Connected Knowing	52.47	8.42	22	70	-.69
Separate Knowing	42.90	8.73	20	70	.12
NFC	99.39	17.51	17	142	-.10
Epistemological Beliefs					
Speed of Knowledge Acquisition	15.01	4.00	8	33	.68
Structure of Knowledge	35.92	4.83	18	52	-.09
Knowledge Construction and Modification	26.05	4.68	13	42	-.06
Characteristics of a Successful Student	13.90	2.75	5	23	.04
Attainability of Objective Truth	8.34	2.25	3	14	.07

In order to test the implicit hypothesis that both ways of knowing support higher order thinking, two analyses were conducted. First, the relationship

between ways of knowing and need for cognition were tested with an analysis of covariance (ANCOVA). Using the mean as the cut-off point, both ways of knowing were categorized as high and low with the higher scores being more mature. These dichotomized variables were used as independent variables and need for cognition served as the dependent variable. To control for people with strong verbal abilities, the vocabulary score was used as the covariate. The results indicated vocabulary (mean = 8.13) was indeed significant ($F(1,425) = 10.66, p < .001, \text{partial } \eta^2 = .02$). A significant relationship was found for both ways of knowing. Individuals with higher scores for connected knowing had correspondingly higher scores for need for cognition ($F(1,425) = 23.56, p < .01, \text{partial } \eta^2 = .05$). Similarly, the higher one scored on separate knowing, the higher the score for need for cognition ($F(1,425) = 18.02, p < .01, \text{partial } \eta^2 = .04$). Descriptive statistics for these analyses are in Table 4.

Second, the relationships between ways of knowing and epistemological beliefs were tested using a MANCOVA. Again, the dichotomized variables of ways of knowing served as the independent variables, the five epistemological beliefs served as dependent variables and vocabulary served as the covariate. The multivariate tests were significant for both main effects, i.e. connected knowing ($F(5,418) = 5.57, p < .001$) and separate knowing ($F(5,418) = 5.48, p < .001$). The interaction term was not significant. Follow-up univariate tests were significant; for separate knowing with Knowledge Modification as a dependent variable ($F(1,422) = 23.86, p < .01, \text{partial } \eta^2 = .05$).

Table 4

Descriptive Statistics for the ANCOVA for ATTLS as the Independent Variable and Need for Cognition as the Dependent Variable

Connected Knowing	Separate Knowing	N	Raw Mean	Standard Deviation	Adjusted Mean*
Low	Low	114	91.67	16.16	92.04
Low	High	85	97.56	15.99	97.48
High	Low	98	98.81	15.17	98.47
High	High	133	106.69	18.34	106.68

*Covariate evaluated using the value: Vocabulary = 8.13

Connected knowing was also significant with Knowledge Modification ($F(1,422) = 19.41, p < .01, \text{partial } \eta^2 = .04$) as well as with Speed of Learning ($F(1,422) = 8.82, p < .01, \text{partial } \eta^2 = .02$). The remaining analyses were not significant. The more highly one scored on ways of knowing (either separate or connected knowing), the more sophisticated one's epistemological belief in Knowledge Modification. Also, the higher one scored on connected knowing, the more sophisticated the belief in the Speed of Learning. Descriptive statistics for these analyses can be found in Tables 5 and 6.

Table 5

Descriptive Statistics for the MANCOVA with Connected Knowing as the Independent Variable and Epistemological Beliefs as the Dependent Variable

Epistemological Belief	Connected Knowing Level	Raw Mean	Standard Deviation	Adjusted Mean*
Speed	Low	15.68	4.06	15.65
	High	14.41	3.83	14.50
Structure	Low	36.48	4.54	36.42
	High	35.56	4.89	35.69
Knowledge Mod.	Low	27.26	4.49	27.09
	High	24.98	4.56	25.18
Successful Student	Low	14.11	2.85	14.11
	High	13.72	2.65	13.70
Objective Truth	Low	8.28	2.31	8.29
	High	8.37	2.16	8.41

*Covariate evaluated using the value: Vocabulary = 8.13

Table 6

Descriptive Statistics for the MANCOVA with Separate Knowing as the Independent Variable and Epistemological Beliefs as the Dependent Variable

Epistemological Belief	Separate Knowing Level	Raw Mean	Standard Deviation	Adjusted Mean*
Speed	Low	15.29	4.06	15.25
	High	14.71	3.90	14.90
Structure	Low	36.50	4.81	36.49
	High	35.48	4.63	35.63
Knowledge Mod.	Low	26.26	4.46	27.19
	High	24.85	4.56	25.08
Successful Student	Low	13.90	2.88	13.88
	High	13.89	2.62	13.93
Objective Truth	Low	8.35	2.19	8.37
	High	8.30	2.27	8.34

*Covariate evaluated using the value: Vocabulary = 8.13

Zero order correlations between epistemological beliefs, need for cognition, and ways of knowing were examined. In Table 7, it can be seen that both separate and connected knowing were significantly correlated with need for cognition.

That is, the more one believed in ways of knowing, the higher propensity for a higher need for cognition.

Although connected knowing is significantly related with all epistemological beliefs except for Objective Truth, the only statistically meaningful correlation is between the belief of Knowledge Modification and the two ways of knowing. Again with separate knowing being statistically significant with two epistemological beliefs, only one of the correlations is notable (Knowledge Modification, $r=.37$). In short, it appears that both connected knowing and separate knowing are related to more sophisticated beliefs about Knowledge Modification.

Table 7

Pearson Correlations for Separate and Connected Knowing With Epistemological Beliefs and Need for Cognition

Variable	Connected Knowing	Separate Knowing
Speed	-.16*	-.09
Structure	-.13*	-.14*
Knowledge Modification	-.26*	-.37*
Successful Student	-.10*	.04
Objective Truth	-.06	.00
Need for Cognition	-.28*	-.33*

* $p < .01$

Chapter 5: Discussion

Overview of the Study

Beliefs about the nature of knowledge and learning, or epistemological beliefs, have been studied with great intensity, particularly since the 1990s. In the 1990s, epistemological beliefs were conceptualized as multi-dimensional (i.e. Certainty of Knowledge, Structure of Knowledge, Source of Knowledge, Control of Knowledge Acquisition, and Speed of Knowledge Acquisition). Much of the research following this conception found multiple links between epistemological beliefs and learning. However, another form of personal epistemology that was not considered in this multi-dimensional approach is ways of knowing.

In the 1980s, Belenky et al. (1986) were examining women's personal epistemology and found two beliefs that tend to be gender related, connected knowing and separate knowing. Connected knowing is characterized by empathizing and placing oneself within another person's situation to see from the inside out. Separate knowing, while not the opposite of connected knowing, is characterized by detaching oneself from a situation to analyze and be objective in an argument. Much research remains to be done on both ways of knowing. For example, both ways of knowing have been hypothesized to support higher order thinking.

The purpose of this study was to test the above hypothesis by examining the relationship between ways of knowing and established epistemological

beliefs, as well as, the relationship between ways of knowing and need for cognition.

The concept of an individual's need for cognition was studied in the 1950s by Cohen et al. (1955) to determine if increased frustration would lead to efforts to restructure a situation and increase one's understanding. In the early 1980s, more research was done; however, Cacioppo and Petty looked to discern individuals' tendencies to "engage in and enjoy thinking" (1982, p. 116). They determined that an individual may have either a high or low need for cognition. Both types of need are able to problem solve and derive meaning of a situation, the difference is in the route taken to get to the final result (i.e. a high need for cognition individual will more likely use empirical information as a basis for his/her judgments and beliefs) (Cacioppo et al., 1996).

The participants for this study were 457 undergraduate and graduate college students who completed three assessment questionnaires. The relationships among these variables were examined.

Results of the data analyses show that the more highly one scored on ways of knowing (either separate or connected knowing), the more sophisticated one's epistemological belief in Knowledge Modification. Also, the higher one scored on connected knowing, the more sophisticated the belief in the Speed of Learning.

Ways of knowing and need for cognition data showed that individuals with higher scores for connected knowing or separate knowing had correspondingly higher scores on Need for Cognition.

The data also supported the hypothesis of women being stronger connected knowers and men being stronger separate knowers.

Conclusion

This study provides two important findings. First, ways of knowing appear to be gender related which is consistent with Galotti et al.'s (1999) hypothesis. Women have a stronger belief in connected knowing and men have a stronger belief in separate knowing. While these findings do support their theory, do remember that the theory is gender related and not gender specific. Any individual can use either way of knowing depending upon the situation. The most sophisticated individuals seem to have the flexibility to use both ways of knowing depending upon the situation.

Second, ways of knowing are correlated with higher order thinking, such as epistemological beliefs. Specifically, connected knowing was correlated with four out of the five epistemological beliefs (Speed of Learning, Structure of Knowledge, Knowledge Modification, and Successful Student). In other words, the more a person believes in connected knowing, the more they believe that learning takes time, knowledge has complex structure, learning requires modification of the material that is to be learned, and a successful student has to work hard. Separate knowing correlated with two of the five epistemological

beliefs (Structure of Knowledge and Knowledge Modification). In other words, the more a person believes in Separate knowing, the more they believe that knowledge has complex structure and that learning requires modification of the material that is to be learned.

Thus, study results support the implicit hypothesis that both separate knowing and connected knowing support higher order thinking and that both ways of knowing are related to need for cognition. That is, the more one believes in connected or separate knowing, the more one needs to be challenged with complex problems and embrace ambiguity. Furthermore, both ways of knowing are significantly related to the epistemological belief of Knowledge Modification, the belief that individuals actively learn by combining and reorganizing information, embracing ambiguity, and being willing to question experts. This empirical evidence supports the previous findings of gender differences and extends the theory by showing the positive impact of both ways of knowing.

These results may have important, practical implications as well. The fact that both ways of knowing support higher order thinking, suggests that students should be encouraged to use both ways of knowing. For example, teachers may want to consider involving students who do not want to debate or argue in activities that allow them a safe haven to take on challenges and learn that it can be an enjoyable experience where they can learn more. For students who have a difficult time taking on others' points of view, teachers may consider engaging them in structural activities that encourage them to take on others' perspectives,

different from their own, and then have them reflect on what they learn from that experience.

While this study did support the hypotheses being tested, like all studies, it has limitations. The sample was limited to the Midwest and to students involved in the disciplines of psychology and education. Sampling a wider range of individuals, both in academic as well as professional arenas, would be beneficial. Information for this study was gathered from volunteer college students agreeing to complete the questionnaire booklets. Findings may be different if the students were not volunteers. Also, finding participants willing to give time for an in-depth interview or to answer open-ended questions in essay format would give researchers a better idea of the honesty and clarity of the participants' answers.

Much more research is yet to be done. First, the limitations mentioned concerning the recent study could be addressed in future research. Second, the relationship between ways of knowing and academic performance needs to be determined and finally, true experimental studies need to be conducted. For example, an intervention study that would provide instruction in separate or connected knowing could provide causal evidence of links between ways of knowing and grades earned in different academic areas. Indeed, there is a strong need for experimental studies in all forms of epistemological beliefs.

Other research questions may address ways of knowing and preferences in both academic and life settings. For example, do ways of knowing relate to students' enjoyment of debate, group work, and content area preferences (i.e.

literature, fine arts)? Do ways of knowing relate to a student's choice of career? For example, a lawyer may have a stronger propensity to separate knowing and a teacher may have a stronger propensity for connected knowing.

It is also important to look at how epistemological beliefs and ways of knowing affect the learning process. In the field of education, this line of research could be beneficial to both educators and students. Determining the consequences for students when the teacher's ways of knowing conflict with the student's ways of knowing, could be important. For example, if a teacher's instructional technique is dominated by being a 'devil's advocate' and a student is only comfortable with empathic understanding, it could lead to communication problems in the classroom.

In summary, an individual can be characterized based on their level of need for cognition, degree of sophistication or naivety of epistemological beliefs, and way of knowing. It seems likely that in order to develop a symbiotic relationship between students and teachers, these characteristics must be taken into account.

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APPENDIX

INFORMED CONSENT FORM

You are invited to participate in a study of students' attitudes about education. We hope to learn if there is a difference in these attitudes among different populations of students. You were selected as a possible participant in this study because you are currently a student in a post-secondary institution. We hope to test up to 500 students of various ages, races, and majors.

If you decide to participate, you will answer a series of questions to assess your attitudes about knowledge and learning. It should take approximately 30 minutes to complete all questionnaires.

There will be no risk of physical injury or harm, nor will there be any psychological risk. Often people find these questions interesting to complete. Should you choose to participate, you will gain the satisfaction of knowing that you contributed to a study designed to potentially improve the ways that students learn and teachers instruct.

Any information obtained in this study in which you can be identified will remain confidential and anonymous.

Participation in this study is entirely voluntary. Your decision whether or not to participate will not affect your future relations with Wichita State University, Friends University, and/or Cowley County Community College. 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 one of the following:

Candice Anderson		at this address: College of Education, #123
Ben Drouhard		Wichita State University
Lynn Harris	OR	Wichita, KS 67260-0123
Dr. Schommer-Aikins		(316) 978-6386

If you have questions pertaining to your rights as a research participant, 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 indicates that you have read the information provided above and have voluntarily decided to participate.

You will be given a copy of this consent form to keep, if you request.

_____	_____
Signature of Participant	Date

_____	_____
Principal Investigator	Date

_____	_____	_____
Co-Investigator	Co-Investigator	Co-Investigator

We appreciate you completing this brief booklet with your honest opinions.

This is your chance to let teachers know what you think and feel, so that they can be better teachers. After all is said and done, we want to understand your perspective so we can see where you are coming from.

In order to make this more interesting, we are putting everyone's name into a drawing for a \$100 cash prize. All you must do is fill out the bottom of this sheet. We will examine each booklet to determine who has completed the booklet with care. If you completed this entire booklet with care, we will include your name in the drawing. We will draw one name from those who complete the booklet and will contact that individual by the end of the year.

Name _____

Phone Number _____

Institution _____

Instructor _____

Class (title/time) _____

Read all items carefully. After you have chosen your answer, fill in the appropriate circle on the computer answer sheet that corresponds with the numbered question in this packet. Fill in the circle completely with a #2 pencil. Do not use any outside materials to aid you in answering the questions in this survey. We are interested in your feelings and attitudes so please answer truthfully.

- Please fill in your date of birth in the space on the computer sheet labeled “Birth Date.”
- In the space of the computer sheet labeled “Sex”, fill in the appropriate space.

M. Male
F. Female

- In the space labeled “Identification Number” fill in your college GPA in spaces “ABC”.

For example, if your GPA is 2.75:
space A will contain 2,
space B will contain 7,
space C will contain 5.

- In space “K”, fill in your booklet number (1, 2, 3, 4, 5, or 6). This information is located at the top of this sheet.

Attitudes Towards Education

The following questionnaire (Attitudes Towards Education) is meant to allow you to tell us what you really believe about the nature of knowledge and learning. You have been randomly selected to have your responses serve as a model. That is, another student will read the questionnaire and your responses in an attempt to have a better understanding about knowledge and learning. We ask that you respond thoughtfully with what you believe to be true about knowledge and learning. After you complete the questionnaire, you may be asked to write a paragraph or two that summarizes the ideas you were trying to convey to the student who is reading from your responses.

Please use the rating system below to rate yourself on the following items.
1=strongly disagree 2=disagree 3=unsure 4=agree 5=strongly agree

1. You can believe most things you read.
2. The only thing that is certain is uncertainty itself.
3. If something can be learned, it will be learned immediately.
4. I like information to be presented in a straightforward fashion; I don't like having to read between the lines.
5. It is difficult to learn from a textbook unless you start at the beginning and master one section at a time.
6. Forming your own ideas is more important than learning what the textbooks say.
7. Almost all the information you can understand from a textbook you will get during the first reading.
8. A really good way to understand a textbook is to reorganize the information according to your own personal scheme.
9. If scientists try hard enough, they can find the answer to almost every question.

1=strongly disagree 2=disagree 3=unsure 4=agree 5=strongly agree

10. You should evaluate the accuracy of information in textbooks if you are familiar with the topic.
11. You will just get confused if you try to integrate new ideas in a textbook with knowledge you already have about a topic.
12. When I study, I look for specific facts.
13. If professors would stick more to the facts and do less theorizing, one could get more out of college.
14. Being a good student generally involves memorizing a lot of facts.
15. Wisdom is not knowing the answers, but knowing how to find the answers.
16. Working on a difficult problem for an extended period of time only pays off for really smart students.
17. Some people are born good learners; others are just stuck with a limited ability.
18. Usually, if you are ever going to understand something, it will make sense to you the first time.
19. Successful students understand things quickly.
20. Today's facts may be tomorrow's fiction.
21. I really appreciate instructors who organize their lectures carefully and then stick to their plan.
22. The most important part of scientific work is original thinking.
23. Even advice from experts should be questioned.
24. If I can't understand something quickly, it usually means I will never understand it.
25. I try my best to combine information across chapters or even across classes.
26. Please fill in circles A, F, & J on your answer sheet.
27. I don't like movies that don't have a clear-cut ending.

1=strongly disagree 2=disagree 3=unsure 4=agree 5=strongly agree

28. Scientists can ultimately get to the truth.
29. It's a waste of time to work on problems that have no possibility of coming out with a clear-cut answer.
30. Understanding main ideas is easy for good students.
31. It is annoying to listen to lecturers who cannot seem to make their mind up as to what they really believe.
32. A good teacher's job is to keep students from wandering from the right track.
33. A sentence has little meaning unless you know the situation in which it was spoken.
34. The best thing about science courses is that most problems have only one right answer.
35. Most words have one clear meaning.
36. The really smart students don't have to work hard to do well in school.
37. When I learn, I prefer to make things, as simple as possible.
38. I find it refreshing to think about issues that experts can't agree on.
39. The information we learn in school is certain and unchanging.

This booklet continues.

Student Information

40. Your current major is
- A. Business
 - B. Education
 - C. Engineering
 - D. Fine arts
 - E. Health professions
 - F. Liberal Arts and Sciences
 - G. Other
41. What best describes your ethnicity?
- A. African-American
 - B. American Indian
 - C. Asian
 - D. Caucasian
 - E. Hispanic
 - F. Multicultural
 - G. Other
42. What type of institution best describes where you are taking this survey?
- A. Junior/Community College
 - B. State University
 - C. Private University
43. What is your classification?
- A. Freshman
 - B. Sophomore
 - C. Junior
 - D. Senior
 - E. Graduate Student
44. What is your current marital status?
- A. Married
 - B. Single
45. How many children do you have living at home?
- A. none
 - B. one
 - C. two
 - D. three or more
46. What is your student status for the current semester?
- A. Part-time (11 credit hours or less)
 - B. Full-time (12 credit hours or more)

Personal Preferences

For each of the statements below, please indicate to what extent the statement is characteristic of you. Please rate yourself with the 9-point scale below on the following items.

1=extremely disagree 2=usually disagree 3=sometimes disagree 4=disagree
5=undecided 6=agree 7=sometimes agree 8=usually agree 9=extremely agree

47. I would prefer simple to complex problems.
48. I like to have the responsibility of handling a situation that requires a lot of thinking.
49. Thinking is not my idea of fun.
50. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.
51. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.
52. I find satisfaction in deliberating hard and for long hours.
53. I only think as hard as I have to.
54. I prefer to think about small, daily projects as opposed to long-term ones.
55. Leave this line blank on your answer sheet.
56. I like tasks that require little thought once I've learned them.
57. The idea of relying on thought to make my way to the top appeals to me.
58. I really enjoy a task that involves coming up with new solutions to problems.
59. Learning new ways to think doesn't excite me very much.
60. I prefer my life to be filled with puzzles that I must solve.
61. The notion of thinking abstractly is appealing to me.
62. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.

1=extremely disagree 2=usually disagree 3=sometimes disagree 4=disagree
5=undecided 6=agree 7=sometimes agree 8=usually agree 9=extremely agree

63. I feel relief rather than satisfaction after completing a task that requires a lot of mental effort.
64. It's enough for me that something gets the job done; I don't care how or why it works.
65. I usually end up deliberating about issues even when they do not affect me personally.

This booklet continues.

Word Break

For each item, choose the answer that most closely matches the definition of the numbered word. Fill in the corresponding circle completely.

66. emancipator

- A. theorist
- B. liberator
- C. prophet
- D. spy

71. emergence

- A. laziness
- B. identity
- C. contrast
- D. coming forth

76. resistant

- A. confusing
- B. conjunctive
- C. systematic
- D. assisting
- E. opposing

67. consultative

- A. monitory
- B. conservative
- C. advisory
- D. narrative

72. blithesome

- A. morbid
- B. cheery
- C. blessed
- D. venturesome

77. incessantness

- A. hopelessness
- B. continuousness
- C. inclination
- D. rashness

68. ejection

- A. restoration
- B. expulsion
- C. reformation
- D. bisection
- E. exposition

73. poignancy

- A. peignoir
- B. gloominess
- C. keenness
- D. gluttony
- E. barony

78. yawl

- A. tropical storm
- B. foghorn
- C. carouse
- D. sailboat
- E. turn

69. devitalize

- A. eat
- B. deaden
- C. soften
- D. wave

74. exonerate

- A. betray
- B. transgress
- C. exult
- D. vindicate

79. calamitous

- A. clamorous
- B. discontented
- C. disastrous
- D. uncouth

70. masticate

- A. chew
- B. massage
- C. manufacture
- D. create
- E. pollute

75. listless

- A. aggressive
- B. adaptable
- C. indifferent
- D. sorrowful
- E. ugly

80. handicraft

- A. cunning
- B. fast boat
- C. utility
- D. manual skill
- E. guild

81. incubate

- A. inform
- B. anticipate
- C. burn
- D. brood

82. ungainly

- A. cheap
- B. stupid
- C. clumsy
- D. hazardous

83. furlough

- A. leave of absence
- B. garden
- C. foot soldier
- D. timberland

84. ignoramus

- A. monster
- B. gossip
- C. dandy
- D. dunce

85. decadence

- A. decline
- B. decision
- C. color
- D. joy

This booklet continues.

Attitudes Towards Thinking and Learning

Indicate your level of agreement with the following 7–point scale. You do not need to dwell on each statement, give the first response that comes to your mind.

1=Strongly Disagree 2=Somewhat Disagree 3=Slightly Disagree 4=Unsure
5=Slightly Agree 6=Somewhat Agree 7=Strongly Agree

86. I like playing devil’s advocate--arguing the opposite of what someone is saying.
87. It’s important for me to remain as objective as possible when I analyze something.
88. When I encounter people whose opinions seem alien to me, I make a deliberate effort to “extend” myself into that person, to try to see how they could have those opinions.
89. I can obtain insight into opinions that differ from mine through empathy.
90. I tend to put myself in other people’s shoes when discussing controversial issues, to see why they think the way they do.
91. In evaluating what someone says, I focus on the quality of their argument, not on the person who’s presenting it.
92. I find that I can strengthen my own position through arguing with someone who disagrees with me.
93. I’m more likely to try to understand someone else’s opinion than to try to evaluate it.
94. Fill in circles E & F on your answer sheet.
95. I try to think with people instead of against them.
96. I feel that the best way for me to achieve my own identity is to interact with a variety of other people.
97. One could call my way of analyzing things “putting them on trial,” because of how careful I am to consider all of the evidence.
98. I often find myself arguing with the authors of books I read, trying to logically figure out why they’re wrong.
99. I have certain criteria I use in evaluating arguments.

1=Strongly Disagree 2=Somewhat Disagree 3=Slightly Disagree 4=Unsure
5=Slightly Agree 6=Somewhat Agree 7=Strongly Agree

100. I always am interested in knowing why people say and believe the things they do.
101. I enjoy hearing the opinions of people who come from backgrounds different from mine-it helps me understand how the same things can be seen in such different ways.
102. I try to point out weaknesses in other people's thinking to help them clarify their arguments.
103. The most important part of my education has been learning to understand people who are very different from me.
104. I like to understand where other people are "coming from," what experiences have led them to feel the way they do.
105. I value the use of logic and reason over the incorporation of my own concerns when solving problems.
106. I'll look for something in a literary interpretation that isn't argued well enough.

Thank you so much for your time. After completing the puzzle on the following page, please return this booklet and the answer sheet to your instructor as soon as possible.