ELEMENTARY SCHOOL TEACHERS' PERSPECTIVES ON LEARNING STYLES, SENSE OF EFFICACY, AND SELF-THEORIES OF INTELLIGENCE

A thesis presented to the faculty of the Graduate School of Western Carolina University in partial fulfillment of the requirements for the degree of Specialist of School Psychology.

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March 2012

AKNOWLEDGEMENTS

I would like to thank my committee for their guidance and encouragement. I would especially like to thank my outstanding chair, Bruce Henderson, for sharing his passion and expertise during this endeavor, and I would like to thank John Habel for encouraging me to step out of my comfort zone by adding a qualitative aspect to this study. I am also grateful for the thoughtful comments and feedback provided by the members of the Qualitative Research Group. Overall, this thesis is dedicated to teachers everywhere in order to recognize the amazing effort, creativity, and passion they apply to all they do for our students. In particular, I would like to express my gratitude to the dedicated teachers who offered their valuable time to participate in this study.

Most importantly, I want to thank my amazing wife, Ann-Marie, for her love, patience, and unending support for me throughout this study. After finishing this thesis, I know nothing is impossible when I have you in my life. Words cannot express how much you inspire me each and every day, and I cannot wait for our next adventure together.

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ABSTRACT

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A recent review of the research literature on learning styles (Pashler, McDaniel, Rohrer, & Bjork, 2009) revealed insufficient evidence to support the claim that learning outcomes are improved when instruction matches the learning styles of students. However, prior studies have failed to investigate teacher's beliefs in learning styles and how these beliefs are related to teachers' sense of efficacy and teachers' self theories of intelligence. This study used a mixed method design, which included a survey and focus group interviews, to explore teachers' perspectives on all of these concepts as well as the relationships among teachers' beliefs about these concepts. Although the results of this study revealed that the majority of participants held the belief that instruction should match learning styles, the overall beliefs of the participants were often inconsistent with learning styles theories. In addition, the survey results revealed a variety of correlations among the three concepts.

CHAPTER I: INTRODUCTION

This is a study on elementary school teachers' perspectives on learning styles, teacher sense of efficacy, and teachers' self-theories of intelligence and the relationships among these three concepts. In an effort to improve educational outcomes for students, many researchers have placed an emphasis on investigating the influence of various teacher beliefs on the types of instructional strategies used by teachers as well as the influence these beliefs have on student outcomes. Teachers' sense of efficacy and teachers' self-theories of intelligence are two types of beliefs held by teachers that have been investigated by previous studies. In contrast, few studies have examined teachers' beliefs that instruction should match learning styles. For practical purposes, the term belief in learning styles will be used in this study when discussing this concept. Likewise, there is a lack of research that investigates the relationships among teachers' beliefs in learning styles, teacher sense of efficacy, and teachers' self-theories of intelligence.

The primary focus of this study is teachers' beliefs in learning styles. Pashler et al. (2009) suggest that learning styles is a term used in numerous theories, and the majority of learning styles theories indicate that students learn more efficiently when material is presented in a manner that is consistent with their learning styles as identified by various learning styles assessment instruments. However, Pashler et al. also contend that there is a lack of empirical support for this claim, and they suggest that this is an issue because it is likely that many teachers have strong beliefs in learning styles because of the popularity of this concept in education during the past three decades. This study

investigated teachers' beliefs in learning styles in order to determine the extent that these beliefs are consistent with current research on this concept. Another goal of this study is to provide information that can be used for the development of training initiatives for teachers that focus on developing accurate beliefs about learning styles.

Teacher sense of efficacy, which is also referred as "teacher efficacy" in the research literature, is another focus of this study. According to Woolfolk Hoy, Davis, and Pape (2006), "Teacher efficacy is the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (p. 727). According to Guskey (1998), teacher efficacy is related to many positive outcomes such as high levels of student achievement, student motivation, adoption of innovations, and program implementation success. For this reason, high levels of teacher sense of efficacy can be considered important beliefs for teachers to hold. This study investigates teacher sense of efficacy from teachers' first person perspectives in order to provide information that can be used for the development of training initiatives for teachers that focus on developing high levels of teacher sense of efficacy.

Teachers' self-theories of intelligence were also investigated by this study. According to Dweck and Molden (2005), self-theories of intelligence are implicit beliefs held by individuals about their intelligence. The authors explain that individuals possess either incremental or trait self-theories of intelligence. The authors add that individuals with incremental theories believe that intelligence is malleable, and it can be changed with effort over time. In contrast, individuals with trait theories believe that people are

born with a certain amount of intelligence, and a person's level of intelligence is a fixed trait that does not change over the course of a lifetime (Dweck & Molden, 2005). According to Woolfolk Hoy et al., (2006), it is desirable for teachers to have incremental self-theories of intelligence because studies have suggested that teachers who hold incremental self-theories of intelligence are more likely to judge students' ability based on their final performance on assignments as opposed to teachers who hold trait self-theories of intelligence. Woolfolk Hoy et al. add that teachers with trait self-theories of intelligence are more likely to judge students' ability based on their initial performance on assignments. As a result, this study investigates teachers' self-theories of intelligence from their first-person perspectives in order to provide information that can be used for the development of training initiatives that promote incremental self-theories of intelligence.

An additional purpose of this study is to examine the relationships among teachers' beliefs in learning styles, teacher sense of efficacy, and incremental self-theories of intelligence. The relationships among these beliefs may indicate various issues related to the belief systems of teachers. For example, if teachers with high levels of sense of efficacy were likely to hold strong beliefs in learning styles, then this would be problematic because this relationship would indicate that teachers who are associated with many positive outcomes (teachers with high efficacy) are also more likely to believe in a concept that lacks empirical support (learning styles). Other potential issues with these beliefs will be discussed later in this study.

CHAPTER II: LITERATURE REVIEW

Teachers' Beliefs

Ballone and Czerniak (2001) suggest teachers typically change their beliefs prior to changing their practices. Similarly, Correa, Perry, Sims, Miller, and Fang (2008) suggest that teachers' beliefs are often related to actions, and teachers' beliefs are typically consistent with each other. As a result, Correa et al. also suggest that teachers usually cannot change a specific belief about teaching without affecting other personal beliefs. These statements indicate that understanding teacher beliefs can be useful when attempting to understand teachers' practices. Moreover, these statements stress the importance of viewing teachers' beliefs as systems as opposed to isolated concepts. Another problem with much of the literature on teachers' beliefs is the difference between what teachers believe and the instructional methods that they use (Henderson, 2003). In order to address this issue, more studies on teachers' beliefs need to be conducted that relate teachers' beliefs to their actions.

Overall, there have been many studies that focus on teachers' beliefs on various topics such as the following: student characteristics, diversity, high stakes testing, content, assessment practices, sense of efficacy, ability, and relating to students (Woolfolk Hoy et al., 2006). One area of future research is teachers' beliefs in learning styles. A literature review by Pashler et al. (2009) reported that learning styles is a popular concept among educators, but very few studies have shown evidence of any potential benefits of matching instruction to learning styles. Pashler et al. also suggest

that most studies within the past 20 years on beliefs about learning have found that most individuals typically have serious misconceptions about the ways humans learn, and they suggest that these misconceptions contributed to the popularity of learning styles. As a result, one may suspect that teachers' may have many of the same misconceptions about learning that were found in general populations, yet few studies have investigated teachers beliefs about learning styles. In summary, efforts to gain an understanding of teachers' beliefs about learning styles, the actions that they take related to these beliefs, and the relationships among learning styles and other central beliefs are currently needed in order to address any misconceptions that may be related to learning styles.

Learning Styles

Learning styles concepts. Learning styles have been a popular topic for educators for over 30 years, and over 170 learning styles models have been developed (Geake, 2008). The exact definition of learning styles differs depending on the model. However, Sternberg and Griginko (2001) suggest learning styles are defined as consistent patterns of methods for completing a task that are stable over long time periods and various activities. Sternberg and Griginko also specify that styles are not accounted for by ability level or personality. In a 2009 review by Pashler et al. the authors examine numerous learning styles models, and they suggest that most learning styles models share on one basic hypothesis that they describe as the "learning styles hypothesis" which is the idea that an individual should receive information in a manner that matches his or her learning style.

Learning styles categories. Coffield, Moseley, Hall, and Ecclestone (2004) conducted a comprehensive review of numerous learning styles models. The authors discussed multiple categories of styles that included the sensory modalities, patterns of cognition, personality types, and learning preferences among others. In addition, Coffield et al. indicated that many learning styles models incorporate Visual, Auditory, and Kinesthetic (VAK) sensory modalities. According to Geake (2008), all learning styles models that incorporate VAK sensory modalities hold the assumption that knowledge from each of the sensory modalities is processed differently in the brain. The Dunn and Dunn model is an example of a popular learning styles model that includes sensory modalities among the many elements that are categorized as environmental, emotional, sociological, physiological, or psychological (Dunn et al., 2009). Overall, reviews of learning styles (Coffield et al., 2004; Pashler et al., 2009) suggest that some models such as the Dunn and Dunn model have been popular due to commercial success. However, little is known about the types of beliefs that teachers hold about learning styles and the extent that they are consistent with various models of learning styles.

Learning styles evidence. The empirical evidence base of learning styles is a controversial topic in the research literature. Pashler et al. (2009) reviewed numerous studies that investigated learning styles. This review suggests the existent of flaws that commonly occur in learning styles research that can be attributed to a wide variety of research findings that suggest empirical support for learning styles. In addition, Pashler et al. contend that many of these studies are flawed because they lack at least one of the following components of factorial randomized research design which is critical for providing evidence for the learning styles hypothesis: learners must be divided into

groups based on a measure of learning styles, participants must be randomly assigned to each learning method, and participants must be administered the same achievement test. Moreover, Pashler et al. specified that the results of each study had to demonstrate a style-by-method cross over interaction. After reviewing the learning styles literature, Pashler et al. found one study that met these criteria that produced results that supported the learning styles hypothesis. However, the authors found numerous studies that met this criteria, and produced results that did not support the learning styles hypothesis. In addition, other reviews of the learning styles literature also identified various concerns related to the empirical evidence that supports the claims made by various learning styles models (Coffield et al., 2004; Geake, 2008).

Possible reasons learning styles are appealing. Despite the limited empirical support for learning styles, the success of many companies that market learning styles resources indicates that this concept has been highly popular for many years. The following are possible reasons why learning styles have gained the support that they have from teachers:

1. Pashler et al. (2009) posit that individuals are attracted to learning styles because it allows them to view other factors (e.g. a school system that does not provide time or resources needed to match learning styles and instruction) as responsible for a students' academic failure. Similarly, when adults with academic difficulties were asked about learning styles, Dunn et al. (2009) reported that many of these adults reported that they were "misjudged" by the education system which did not accommodate their learning styles.

2. Pashler et al. (2009) suggest that people possess "study preferences" which means that most people have fairly stable preferences for the manner in which they learn new information. However, Pasher et al. suggest that there is little evidence to suggest that providing instruction that matches an individual's study preferences has a positive impact on academic achievement.

3. Research demonstrated that individual differences in perceptual and cognitive abilities can contribute to individual differences in performance on tasks that involve particular sensory modalities (Pashler et al., 2009). The authors conjecture teachers' beliefs in learning styles might be influenced by times when teachers correctly observe this phenomenon.

4. Pashler et al. (2009) speculate that people may be attracted to learning styles because of a desire to categorize people into different "types." The authors draw comparisons to the highly popular Myers-Briggs Type Indicator test which categorizes personalities into various types.

5. Teachers and parents may be attracted to the concept of learning styles because it promotes the idea that school staff should acknowledge the unique traits of all students (Pashler et al., 2009).

6. Finally some educators may be drawn to learning styles because of the idea that all students have the potential to learn more effectively if instruction matches their learning styles (Pashler et al., 2009).

Issues related to teachers' beliefs in learning styles. There are three actions teachers could take based on their beliefs in learning styles that might negatively impact the students they serve.

1. Assessing students' learning styles and providing individualized instruction that matches each student's learning styles is considered a waste of resources because there is little evidence that this has a positive impact on student learning outcomes (Pashler et al., 2009).

2. Teaching students about their learning styles may negatively impact students by encouraging this belief among students because beliefs that have been in place for long periods of time are more persistent than beliefs that are new to a person (Ballone & Czerniak, 2001). As a result, students may develop misconceptions about learning.

3. Providing only one type of instruction to students in order to match students' learning styles is another action that may negatively impact students. Individuals are capable of learning in many different ways, and learning outcomes often improve when people receive various types of instruction (Bransford, Brown, & Cocking, 2000; Pashler et al., 2009).

Teachers' Sense of Efficacy

As mentioned previously, "Teacher efficacy is the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (Woolfolk Hoy et al., 2006, p.727). This definition stresses the importance of context and specific tasks because the authors assert

that these factors play a major role in teacher sense of efficacy beliefs. Although some studies refer to this concept as "teacher efficacy" or "teachers' sense of efficacy," the term "teachers' sense of efficacy" is used for this study in order to maintain consistency. Tschannen-Moran et al. (1998) developed the following model which suggests that teacher efficacy decisions are based on interactions between the "analysis of teaching task" and the "analysis of teaching competence." The authors add that these decisions influence the following: the teachers' goals for themselves, the persistence put forth when facing challenges, and effort they put forth to reach their goals. According to Woolfolk et al. (2006), this model of teacher efficacy was used by Tschannen-Moran, Woolfolk-Hoy, and Hoy to develop the Teachers' Sense of Efficacy Scale (a modified version of this scale was used for this study), and they included three dimensions of teacher efficacy for this scale which included the following: "efficacy for student engagement, efficacy for instructional strategies, and efficacy for classroom management" (p. 727).

Teacher sense of efficacy is an important belief because research has demonstrated that it is one of only a few teacher traits that are consistently related to student achievement (Woolfolk Hoy et al., 2006; Tischannen-Moran et al., 1998). However, student achievement is not the only positive trait that it is linked to. For instance, Guskey (1998) suggests that teacher efficacy is related to the following: "student achievement and motivation, teachers' adoption of innovations, teachers' classroom management, teachers' referrals to special education, supervisors' ratings of teachers' competence, program implementation success, and school effectiveness" (p. 5). Overall, research has suggested that teachers' sense of efficacy is an important belief, but it is also a challenging concept to measure due to the context and situational factors

involved in this belief. In order to address this problem, it is advantageous to study this concept using qualitative research methods that allow teachers to describe various situations and contexts that influence their sense of efficacy.

Self-Theories of Intelligence

According to Dweck and Molden (2005), self-theories of intelligence are implicit beliefs held by individuals about their intelligence. The authors explain that individuals possess either incremental or trait self-theories of intelligence. Dweck and Molden add that individuals with incremental theories believe that intelligence is malleable and can be changed with effort over time. In contrast, the authors state that individuals with trait theories believe that people are born with a certain amount of intelligence, and the level of intelligence is a fixed trait that does not change over the course of a lifetime.

Teachers' self-theories of intelligence. This study investigates teachers' self-theories of intelligence for several reasons. Henderson (2003) suggests that the self-theories of intelligence held by teachers may be related to the instructional practices they use in the classroom. Teachers with incremental theories of intelligence are likely to believe that students can become more intelligent by putting more effort into a task or by using different approaches (Henderson, 2003). According to Woolfolk Hoy et al. (2006), teachers' self-theories of intelligence can influence the way teachers interpret students' interactions in the classroom. For example, teachers with incremental self-theories of intelligence are more likely to interpret a students' initial performance on a task as higher aptitude than the student's performance on a similar task later in the year. In addition, the authors suggest that the opposite is true for teachers with trait self-theories of

intelligence. According to Woolfolk Hoy et al., teachers with incremental self-theories of intelligence were also more effective when working with exceptional students. Psychologists have historically debated which of these theories are correct with no resolve, yet Dweck and Molden (2005) suggest that children and adults with incremental self-theories are associated with more positive outcomes than children and adults with trait self-theories.

Students' self-theories of intelligence. Overall, many studies have investigated children's self-theories of intelligence. Bransford et al. (2000) suggest that children with incremental theories of intelligence display higher levels of persistence, aim to increase their competence, and seek challenges; while children with trait theories of intelligence are less likely to display these qualities. Thus, incremental self-theories are often viewed as more desirable for students to have than trait theories of intelligence. Dweck and Molden (2005) suggest that students with incremental self-theories have high levels of academic achievement and positive beliefs about effort.

Dweck and Molden (2005) also suggest that children with trait self-theories of intelligence were likely to set performance goals, and those with incremental self-theories of intelligence were likely to set mastery goals. Coutinho and Neuman (2008) state that learners who are motivated by performance goals value being successful compared to others, and they try to avoid failure as well as assessments that may make them look bad in the presence of peers. In contrast, students who set mastery goals see failure as an opportunity to learn from mistakes, and they are focused on improving their knowledge without being concerned about how they compare to others (Coutinho & Neuman, 2008).

Research findings from multiple studies also reveal that teachers are able to influence their students' self-theories of intelligence (Bransford et al. 2000; Dweck &Molden, 2005). Given this notion, it would be beneficial to promote incremental self theories of intelligence among teachers so that they can promote incremental self-theories with their students as well.

Statement of the Problem

Teachers' beliefs in learning styles. Although this study investigates teachers' beliefs about multiple concepts, teachers' beliefs in learning styles is a primary focus of this study because it has been a popular idea among educators for many years, and there is a lack of empirical support for the learning styles hypothesis (Pashler et al., (2009). If this is a commonly held belief among teachers, then it is problematic that teachers who possess this belief might be misspending their limited time and resources assessing student learning styles and providing instruction that matches learning styles when there is not sufficient evidence to support the claim that these procedures improve learning outcomes. Unfortunately, few studies have investigated teachers' beliefs in learning styles, so the extent to which teachers' support this notion is unknown. This study addresses this problem by examining the extent that teachers' beliefs are consistent with the learning styles hypothesis.

This study also explores teachers' perspectives on learning styles in order to gain an understanding of how they apply this concept to their teaching and why they have the beliefs they do about learning styles. In addition, this study explores these beliefs in order to determine the extent to which they are consistent with current research literature

on the subject of learning styles and individual leaner differences. The results of this study can be used to provide information that may be useful in developing strategies to promote accurate beliefs about learning styles among teachers.

Due to the limited research literature on this topic, this study used three methods for studying teachers' beliefs in learning styles and perspectives on learning styles in order to provide a wide variety of information related to this topic. The first method examined the extent to which teachers supported specific beliefs related to learning styles by conducting a quantitative analysis of the individual items of the learning styles scale. The second method involved a qualitative analysis of the four open-ended survey items (open-ended items only addressed learning styles because it was the primary focus of this study). This method was selected because open-ended questions allow participants to describe their beliefs and experiences in greater detail from their first-person perspectives. The third method involved a qualitative analysis of the findings of a focus group interview on teachers' perspectives on learning styles. The focus group procedure was selected because it also allows participants to describe their beliefs and experiences in greater detail from their first-person perspectives.

The focus group method is considered useful when exploring topics that are relatively unknown (Morgan, 1997). The qualitative data collected in this study can be used to guide future efforts to clarify misunderstandings about learning styles because they provide more information regarding teachers' reasons for believing in learning styles, and they provide an in-depth understanding of how teachers apply their beliefs about learning styles to the instruction they provide. In addition, the qualitative data can

also be used to guide future studies on this topic. The following research objectives explore teachers' beliefs about learning styles using all three methods:

1. Explore teachers' beliefs about the nature of learning styles.
2. Explore teachers' beliefs about how learning styles should be included integrated into instruction.
3. Explore teachers' beliefs about assessing learning styles.
4. Explore the ways and the extent to which teachers believe learning styles affect students.
5. Explore teachers' beliefs about the practicality of integrating learning styles into instruction.
6. Explore teachers' experiences with training and professional development that deal with learning styles.

The relationships among the three concepts. This study also investigates the relationships among teachers' sense of efficacy, teachers' self-theories of intelligence, and teachers' beliefs in the learning styles hypothesis. As mentioned previously, the term "belief in learning styles" will be used when discussing the "learning styles hypothesis." This study investigated these relationships because there is a lack of information in the research literature pertaining to these relationships, and this study investigated these relationships in order to determine how beliefs in learning styles relate to teachers' sense of efficacy and teachers' self-theories of intelligence, which are important concepts in the research literature on teachers' beliefs. Moreover, the relationships among these beliefs

may suggest various issues or misconceptions in teachers' belief systems which are discussed in the following paragraphs.

The relationship between teachers' sense of efficacy and teachers' beliefs in learning styles. No studies thus far have investigated this relationship. However, since efficacy in instructional practices is a major component of teachers' sense of efficacy, it is reasonable to predict that teachers with a high sense of efficacy are likely to have strong beliefs about the instructional practices they believe to be effective. If this is true, then it is also reasonable to predict that teachers with high efficacy are more likely to believe in learning styles because it has been promoted as an effective instructional strategy for many years. If this prediction is true, then it is troubling that the teachers' with high efficacy are also more likely to believe in the usefulness of an instructional method that lacks empirical support (i.e. learning styles) because research has suggested that these teachers are also likely to be highly successful teachers.

The relationship between teachers' sense of efficacy and incremental self-theories of intelligence. A review of the research literature revealed few studies that investigated the relationship between teachers' sense of efficacy and incremental self-theories of intelligence. However, Leroy, Bressoux, Sarrazin, and Trouilloud (2007) investigated the relationship between teachers' incremental self-theories of intelligence and teacher efficacy by correlating self-theories of intelligence as measured by The Nature of Ability Beliefs Scale developed by Sarrazin and colleagues in 1996 with teacher efficacy as measured by a French version of the Teacher Efficacy Scale developed by Gibson and Dembo in 1984. The results of the study by Leroy et al.

revealed a weak positive correlation (r=.22) that was highly significant (p=.001) between teachers' incremental self-theories of intelligence and teacher efficacy. In addition, it is reasonable to expect that teachers with high efficacy possess elevated levels of optimism regarding their impact on student learning and performance, and it is possible that many of these teachers also possess optimism that intelligence is malleable. Thus, this study predicts that incremental self-theories of intelligence and teachers' sense of efficacy are positively related.

The relationship between self-theories of intelligence and beliefs in learning styles. Currently, no studies have investigated the relationship between incremental self-theories of intelligence and learning styles. One might suspect that teachers with incremental self-theories of intelligence are more likely to attribute a students' performance to his or her effort instead of other factors such as learning styles. In addition, teachers with trait self-theories of intelligence might be more likely to use instruction that matches learning styles as a strategy to help low performing students since they do not believe that intelligence can change. As a result, this study predicted that teachers with incremental self-theories of intelligence are less likely to believe in learning styles. If this prediction is not correct, then teachers who have positive expectations of students (i.e. teachers with incremental self-theories of intelligence) are just as likely or more likely to believe in a concept that lacks empirical support (i.e. learning styles) than teachers with trait self-theories of intelligence. The relationships among teachers' sense of efficacy, beliefs in learning styles, and incremental self-theories of intelligence were investigated and the following hypotheses were tested in this study using data from the survey:

1. A negative relationship exists between the belief that learning styles should match instruction (belief in learning styles) and incremental self-theories of intelligence.

2. A positive relationship exists between the belief that learning styles should match instruction (belief in learning styles) and teachers' sense of efficacy.

3. A positive relationship exists between teachers' sense of efficacy and incremental theories of intelligence.

Teachers' perspectives on teachers' sense of efficacy and self-theories of intelligence. Another goal of this study was to obtain information that can be used to develop strategies to help promote incremental self-theories of intelligence and high levels of teachers' sense of efficacy. However, information gathered from the Teachers' Sense of Efficacy Scale and the self-theories of intelligence rating scales did not provide a high level of detail about these two concepts from teachers' first person perspectives. Consequently, a focus group interview was conducted for teachers' sense of efficacy, and a focus group interview was conducted for self-theories of intelligence. This method was selected because focus groups are useful when studying beliefs that are complex or often unarticulated because they allow participants to discuss beliefs in an environment where they feel comfortable because they are surrounded by peers (Morgan & Krueger, 1998). In addition, teacher efficacy is influenced by context and situational factors (Woolfolk Hoy et al., 2006), and the focus group method was selected to study this concept because these factors can be described in detail when participants discuss their experiences. The

following objectives were developed for the focus group that investigated teachers' self-theories of intelligence:

1. Explore teachers' perspectives on the nature of intelligence.
2. Explore teachers' perspectives on the stability of intelligence.

In addition, the following objective was developed for the focus group that investigated teachers' sense of efficacy:

1. Explore teachers' perspectives on the extent that they feel that they have the capacity to succeed at various teaching tasks.

CHAPTER III: METHOD

This study used a mixed-method design which included a survey procedure and a focus group procedure. Each procedure is discussed separately beginning with the survey procedure.

Survey Participant Sample

The survey participant sample included 70 elementary school teachers from a public school district in the Southeastern region of the United States. This district was selected due to its convenience. Overall, 360 surveys were distributed to teachers at 12 of the 13 elementary schools in the district, and 70 were completed. This indicates that the survey response rate was 19.4%. Descriptive information about the survey participant sample is provided in Table 1 below.

Table 1

Survey Sample Characteristics

Descriptors	*Frequency*	*Percentage*	*M*	*SD*
Years of experience	-	-	13.36	10.43
Highest Degree Earned				
Bachelor's Degree	25	35.7	-	-
Master's Degree	45	64.3	-	-
Current Grade(s) Taught				
Kindergarten	6	8.6	-	-
First	12	17.1	-	-
Second	5	7.1	-	-
Third	10	14.3	-	-

Fourth	14	20.0	-	-
Fifth	5	7.1	-	-
Multiple	18	25.7	-	-
Sex				
Male	4	5.7	-	-
Female	66	94.3	-	-
Current School of Employment				
School 1	6	8.6	-	-
School 2	6	8.6	-	-
School 3	3	4.3	-	-
School 4	6	8.6	-	-
School 5	4	5.7	-	-
School 6	2	2.9	-	-
School 7	14	20	-	-
School 8	8	11.4	-	-
School 9	3	4.3	-	-
School 10	9	12.9	-	-
School 11	7	10	-	-
School 12	2	2.9	-	-

All participants were licensed teachers in the state in which the study was conducted. The participants included general education teachers, special education teachers, and teachers serving in specialist positions such as reading, English as a second language, and academically and intellectually gifted teachers.

Survey Materials

A survey packet was completed by all of the participants (see Appendices A, B, and C). The survey packet included a brief letter that provided a description of the study and instructions for completing the survey. The participants were instructed to fill out an informed consent form (see Appendix C), and they were informed of the following: personal information will be kept confidential, completed surveys will be store in a secure location, no names or identifying information will be used in the results of this study, participation is voluntary, and participants can omit items that they do not feel comfortable answering. The survey packet consisted of three different rating scales in order to rate teachers' beliefs about each of the three concepts (teachers' sense of efficacy, self-theories of intelligence, and belief in learning styles). In addition, the survey packet included four open-ended questions that addressed teachers' beliefs in learning styles. The survey also included a brief demographic survey (see Appendix A).

Belief in learning styles scale. This scale in included 30 items, and it asked participants to rate the extent that various statements about learning styles were true for them using a Likert-type scale (1 = not at all true for me, 2 = somewhat true for me, 3 = moderately true for me, and 4 = very true for me). This scale was developed based on a review of the research literature (see Literature Review section above) on the topic of learning styles and the research objectives of the study (see Statement of the Problem section above). Items on this scale rated teachers' beliefs about the following: (a) using learning styles strategies, (b) awareness of students' learning styles, (c) positive outcomes associated with learning styles, (d) sensory or environmental factors associated with

learning styles, (e) informing students about learning styles, matching learning styles and instruction, (f) students' ability to learn information in various ways, (g) the practicality of applying learning styles to instruction, and (h) comparing learning styles to other factors that influence instruction. In addition, some items were positively worded and others were negatively worded.

Teachers' sense of efficacy scale. This study used a modified version of the Teachers' Sense of Efficacy Scale (long form) was developed by Tschannen-Moran and Woolfolk Hoy (2001). A copy of this scale was retrieved from Anita Woolfolk Hoy's webpage on The Ohio State University's website. A letter granting permission for the public use of this scale can also be viewed on Anita Woolfolk Hoy's website. The Teachers' Sense of Efficacy Scale includes the three following subscales: "efficacy in student engagement, efficacy in instructional practices, and efficacy in classroom management" (Woolfolk Hoy et al., 2006, p. 727). The efficacy in classroom management items were not included in the modified version of the Teachers' Sense of Efficacy Scale used for this study. In addition, the original version used a Likert-type scale that asked participants to rate their beliefs on a scale of 1 to 9. For this study, the Likert-type scale was simplified so that it asked participants to rate their beliefs on a scale of 1 to 5 (1 = Nothing, 2=Very Little, 3= Some Influence, 4=Quite a Bit, and 5 = A Great Deal). Overall, the efficacy in classroom management subscale was omitted, and the Likert-scale was simplified in order to increase participation by making the scale to appear less overwhelming to participants.

Self-theories of intelligence scale. This survey consists of 15 items that used a forced choice format. Participants were asked to select one of two statements that they agreed with the most, and each item contained one statement that represented an incremental self-theory and one statement that represented a trait self-theory of intelligence. The items on this scale were based on a review of the research literature on teachers' self-theories of intelligence (see Literature Review section above). Items on this scale rated teachers' beliefs about the stability of intelligence, and this scale also rated teachers' beliefs about performance and mastery goals since previous studies have suggested these beliefs are related to teachers' self-theories of intelligence (Dweck & Molden, 2005).

Open-ended survey items. This section of the survey included four open-ended items that provided the subjects with an opportunity to share additional thoughts about learning styles from their first-person perspectives. The following items were included in the survey:

1. Think of a time when you applied what you know about learning styles to your teaching, and tell me about this experience.
2. Think of a time when you encountered challenges that prevented you from applying what you know about learning styles to your teaching, and tell me what you can about this experience.
3. Have you attended any training or professional development sessions within the past year that focused primarily on learning styles? If so, briefly summarize what stood out to you about the session(s).

4. Have you experienced a time when a student's academic performance was influenced by his/her learning style? If so, please describe this experience.

Survey Procedure

To recruit participants, the assistant superintendent of the district was contacted and the objectives of the study were explained as well as the data collection procedures. Once the study was approved at the district level by the assistant superintendent, the principals of the district's 13 elementary schools were contacted, and permission to distribute survey packets to all licensed teachers at 12 of the 13 schools was obtained (the content of the survey packets is discussed in detail in the Survey Materials section above). When contacting the principals in this district, I offered to organize free professional development sessions for teachers led by my faculty advisor for the study. None of the principals accepted this offer due to limited opportunities for additional professional development sessions. No other incentives for participation were offered, and all participants completed the surveys on a voluntary basis.

Once permission to conduct the study was obtained at each school, I delivered a survey packet to all licensed teachers at each school. Survey packets were delivered to five of the twelve schools by hand, and they were delivered to the remaining schools via the school district courier. Survey packets included a letter that informed the participants about the study, and it also included instructions for completing the survey and returning it. The participants were given an informed consent form to sign if they agreed to all of the terms listed on the form (Appendix C). The participants were informed that their participation was voluntary. In addition, participants were informed that the data

collected during the study will be stored in a secure location, and their personal information will be kept confidential by the assignment of an identification number to each participant. After the participants completed the survey, they returned the survey and the signed consent forms to the school where I was serving as an intern via the school district courier.

Initial Analysis of Survey Data

Missing data. An initial review of the survey data revealed missing data on various items in each of the three scales. The Belief in Learning Styles Scale and the Teachers' Sense of Efficacy Scale contained few missing values, but the self-theories of intelligence scale contained many missing values. Individual mean substitution was used to replace missing values on individual items on the learning styles scale and the modified Teachers' Sense of Efficacy Scale. According to Widaman (2006), this method involves replacing a participant's missing value(s) on a scale with the mean of all items with no missing values for that participant. This method was selected because it is useful when the majority of items for a participant are not missing. In addition, this method can be used when items with missing values are similar to items with no missing values in the extent that they are likely to produce extreme values to the items with no missing values (Widaman, 2006). Pairwise deletion, a method that involves omitting a participants data for a calculation when he or she does not data for each variable, was used to address missing values on individual items on the self-theories of intelligence scale because of the limited number of items on this scale (only two items were included in the final analysis).

A review of the responses to the self-theories of intelligence scale revealed multiple items with high rates of missing values, and I decided to omit these items from the total scale score. In addition, I determined that some of the items on this scale were not directly related to self-theories of intelligence after carefully reviewing the scale so these items were omitted as well. Two items (items 2 and 3) were kept because they were the most accurate representations of self-theories of intelligence. Finally, each participant's scores for each scale were added to create total scale scores for each participant. The belief in learning styles scale and the self-theories of intelligence scale both included negatively worded items and the scores for these items were reversed when the total scores for these scales were calculated.

Internal consistency of rating scales. Once missing data were replaced in all of the different scales, a reliability analysis was conducted to calculate the internal consistency of all of the items on the Teachers' Sense of Efficacy Scale and the learning styles scale. For the self-theories of intelligence scale, a reliability analysis was conducted on the two items that were kept. The results of these analyses can be view in Table 2 below. Orcher (2005) suggests that a Cronbach's Alpha of at least .75 is needed for a scale to be considered acceptable. All of the scales for this study were above this level except for the self-theories of intelligence scale. Due to the exploratory nature of this study the results of this scale were still included in the analysis despite the low internal consistency.

Table 2

Reliability Coefficients of Rating Scales

Scale	*Cronbach's Alpha*
Belief in Learning Styles	.93
Teachers' Sense of Efficacy Scale	.83
Self-Theories of Intelligence Scale	.57

Note. The Teachers' Sense of Efficacy Scale is a modified version of the scale created by Tschannen-Moran and Woolfolk Hoy (2001).

Open-ended survey item analysis. The data from the open-ended survey items were analyzed using the same procedure as the focus groups (see Focus Group Analysis section below). However, the open-ended survey item analysis also included enumeration which is a process that involves counting how many participants mentioned each theme (Orcher, 2005). This process was selected due to the large number of survey participants. The open-ended survey items were analyzed one item at a time. Codes for these themes consisted of keywords or phrases for each theme. Then themes for each question were organized by categories which were based on the research objectives (see Statement of the Problem section). Then the themes for each category were analyzed by major and minor themes (see Focus Group Analysis section below).

Focus Group Participant Sample

Participants for the three focus groups were 11 teachers, one interim teacher, and four tutors from an elementary school in the Southeastern United States. Four of these teachers also completed the survey used in this study. I was acquainted with all of the participants before the study because I was working as a school psychologist intern at the elementary school that the participants worked at. Each focus group consisted of five of the participants. The demographic characteristics of this sample can be viewed below in Table 3.

Table 3

Focus Group Sample Characteristics

Descriptors	*Frequency*	*Percentage*
Sex		
Male	1	6.6
Female	14	93.3
Current Grade(s) Taught		
Kindergarten	1	6.6
First	1	6.6
Second	4	26.6
Third	1	6.6
Fourth	1	6.6
Fifth	2	13.3
Multiple	5	33.3
Position		
General Ed. Teacher	9	60
Tutor	4	26.6
AIG Teacher	1	6.6

Interim Teacher	1	6.6
Years of experience teaching		
Less than 10	7	46.6
Between 10 and 20	1	6.6
Between 20 and 30	4	26.6
30 or more	3	20

Focus Group Materials

Materials for aspect of the study included: a digital audio recorder, paper and pencil for taking notes, refreshments for the participants, and a list of questions and probes for each focus group. A computer with a word processing program was used to transcribe the audio recordings from the focus groups.

Focus Group Procedure

Focus group topics and size. One focus group was conducted for each of the following concepts: self-theories of intelligence, teachers' sense of efficacy, and learning styles. Each focus group consisted of five participants for two reasons: (a) there was limited time to conduct focus groups due to the busy schedule of the participants, and Peek and Fothergill (2009) suggest that small focus groups which include three to five participants are typically less difficult to manage than larger groups when time constraints are present; (b) Peek and Fothergill also recommend small groups because they provide more opportunities for group members to express disagreement and they found that dominant group members are less common in small groups.

Focus group assistants. I also recruited two volunteers to assist with the focus groups. When moderating focus groups, Morgan and Krueger (1998) suggest that other individuals can assist the moderator by observing the group, taking notes, and debriefing with the moderator after the focus group. Morgan and Krueger propose that these measures can improve the validity of the focus group results, and it can provide the moderator with fewer distractions during the sessions. For this study, I instructed the assistants to sit quietly, observed the group, and take notes. I instructed the assistants to take notes related to comments or themes that stood out to them, the dynamics of the group, seating arrangements, body language, and expressions of the participants. Once each group interview ended, my assistant and I discussed these factors together. I recruited two friends to assist with the focus groups, and I selected these individuals because of their self-discipline and interest in the topics. One assistant attended the self-theories of intelligence focus group, and the other assistant attended the teachers' sense of efficacy focus group. Due to scheduling conflicts, neither assistant was available to attend the learning styles focus group.

Participant selection and recruitment. The original plans for this study included using purposive sampling to selecting participants. According to Morgan and Krueger (1998), purposive sampling is when participants are chosen based on characteristics that make them relevant to the study. In order to obtain a variety of perspectives about each of the three concepts, participants who were heterogeneous in terms of levels of experience and grade level taught were sought for each focus group.

When recruiting participants, I developed a list of potential participants who were heterogeneous in terms of level of experience and grade level taught. Then I recruited participants by speaking to them in person at the elementary school. I provided a brief description of the study to the participants, and I asked them if they would be willing to participate. No incentives for participation were offered during recruitment. Unfortunately, many teachers were unavailable to participate in a focus group interview due to time constraints. Once I exhausted the list of potential participants, I selected others based on convenience. For instance, four of the participants for the teachers' sense of efficacy group were tutors who worked part-time at the elementary school where the focus group interviews were conducted in. The tutors were selected based on convenience because their part-time schedules allowed them more time to participate than the full time teachers. In addition, Krueger and Casey (2009) suggest it is beneficial to select participants who are likely to have a great deal of information and experiences that relate to the topic of the study. Thus, the tutors were selected specifically for the teachers' sense of efficacy focus group because they were all retired teachers who all had many years of experience as teachers.

Once all of the participants were recruited, I scheduled each focus group session at the convenience of the participants for each focus group. The focus group interviews took place in the conference room at the school where the teachers are employed. The participants were instructed to fill out an informed consent form (see Appendix D), and the they were informed of the following: personal information will be kept confidential, interview data will be stored in a secure location, no names or identifying information will be used in the results of this study, participation is voluntary, a digital audio recorder

will be used to record each session, and participants can decline to answer questions that they do not feel comfortable answering. I recorded the focus group sessions with a digital audio recorder, and I asked the following questions to participants during the self-theories of intelligence focus group interview:

1. Think of a person you know who is very intelligent, and tell us about this person.
2. Think back about your experiences teaching. Is there a student you have worked with who has become more intelligent over time?
3. Does anyone see this (the idea that a student's intelligence can change) differently?
4. Has anyone experienced a time when a student's intelligence remained unchanged? Tell us about this experience.

After the participants provided their initial responses, the following probes were used, as needed:

1. What makes this person intelligent?
2. How do you know this person's intelligence changed?
3. What caused the change in his or her intelligence?
4. How do you know that this person's intelligence remained the same?

I asked the following questions to participants during the teachers' sense of efficacy focus group interview:

1. Think about your experiences teaching. Tell us about a time when you were able to get through to a difficult student.
2. Think about a time when you were able to motivate a student with low interest.
3. Think about a time when you were able to help your students think critically.
4. Think of a time when you were able to support a family in helping their child do well in school.
5. In what ways do you think you can help students the most?

After the participants provided their initial responses, the following probes were used, as needed:

1. Tell us about a time when you did all that you could, but made little or no progress with a difficult student.
2. Think about your experiences teaching. Has there been a time when you felt you could not motivate a student despite your best efforts?
3. Describe a time when it was difficult to help a student think critically.
4. Tell us about a time when you felt limited in your ability to help a student's family.
5. In what ways do you think you can help students the most?

I asked the following questions to participants during the learning styles focus group interview:

1. Think about your experiences teaching. Tell us about a time when you thought about the learning styles of your students when preparing for your class?
2. Tell us about a time when you were aware of the learning style(s) of (of one) your students.
3. Think about your experiences teaching. Has there been a time when it has been challenging to incorporate learning styles into your teaching?
4. Think about your experiences teaching. Has there been a student who was aware of his/her learning style.
5. Besides learning styles, what are other ways that you meet the needs of individual students in your class?

After the participants provided their initial responses, the following probes were used, as needed:

1. How did your students respond when you (applied learning styles when teaching)?
2. Is there anyone who has not seen this?
3. How do you know what learning style a student has?
4. Tell us about a student who is (an auditory) learner.

In general, the focus group questions used an open-ended format. This format was chosen because it allows participants to share their thoughts as opposed to what the researcher thinks the participants' thoughts might be (Morgan & Krueger, 1998).

According to Henderson (2003), there is often a difference between teachers' beliefs and the instructional practices they use. To address this issue, this study used a number of focus group questions that asked participants to "think back" or "tell us about a time." These questions inform the participants that the researcher would like them to provide responses that are detailed and based on their experiences (Morgan & Krueger, 1998). These questions encourage participants to think about experiences from the past as opposed to just describing recent experiences which increases the reliability of the data by leading the participants to describe past experiences instead of current or future intentions (Morgan & Krueger, 1998). After the focus groups were conducted, I transcribed each focus group. All identifying information provided during the focus groups was omitted in the transcripts.

Focus group analysis. The analysis of the focus group data was based on a method proposed by Marshall and Rossman (2006) which involves the seven steps of data analysis listed below.

1. The first step of Marshall and Rossman's data analysis process is organizing. For this study, the data were organized by transcribing audio data from each focus group into a separate transcript. The data were used to create abridged transcripts, which are used to include all data that is related to the research objectives while omitting all irrelevant comments (Morgan & Krueger, 1998).

2. The second step of Marshall and Rossman's data analysis process is immersion. The authors suggest this stage helps familiarize the researcher with the data. For this study, I listened to the audio recordings twice, transcribed the data, and read the transcripts again

before analyzing the data. During the immersion process I took notes of my initial impressions of the results.

3. The third step of Marshall and Rossman's data analysis process is generating categories and themes. I initially developed a list of all possible themes. Then I organized the data based on categories. The categories for the learning styles and self-theories of intelligence focus groups were determined by the research objectives of this study (see Statement of the Problem section for a list of objectives). Then I refined and organized the themes for each objective based category. When organizing themes, Krueger and Casey (2009) recommend considering the frequency, specificity, emotion, and extensiveness of comments or themes when deciding on how much emphasis to give to themes. The four factors discussed by Krueger and Casey were considered when the themes for this study were grouped into "major themes" and "minor themes." Major themes were emphasized because they were frequent, specific, emotional, and extensive while minor themes were emphasized less because they lacked the four factors discussed above. However, minor themes were included in the results because they were relevant to the research objectives. Krueger and Casey specify that the frequency of a theme or comment is the number of times it occurs within the data, and extensiveness refers to how many different people expressed a theme or made similar comments. As a result, it is possible to have a theme that is frequent but not extensive because it is repeated many times by one participant, but it is not stated by multiple participants. Specificity refers to the amount of detail comments or themes provide. Krueger and Casey also suggest that the various types of emotion participants express during focus groups can be considered, but they recommend interpreting body language with caution.

4. The fourth step of Marshall and Rossman's (2006) data analysis process is coding the data. The authors suggest that various methods of coding can be used to represent the categories and themes identified in the data. Numerical coding systems were used for the three focus groups.

5. The fifth step of Marshall and Rossman's data analysis process is offering interpretations. At this stage, I considered various quotations from the data that were used to satisfy the research objectives.

6. The sixth step of Marshall and Rossman's data analysis process is searching for alternative understandings. After initial analysis, I reviewed the data again in search of data that challenged the themes that were already indentified.

7. The seventh and final step of Marshall and Rossman's data analysis process is writing the report, and they mention that the way the data are reported depends on the study. For this study, the data were organized by the categories mentioned above. Since three topics were covered during the focus groups, I analyzed the data from each focus group separately. Once the focus groups were analyzed, I analyzed the results of all three focus groups and discussed the common themes found among multiple focus groups.

CHAPTER IV: RESULTS

Analysis of Learning Styles Scale Items

The mean and standard deviation of participants' responses to each item of the learning styles scale were examined as well as the frequencies of each level of response were examined for each item. Responses for each item could range from 1-4 with '1' indicating "Not at all true for me," '2' indicating "Somewhat true for me," '3' indicating "Moderately true for me," and '4' indicating "Very true for me."

Using learning styles strategies. On these items, the participants rated the extent to which they believe that they use various strategies related to learning styles. The majority of the participants expressed moderate or low support for the idea that they can identify students' learning styles from observation in the classroom (see item 1 in Table 4 below). On item 3, the participants expressed various levels of support for the belief that they know which of their students are visual, auditory, or kinesthetic learners. Most participants expressed little or no support for the notion that they assess their students' learning styles and share that information with them (item 6). The majority of participants indicated that they think about their students' learning styles when planning instruction (item 2), and very few participants indicated that that learning styles are not a major factor in how they plan their instruction (item 5). Likewise, most participants indicated that they provide students with a variety of learning experiences so that their students' learning styles are matched (item 4).

Table 4

Means, Standard Deviations, and Frequencies of Ratings for Learning Styles Scale Items Associated with Learning Styles Strategies

			Level 1[a]	Level 2[b]	Level 3[c]	Level 4[d]
Learning Styles Scale Item[e]	*M*	*SD*	*Frequency*	*Frequency*	*Frequency*	*Frequency*
1. I am able to identify students' preferred learning styles from observation in the classroom.	2.67	.79	5	22	34	9
2. I regularly think about my students' learning styles when I am planning instruction.	2.93	.95	6	16	25	23
3. I know which of my students are visual, auditory, or kinesthetic learners.	2.74	.88	6	20	30	14
4. I provide my students with a variety of learning experiences so that all of my students' learning styles are matched.	3.47	.65	0	6	25	39
5. Learning styles are not a major factor in how I plan my teaching.	1.64	.92	41	18	6	5
6. I assess my students' learning styles, and I share this information with my students.	1.84	.85	28	28	11	3

Note. Negatively worded items are shown in boldface. Missing values were replaced using individual mean substitution, and the frequencies of the values used to replace missing values are not shown on this table.

[a]Level 1 = Not at all true for me

[b]Level 2 = Somewhat true for me

[c]Level 3 = Moderately true for me

[d]Level 4 = Very true for me

[e]Item numbers in this table were modified from their original values in the survey for organizational purposes.

Awareness of students' learning styles. On these items, the majority of the participants expressed little or no support for the belief that assessing student learning styles has little impact on my students (see item 2 in Table 5 below). The participants also tended to think that it is important to be aware of their students' learning styles (item 1). These results suggest that the participants think that it would be useful to assess student learning styles, yet the results mentioned in the previous paragraph revealed that few participants indicated that they actually do assess their students' learning styles.

Table 5

Means, Standard Deviations, and Frequencies of Ratings for Learning Styles Scale Items Associated with Awareness of Students' Learning Styles

			Level 1[a]	Level 2[b]	Level 3[c]	Level 4[d]
Learning Styles Scale Item[e]	*M*	*SD*	*Frequency*	*Frequency*	*Frequency*	*Frequency*
1. It is important to know what style of learning each of your students is using.	3.41	.71	0	9	23	38
2. Assessing student learning styles would have little impact on my students.	1.43	.79	50	13	4	3

Note. Negatively worded items are shown in boldface. Missing values were replaced using individual mean substitution, and the frequencies of the values used to replace missing values are not shown on this table.
[a]Level 1 = Not at all true for me
[b]Level 2 = Somewhat true for me
[c]Level 3 = Moderately true for me
[d]Level 4 = Very true for me
[e]Item numbers in this table were modified from their original values in the survey for organizational purposes.

Positive outcomes associated with learning styles. On these items, few participants thought that learning styles are not a good use of their time (see item 1 in Table 6 below), and most participants tended to think that learning styles are part of an effective teaching strategy (item 2). In addition, the participants tended to believe that students are more motivated when the learning environment is consistent with their learning styles (item 3).

Table 6

Means, Standard Deviations, and Frequencies of Ratings for Learning Styles Scale Items Related to the Positive Outcomes Associated with Learning Styles

			Level 1[a]	Level 2[b]	Level 3[c]	Level 4[d]
Learning Styles Scale Item[e]	*M*	*SD*	*Frequency*	*Frequency*	*Frequency*	*Frequency*
1. I don't think learning styles are a good use of my time as a teacher.	1.37	.78	53	12	1	4
2. Learning styles are part of an effective teaching strategy.	3.40	.69	1	5	29	35
3. Students are more motivated when they can learn in an environment that matches their learning styles.	3.23	.71	1	8	34	26

Note. Negatively worded items are shown in boldface. Missing values were replaced using individual mean substitution, and the frequencies of the values used to replace missing values are not shown on this table.

[a]Level 1 = Not at all true for me

[b]Level 2 = Somewhat true for me

[c]Level 3 = Moderately true for me

[d]Level 4 = Very true for me

[e]Item numbers in this table were modified from their original values in the survey for organizational purposes.

Sensory or environmental factors. The participants' ratings of these items revealed that they tended to think that instruction should match the auditory, visual, or kinesthetic styles of students (see item 1 in Table 7 below), and the participants expressed various levels of support for the belief that student preferences for lighting or room arrangement influences student learning (item 2).

Table 7

Means, Standard Deviations, and Frequencies of Ratings for Learning Styles Scale Items Associated with Sensory or Environmental Factors

			Level 1[a]	Level 2[b]	Level 3[c]	Level 4[d]
Learning Styles Scale Item[e]	*M*	*SD*	*Frequency*	*Frequency*	*Frequency*	*Frequency*
1. Instruction should match the auditory, visual, or kinesthetic style of a student.	3.19	.75	2	8	35	25
2. Matching student preferences for factors such as lighting or room arrangement influences student learning.	2.84	.96	5	23	20	22

Note. Missing values were replaced using individual mean substitution, and the frequencies of the values used to replace missing values are not shown on this table.
[a]Level 1 = Not at all true for me
[b]Level 2 = Somewhat true for me
[c]Level 3 = Moderately true for me
[d]Level 4 = Very true for me
[e]Item numbers in this table were modified from their original values in the survey for organizational purposes.

Informing students about learning styles. On these items, the participants typically thought it was beneficial to inform students about their learning styles (see item 2in Table 8 below), and they tended to not support the idea that it can be harmful to inform students about their learning styles (item 1).

Table 8

Means, Standard Deviations, and Frequencies of Ratings for Learning Styles Scale Items Associated with Informing Students about Learning Styles

			Level 1[a]	Level 2[b]	Level 3[c]	Level 4[d]
Learning Styles Scale Item[e]	*M*	*SD*	*Frequency*	*Frequency*	*Frequency*	*Frequency*
1. Informing students about their learning styles can be harmful by leading students to believe that they are only capable of learning information that is presented in a manner that is consistent with their learning styles.	1.75	1.05	40	14	7	8
2. Students benefit from knowing what their learning styles are because they can eventually learn to study in ways match their learning styles.	2.85	.88	5	17	30	17

Note. Negatively worded items are shown in boldface. Missing values were replaced using individual mean substitution, and the frequencies of the values used to replace missing values are not shown on this table.
[a]Level 1 = Not at all true for me
[b]Level 2 = Somewhat true for me
[c]Level 3 = Moderately true for me
[d]Level 4 = Very true for me
[e]Item numbers in this table were modified from their original values in the survey for organizational purposes.

Matching learning styles and instruction. On these items, the majority of participants expressed high or moderate levels of support for the idea that matching instruction to student learning styles has a positive impact on learning (see item 1 in Table 9 below), retention of information (item 2), and student achievement (item 3).

Table 9

Means, Standard Deviations, and Frequencies of Ratings for Learning Styles Scale Items Associated with Matching Learning Styles and Instruction

			Level 1[a]	Level 2[b]	Level 3[c]	Level 4[d]
Learning Styles Scale Item[e]	*M*	*SD*	*Frequency*	*Frequency*	*Frequency*	*Frequency*
1. Students learn best when taught in a manner consistent with their learning styles.	3.54	.67	1	4	21	44
2. Students' retain information better when the teaching they experience matches their learning styles.	3.37	.62	1	2	37	30
3. Matching teaching methods with student learning styles is not likely to have much influence on student achievement.	1.33	.68	52	13	2	2

Note. Negatively worded items are shown in boldface. Missing values were replaced using individual mean substitution, and the frequencies of the values used to replace missing values are not shown on this table.
[a]Level 1 = Not at all true for me
[b]Level 2 = Somewhat true for me
[c]Level 3 = Moderately true for me
[d]Level 4 = Very true for me
[e]Item numbers in this table were modified from their original values in the survey for organizational purposes.

Students' ability to learn information in various ways. Overall, these responses revealed that most of the participants believe that students are capable of learning in different ways (see item 2 in Table 10 below), and it is important to present information in a way that matches student learning styles (item 3). In addition, most participants thought that "teaching" should not match student learning styles because a variety of types of instruction should be provided to all students instead (item 1).

Table 10

Means, Standard Deviations, and Frequencies of Ratings for Learning Styles Scale Items Associated with Students' Ability to Learn Information in Various Ways

			Level 1[a]	Level 2[b]	Level 3[c]	Level 4[d]
Learning Styles Scale Item[e]	*M*	*SD*	*Frequency*	*Frequency*	*Frequency*	*Frequency*
1. Instead of matching teaching with learning styles, a variety of different teaching methods should be used with all students.	3.31	.97	0	7	22	38
2. Students with all kinds of learning styles are capable of learning when material is represented in a variety of ways.	3.57	.63	1	2	23	44
3. It is not important to present information in a way that matches students' learning styles because students are capable of learning in many different ways.	1.80	.83	29	29	9	3

Note. Negatively worded items are shown in boldface. Missing values were replaced using individual mean substitution, and the frequencies of the values used to replace missing values are not shown on this table.

[a]Level 1 = Not at all true for me

[b]Level 2 = Somewhat true for me

[c]Level 3 = Moderately true for me
[d]Level 4 = Very true for me
[e]Item numbers in this table were modified from their original values in the survey for organizational purposes.

The practicality of applying learning styles to instruction. The participants expressed varying levels of support for the belief that it is not difficult to provide instruction that matches student learning styles (see items 2 and 3 in Table 11 below). In addition, the participants typically did not support the notion that that it is impractical or time consuming to assess their students' learning styles (items 1 and 4). It is surprising that the participants responded this way to items 1 and 4 when most participants indicated that they did not assess learning styles.

Table 11

Means, Standard Deviations, and Frequencies of Ratings for Learning Styles Scale Items Associated with the Practicality of Applying Learning Styles to Instruction

			Level 1[a]	Level 2[b]	Level 3[c]	Level 4[d]
Learning Styles Scale Item[e]	*M*	*SD*	*Frequency*	*Frequency*	*Frequency*	*Frequency*
1. I usually do not have enough time to accurately identify my students' learning styles.	2.06	.96	23	27	13	7
2. I do not know any practical ways to assess my students' learning styles.	1.73	.87	34	25	7	4
3. It would require too much work to match student learning styles to specific kinds of	1.68	.88	36	24	4	5

instruction.						
4. It is usually easy to teach in way that caters to all of my students' learning styles.	2.84	.88	7	12	36	15

Note. Negatively worded items are shown in boldface. Missing values were replaced using individual mean substitution, and the frequencies of the values used to replace missing values are not shown on this table.
[a]Level 1 = Not at all true for me
[b]Level 2 = Somewhat true for me
[c]Level 3 = Moderately true for me
[d]Level 4 = Very true for me
[e]Item numbers in this table were modified from their original values in the survey for organizational purposes.

Comparing learning styles to other factors that influence instruction. The participants displayed little to no support for the notion that prior knowledge is more useful than awareness of students' learning styles (see item 5 in Table 12 below), and they expressed various levels of support for the notion that an effective teacher can get students to achieve regardless of learning styles (item 2). The participants expressed varying levels of support for the notion that student interest is more important than learning styles (item 4), and they tended to express low levels of support for the belief that achievement depends more on motivation than learning styles (item 1). Finally, they tended to not believe that intelligence has a greater impact on academic achievement than learning styles.

Table 12

Means, Standard Deviations, and Frequencies of Ratings for Learning Styles Scale Items Associated with Comparing Learning Styles to Other Factors that Influence Instruction

			Level 1[a]	Level 2[b]	Level 3[c]	Level 4[d]
Learning Styles Scale Item[e]	*M*	*SD*	*Frequency*	*Frequency*	*Frequency*	*Frequency*
1. The academic achievement of students depends more on motivating students than on matching teaching and learning styles.	2.69	.83	3	29	25	13
2. An effective teacher can get students to achieve regardless of learning styles.	2.80	.93	6	20	26	18
3. The intelligence of students has a greater impact on their academic achievement than learning styles.	2.37	.83	10	28	25	5
4. If a lesson is presented in a way that is interesting to students, they will learn regardless of their learning styles.	2.84	.79	3	19	34	14
5. What students already know about a topic is a better guide to effective instruction than knowing their learning style.	2.33	.86	11	32	20	7

Note. Negatively worded items are shown in boldface. Missing values were replaced using individual mean substitution, and the frequencies of the values used to replace missing values are not shown on this table.

[a]Level 1 = Not at all true for me

[b]Level 2 = Somewhat true for me

[c]Level 3 = Moderately true for me

[d]Level 4 = Very true for me

[e]Item numbers in this table were modified from their original values in the survey for organizational purposes.

Correlations among Beliefs in Learning Styles, Teachers' Sense of Efficacy and Self-Theories of Intelligence

Pearson Correlations were used to examine the relationships among beliefs in learning styles, teachers' sense of efficacy and self-theories of intelligence (refer to Table 13 below). Beliefs in learning styles were measured using the sum of scores from all items on the learning styles scale, and high scores on this scale correspond to strong beliefs that favor the learning styles hypothesis developed by Pasher et al. (2009). Teachers' sense of efficacy was measured using the sum of scores from all items on the Teachers' Sense of Efficacy Scale (modified version), and high scores on this scale correspond to high levels of teachers' sense of efficacy. Self-theories of intelligence were measured using the sum of item 2 and item 3 from the self-theories of intelligence scale (item 2 was negatively scored and was recoded in order to be consistent with positively scored items). On this scale, higher scores represented incremental theories and lower scores represented trait theories. The correlation between incremental self-theories of intelligence and teachers' sense of efficacy was statistically significant. This suggests that teachers with more incremental self-theories of intelligence are likely to have higher levels of teachers' sense of efficacy (see Table 13). The correlation between beliefs in learning styles and teachers' sense of efficacy was statistically significant. This suggests that teachers with strong beliefs in learning styles are likely to have higher levels of teachers' sense of efficacy. Beliefs in learning styles scores did not reveal significant variations related to incremental self-theories of intelligence scores.

Table 13

Summary of Intercorrelations, Means, and Standard Deviations for Belief in Learning Styles, Teachers' Sense of Efficacy, and Incremental Self-Theories of Intelligence

Measure	1[a]	2[b]	3[c]	*M*	*SD*
1. Beliefs in learning styles	1	-	-	87.5	13.86
2. Teachers' sense of efficacy	.23*	1	-	66.3	6.07
3. Incremental self-theories of intelligence	.03	.38**	1	1.48	.79

Note. Beliefs in learning styles were measure using the Learning Styles Scale. Teachers' sense of efficacy was measured using the Teachers' Sense of Efficacy Scale. Incremental self-theories of intelligence were measured using two items from the Self-Theories of Intelligence Scale.
[a]Beliefs in learning styles
[b]Teachers' sense of efficacy
[c]Incremental self-theories of intelligence
*Statistically significant at the .05 level (P=.05).
**Statistically significant at the .01 level (p=.01).

The means and standard deviations of the total scores for each scale were also calculated (see Table 13 above). For the Learning Styles Scale, the mean was 87.5 with 30 being the lowest possible score and 120 being the highest possible score. This data indicates that the majority of teachers believed instruction should match learning styles. For the Teachers' Sense of Efficacy Scale, the mean was 66.3 with 80 being the highest possible score and 16 being the lowest possible score. This data indicates the majority of participants rated their sense of efficacy as fairly high. On the Self-Theories of Intelligence Scale, the mean was 1.48 with 2 being the highest possible score and 0 being the lowest possible score. This indicates that the majority of participants reported incremental theories of intelligence, but there was a fairly large amount of variance among these scores. The frequencies of the sum of scores for the self-theories of intelligence scale were also calculated (see Table 14 below). These data suggest that

most of the participants had incremental self-theories while only a small portion of participants had trait self-theories. These data suggest that participants with a total score of one either possess a moderate incremental self-theory or a moderate trait self-theory.

Table 14

Frequencies and Percentages of Total Scores for Items 2 and 3 of the Self-Theories of Intelligence Scale

Total Scores	*Frequency*	*Percentage*
Missing Data[a]	5	7.1
0	12	17.1
1	10	14.3
2	43	61.4

[a]Missing data includes all surveys in which at least one of the two items was not completed.

Open-Ended Survey Item Results

The results of the open-ended survey items are discussed by item. Themes for each item were organized by categories which were based on the objectives of this study, and themes were also organized into major and minor categories (see Method section).

Item one. The first open-ended item asked participants to "Think of a time when you applied what you know about learning styles to your teaching, and tell me about this experience." Fifty-eight of the 70 survey participants responded to this question.

Perspectives on applying learning styles to teaching. *Major themes.* The participants discussed various themes related to applying learning styles to their teaching. Ten participants provided responses that indicated that they use visual, auditory, and

kinesthetic sensory modalities when teaching their students. One participant specifically stated "Most of my reading lessons incorporate multi-sensory activities which meet the needs of visual, auditory, & kinesthetic." In addition, 15 participants mentioned using various combinations of activities or "styles" to teach students in a way that matches their learning styles. The following are examples of some of the activities and styles the participants reported using: music, art, visual, auditory, cooperative learning, tactile, kinesthetic, and other various activities. One participant mentioned "I use most learning styles in most lessons most of the time. We do some parts alone, turn & talk to cooperative partner, we sing, we move, we apply to real world." The use of "kinesthetic" or "hands-on" instruction without mention of any other sensory modalities was a theme that was expressed by eight participants. For example, one participant reported "Whenever I intro new vocab [*sic*] w/ gestures (before a definition) they notice the word much more readily when they come to it in the text."

The participants also mentioned various methods of structuring classes and lessons to incorporate student learning styles. Six participants stated that they have placed students into groups based on their learning styles. Four participants stated they provided centers that each involved an activity that focused on one particular learning style. Ten of the participants discussed providing whole group instruction that incorporated multiple learning styles into single lessons.

Six participants indicated that they used learning styles to help students who are struggling academically or who are identified for special education. One participant specifically stated "I integrated learning styles into my math lessons especially to meet

the needs of some students who were mainstreamed - groups of 3 (V, A, K) - effective." Five participants discussed providing cooperative learning experiences while discussing learning styles. Another participant stated "I placed one child from each learning style in a group and had them work together. It was wonderful. I was able to see how they all worked together and they all were able to participate in a way they were successful."

*Minor Themes***.** Two participants indicated that they assessed the learning styles of their students. One participant responded "I gave each child and parent a survey with many questions about learning styles. Almost all came back kinesthetic learners." One participant mentioned "Due to the nature of my EC students with autism - every individual lesson presented to each student - hour by hour - is individualized." Another participant discussed providing lessons that allowed student to choose which learning style to use. In contrast to all other statements, one participant commented "I do not use learning styles to teach my students."

Four of the participants discussed issues related to applying learning styles to teaching. Three of the participants discussed challenging behaviors that make it difficult to teach using various learning styles, and one participant described lessons that provided a choice of learning styles as "very time consuming."

Perspectives on the effects of applying learning styles to their teaching. *Major themes.* In response to item one, many of the participants expressed beliefs related to the effects of applying learning styles to instruction. Eight participants expressed the general belief that learning styles are beneficial, and six participants expressed the belief that

applying learning styles to instruction can lead to improved learning outcomes such as greater retention of information or a greater understanding of the material.

Minor Themes. Other themes included beliefs that learning styles can increase the following for students: time on task, interest, focus, motivation, creativity, comfort, and mathematics performance. In addition, one participant mentioned that learning styles helps students "discover hidden skills." In contrast, one participant stated "I honestly did not see a difference" after describing a time when students were grouped by learning styles.

Item two. The second open-ended item asked participants to "Think of a time when you encountered challenges that prevented you from applying what you know about learning styles to your teaching, and tell me what you can about this experience." Forty-eight of the 70 survey participants responded to this question.

Perspectives on issues with learning styles. *Major Themes*. The belief that it is time consuming or impractical to provide instruction that uses learning styles was shared by 21 of the participants. For instance, one participant stated "When there are 24 individuals in a room, it is impossible to teach each lesson with each individual learning style in mind." Four participants indicated that it was challenging to provide activities that cater to various learning styles because of limited funding for supplies. Eleven of the participants discussed challenging behaviors that make it difficult to teach using various learning styles. Some of these participants also mentioned that student behavior can be difficult to manage when students are participating in kinesthetic learning activities. One participant elaborates:

> There have been times when student behavior prevented me from doing activities with my class that would allow different learning styles to be realized. The students were not able to handle the interaction with others or chose to use manipulatives as toys instead of tools.

The belief that preparing for end of grade (EOG) tests make it challenging to provide teaching that incorporates learning styles was expressed by five participants. One participant commented "Often students are assessed by using paper/pencil (EOG) therefore preparing for that does not allow for as much teaching per learning styles." Similarly, four other participants also expressed the belief that it can be challenging to teach students using traditional "paper and pencil" activities because the students need to learn by using their various learning styles.

Minor Themes. The participants also described other various experiences or beliefs that made it challenging to apply learning styles to their teaching. These experiences include the following: not being able to "find a learning style" for certain students, working with English language learner students, and co-teaching in inclusion settings. One participant stated the belief that it is challenging to teach to all learning styles, and another stated that "Some things or processes just have to be learned/memorized."

Themes that involve providing learning styles instruction and the effects of this were also revealed in the responses to this question. Some participants described the following themes related to providing instruction that incorporates learning styles: grouping students by learning styles, providing multisensory instruction, and providing

visual, auditory, and kinesthetic instruction. The belief that learning styles increase student comfort was expressed. However, one participant indicated she "did not see a difference."

Item three. The third open-ended item asked participants "Have you attended any training or professional development sessions within the past year that focused primarily on learning styles? If so, briefly summarize what stood out to you about the session(s)." Fifty-six of the 70 survey participants responded to this question.

Perspectives on training/professional development involving learning styles.

Major Themes. Twenty-five of the 56 participants who completed this item, provided "no" or "N/A," and this indicated that many participants had not received any recent professional development or training that focused primarily on learning styles. In addition, twelve teachers indicated that they have not had any professional development or training experiences recently, but they have in years past.

Seven teachers mentioned that learning styles were discussed during recent workshops or training sessions they attended, but it was not the primary focus of the workshop. For instance, one teacher stated "No recent sessions particular to learning styles, however formative assessment training touches on learning styles when you are thinking of [*sic*] best ways to assess achievement." The following are the names of workshops and training sessions which teachers attended that focused on learning styles: "Math Partners," "Howard Gardner," "Intel Teach Technology," "Love & Logic," and "differentiation workshop." Four teachers stated that they attended informal training sessions led by fellow school staff that discussed learning styles.

Five teachers stated that they attended professional development sessions presented by Rick Welsh. One teacher who indicated that she attended a Rick Welsh session mentioned that the "importance of groups of 3 & varying "jobs/tasks" in lessons with group work" stood out to her.

Minor Themes. Some of the teachers discussed what stood out to them about training or professional development sessions, and these comments were typically consistent with the themes discussed during the other open-ended survey items. The following themes were each expressed by two participants: grouping students by learning styles, modifying seating arrangements based on student learning styles, and providing whole group instruction that matched student learning styles. In addition, two participants commented that they learned how to make activities "engaging" by integrating learning styles, and one mentioned learning styles can "make math fun." One participant expressed support for professional development that focuses on learning styles by providing the response "we need more of this." Another teacher reported that she learned about learning styles in college. One teacher reported that she attended two recent workshops that did not focus on specifically on learning styles, yet she stated they "Both discussed the <u>new</u> news that that "scientists" are saying "learning styles" is <u>not</u> a <u>real</u> phenomenon - ☹."

Item four. The fourth open-ended item asked participants to respond the question "Have you experienced a time when a student's academic performance was influenced by his/her learning style? If so, please describe this experience." Twenty of the 70 survey participants responded to this question, and seven of those responses were "no" or "N/A."

Overall, most of the themes expressed in the responses to this question were consistent with themes expressed in the responses to the first three questions.

Perspectives on applying learning styles to teaching. *Major themes.* Providing multisensory instruction was discussed by eight participants, and three participants expressed the theme that they provide instruction that incorporates multiple learning styles. Five participants mentioned the use of kinesthetic or hands-on instruction. Six participants discussed providing instruction that incorporated learning styles to students who were struggling or were identified for special education.

Minor Themes. Other methods of applying learning styles to instruction mentioned in the responses to this question included the following: activities that involve smell and taste, activities that involve technology, lessons that offer a choice of activities that use various, and "figuring out student learning styles." One participant mentioned "I have a student that is 100% visual 0% auditory. I have to make sure all directions are written out otherwise she struggles to be successful." Another participant specifically discussed her beliefs related to assessing and providing instruction based on learning styles. She reported:

> I don't actually spend too much time getting to know or assessing my 1st graders' learning styles. While I think they're important & will influence their success in education, I try to instruct using a variety of learning styles. Every lesson in my class usually has an auditory, visual, & extremely kinesthetic (hands-on) aspect to it. My philosophy is that exposing children to so many ways of learning will help them learn & comprehend.

Teachers' perspectives on the effects of applying learning styles to their teaching. *Major Themes.* When responding to item four, the participants expressed multiple themes that were expressed in the first three open-ended items. The general belief that providing instruction that involves learning styles is an effective strategy was expressed by 11 participants. Five participants expressed the belief that instruction that involved learning styles was beneficial when teaching math. Three of the participants also discussed the belief that learning styles influence academics because some students do not do well with traditional pencil and paper activities and tests. One participant stated "The EOGs are a perfect example. Most of my kids are poor test takers & do not do well with pencil/paper activities. They are hands on. My students struggle with EOGs."

Minor Themes. Various participants expressed beliefs that learning styles improved the following: student interest, enjoyment, mathematics performance, comfort, and attitudes. A participant stated that using various learning styles helped English language learner students learn English. Another participant discussed allowing a student to participate using various learning styles. She commented "I understood his intelligence might be hidden in his learning disability, and was better able to determine his achievement level." Two participants indicated that they had not observed a time when the academic performance of their students was influenced by their learning styles, but they indicated that they "hope to see it soon."

Two participants doubted the effectiveness of learning styles. One participant expressed the belief that students "learn in more than one way," and another participant

expressed skepticism that learning styles influence academic achievement. "I can't say for sure that the way I presented the material was the reason that the student's performance was high."

Summary of open-ended survey items. Overall, the survey participants' responses to these items revealed several prominent themes which are described in this paragraph. Many participants indicated that they provided multisensory instruction which included VAK sensory modalities and other participants discussed providing multisensory instruction that included a variety of sensory modalities. Many participants expressed the belief that they provide whole group instruction that caters to various learning styles, yet some participants grouped students by learning styles. Some participants described the use of learning centers that incorporate various learning styles. Many participants expressed the general belief that matching instruction to student learning styles is related to various positive outcomes including, but not limited to, the following: greater retention of information, greater levels of student success, and higher levels of student enjoyment. Many participants discussed attending training or professional development sessions that discussed learning styles as a primary focus or as a related topic during their careers as teachers, but few described recent training experiences that focused primarily on learning styles. The following issues related to learning styles were also expressed: limited time to provide instruction that matches learning styles, increased behavior problems during lessons that incorporate various learning styles, and limited funding to provide lessons that incorporate various learning styles.

Focus Group Results

As mentioned previously, a focus group interview was conducted for each of the three concepts that were investigated during this study. Participants for each group are referred to by their assigned identification code in this report. Each identification code consisted of a letter that represented each focus group (I represented the self-theories of intelligence group, T represented the teachers' sense of efficacy group, and L represented the learning styles focus group). Each identification code also contains a number that was assigned to each participant based on the order in which he or she arrived to each focus group. For instance, participant T1 was a participant in the teachers' sense of efficacy focus group and she was the first participant to arrive to the discussion.

Self-theories of intelligence focus group. In order for participants to discuss intelligence from their perspectives, the first question asked participants to describe individuals who they felt were highly intelligent. After this discussion took place, the participants were asked if they had experienced a time when an individual's intelligence had changed, and various probes were used to elicit more information from their responses (see Focus Group Procedure section for a full list of questions and probes). The characteristics of the participants for this focus group are provided below in Table 15.

Table 15

Self-Theories of Intelligence Focus Group Participant Characteristics

Participant	Sex	Grade/Subject Taught	Experience[a]
I1	F	2nd	5
I2	F	2nd	3
I3	F	5th	23
I4	F	3rd	15
I5	F	AIG	32

Note. Codes were used in place of participant names. An explanation of the codes used can be found under the Focus Group Results heading.
[a]Experience refers to years of experience teaching.

Teachers' perspectives on intelligence. *Major themes.* When asked to describe a person who is very intelligent, the five teachers described many different people with a variety of characteristics. However, they all expressed the theme that they were not sure about "what intelligence is." Participant I4 specifically stated "It is hard to know what intelligence is," and Participant I5 commented "The longer I teach, the less I know about intelligence."

Despite their overall uncertainty about intelligence, the five teachers all described some characteristics of intelligent people that were similar. The five teachers all described intelligent people as being highly knowledgeable. When Participant I3 described an intelligent person she commented "You could sit down and really talk to him about anything." All of the teachers described individuals who were highly motivated by various interests. Participant I2 commented "Whatever interest them can motivate them to learn more about that."

All of the participants discussed whether highly intelligent people are "well rounded" or if highly intelligent people can be intelligent in "different ways." Participants I1, I2, I4, and I5 all expressed the belief that people can be intelligent in different ways. These participants indicated that people can possess various "areas" of intelligence or "ways" of being intelligent such as "socially," "doing things hands-on," "teaching," "electrical work," and "musically." Participant I5 used the term "multiple intelligence" to describe this belief. She commented "and multiple intelligence is, you know. I have seen people who are extremely intelligent in as you say 'electricity.'" In contrast, Participant I3 described highly intelligent individuals as "well-rounded." She specifically described her father:

> To me he was well-rounded. He could talk to people, and it did not matter their level in society. He could talk to the poorest of the poor or the rich. I am not saying that he knew about physics and everything to the T, but he knew a lot about a lot of different things.

Minor themes. Other traits of highly intelligent people were discussed. Three of the teachers described intelligent people as lacking social skills and common sense. Participant I1 described her highly intelligent students as "those odd ball kids that don't have many friends," and I5 described a highly intelligent person who was "so out of the norm of normal society." Participants I1, I2, and I5 articulated the theme that highly intelligent individuals "have a different outlook on things." For instance, Participant I1 stated, "He is the kind of person who knows something about everything and makes

everybody think about other things in other ways." Participant I5 expressed the belief that "creative energy drives them [intelligent people]."

Teachers' perspectives on the stability of intelligence. *Major themes.* When asked to describe an instance when a students' intelligence changed, the teachers all discussed instances when a students' academic performance changes. However, the five participants expressed uncertainty that change in academic performance is not indicative of change in intelligence.

While discussing whether or not intelligence can change, all of the teachers were in agreement that it is hard to determine if intelligence changes because they were not able to define intelligence. Participant I2 specifically stated "I would need a good definition to really know."

While discussing the stability of intelligence, participants I1 and I2 agreed with I4 when she specifically stated "I think that if you've got it, you've got it. And if you don't, you don't." In addition, Participant I2 expressed the following belief: "I think if they have true intelligence it doesn't level off. That is my opinion. If they have true intelligence, they have that drive." When asked if to describe a student whose intelligence did not change, Participants I2, I1, and I4 agreed that the majority of students, as Participant I4 commented "stay right there on the average plane," and do not experience a change in intelligence.

The teachers were also in consensus that many parents mistakenly believe their children are highly intelligent as they begin elementary school. The participants expressed the belief that this occurs because some students have advanced academic

abilities when they begin elementary school, but other students who had less academic exposure before they begin school often make greater academic gains as they progress through school because they are more intelligent. Participant I2 stated:

> There is [*sic*] those kids who are in first grade and are above average, but their parents think that they are great like I3 was saying, but at some point in time they just turn into the average kid. Whereas, there are some that still succeed or always above and striving and have that desire to learn.

While discussing times when they realized that a student's academic performance changed, the participants all stated that they are not sure if intelligence changed or if their performance was influenced by various factors. The following reasons why students might be motivated to work hard and improve their performance were provided by various participants: connecting with the teacher, peer influences, desire to go to college, career goals, finding a "nitch [*sic*] that they love that just inspires them," and home life. Participant I3 provided the following comment after other participants discussed situations when intelligence might increase:

> but do we consider that as their intelligence improving? It is not that their intelligence is improving, but they are performing better. It doesn't really mean that their performance is getting any better or worse. It seems like the only way you would know that is if you took an IQ test, and then you would be able to tell if their actual IQ is going up. But otherwise, it is really all you are doing is just basing it on how they perform. And that would be based on lots of things like you said. What's going on at home? Do they connect well with the teacher? Who

> they sit next to in class? So I don't think we can say because they did poor one year, that they did better, we can say they improved their intelligence.

Minor Theme. Participant I5 expressed the idea that students may be able to "mold" intelligence. She commented:

> I have seen a few people I think. I mean I don't really know what has happened, but it is almost as if something was a catalyst. As I am saying with these kids that didn't excel in elementary school at the level that I think they could, but something triggers them to all of the sudden take off, and they may have gaps in their learning because they did not always apply themselves to schooling, but they pick up education. I don't know how to say it. They catch up so quickly and become national merit scholars and they are at the top fifteen percent at the scholar's luncheon at the end of the year and that sort of thing. So I don't know, did they gain intelligence or did they just mold their intelligence? I don't know what the answer is.

Self-theories of intelligence focus group summary. The participants held a variety of beliefs related to the nature of intelligence and the stability of intelligence. Three participants seemed to favor trait theories, while two participants indicated that they were not sure. The participants were also unsure if changing levels of academic performance corresponded with changing levels of intelligence.

Teachers' sense of efficacy focus group. In order to get participants to discuss teachers' sense of efficacy (i.e. the extent that they believe they have the capacity to achieve success in various teaching tasks) from their perspectives, the participants were

asked to describe experiences when they felt that they were successful when working with students. In addition, the participants were asked to discuss times when they felt limited in their ability to help students (see Focus Group Procedure section for a full list of questions and probes). The categories of themes are organized by major and minor categories (see Focus Group Procedure for more information). Characteristics of the participants for this focus group are provided below in Table 16.

Table 16

Teachers' Sense of Efficacy Focus Group Participant Characteristics

Participant	Sex	Grade Taught/Position	Experience[a]
T1	F	Tutor	35
T2	F	Tutor	28
T3	F	Tutor	6
T4	F	2nd	22
T5	M	Tutor	33

Note. Codes were used in place of participant names. An explanation of the codes used can be found under the Focus Group Results heading.
[a]Years of experience teaching.

Major categories of teachers' sense of efficacy. *Uncertainty of influence while teaching.* The five participants discussed many different examples of times they were able to influence students, yet they expressed the theme that they were not always exactly sure of the specific ways they influenced students during the times when they were teaching them. Participant T3 commented that "you never know when what you say is going to make an impact."

Teacher/student relationships. The five participants mentioned that they were able to help students by forming positive teacher-student relationships. They all discussed instances when teachers are the one person who cares for students, believes in students, and is consistently there for students. While describing a student he felt he made a difference with a student, Participant T5 mentioned "the last letter I got from him talking about how I always believed in him, and that was one of the things that kept him hopeful that he was going to turn his life around." Participants T2 and T3 expressed the belief that teachers must have boundaries with your students in order to maintain effective teacher/student relationships. Participant T2 elaborates:

> I'll never forget what they said when I first began teaching was, "you never smile until after thanksgiving." And this was true! If they thought you were going to be their buddy, you lost them at the get go.

All five of the participants agreed that it is difficult to help students with social or emotional issues because they believe that teachers are expected to focus primarily on academics. Participant T5 elaborated, "Can you imagine being a second grader and watching your father shoot and kill your mother? That happened! And you talk about concentrating on long division or whatever?"

In addition, Participants T2, T3, and T5 expressed the idea that teachers must understand their limitations in their roles as teachers because teachers who try to do too much burn out. As a result, these teachers believe there are times when they cannot do everything they would like to do to help struggling students. Participant T5 elaborates:

> And when they have students who are being abused at home or whatever it might be they just don't really, they can't absorb the limits that they can effect change so it drives them crazy, and they just can't take that, and they say, "and I have to go into some other line of work."

Behavior management. All five participants expressed the theme that they can help students improve their behavior, and they all described at least one instance when they had a positive influence on a student with behavioral or emotional issues. Participant T2 commented that one of her students "turned around" during her time teaching him. The participants believed they were able to manage behavior by using the following methods: providing a safe environment, providing structure and organization, and maintaining appropriate boundaries with students.

Although the participants expressed the belief that they can help students improve their behavior, they all agreed that there are some times when they can do very little to help some students with severe behavior problems because their behavior is interfering with the rest of the class. Participant T3 specifically discussed a recent situation she dealt with while tutoring:

> Finally today, it just went too far, and I felt like things were inappropriate and the other kids were looking at me like "We're doing what we are supposed to do." And I felt like it was time, and nothing I was going do to was going to change the situation, but I did send him back to his classroom teacher, but I did not feel very effective, but I was able to salvage that time for four other children, and that way I felt like it was the right decision.

The teachers also felt limited in their ability to manage behavior because they believe teachers are expected to focus primarily on academics. Participants T5 expressed the belief that "You can't change home," and participant T3 agreed "We don't know what the family life of a child is like, they might have so much going on at home that no matter what we do we are not going to impact them for one reason or another."

Influencing student/student relationships. When asked to describe the influence they have on relationships among students, the teachers expressed the belief that there is little they can do to influence relationships among students. Participant T5 commented:

> I am sure all of us had situations when you had bad combinations just as you are describing, and there is not a whole lot you can do to legislate that except physically put them in different parts of the room, but you try to the next year have them placed in different classes so hopefully that will slow down that relationship a little if you can, but it is hard to do.

They also agreed that it becomes increasingly difficult to influence relationships among students as they age because they believe that older students need more approval from their peers, and Participant T5 commented "the older ones don't need as much approval from their teachers."

Minor categories of teachers' sense of efficacy. *Instructional Strategies.* Different viewpoints concerning the use of learning styles to improve were expressed by participants. Participants T2 and T5 expressed the belief that figuring out "how your learner learns" and providing instruction that is auditory or hands-on in order to match

the "learning ways" of students is an effective teaching strategy for struggling students. Participant T2 commented:

> I think these teachers at _____ [this elementary school] are very good that because they will give you all different types to hit all different learners because you will have some types that only do it auditory, and you will have some that can only do it through hands on, and I think if you can figure out what your learner learns or how your learner learns. I think that's a step in the right direction as far as being effective to that particular student, but you know you've got to find that.

In response to this statement, Participant T4 expressed concern that "when they go the work force they will say, 'Oh, you're an auditory learner so I am going to make sure that all of your directions I am going to tell you.'" Participant T5 replied, "Yeah, but our hope is that by the time they are 22 or whatever they will have learned to cope and adapt to those things."

Student Engagement. When asked to describe a time when they were able to get through to a difficult student, participants T4 and T5 expressed the belief that they could help students become more interested in school by teaching material in a way that engages students. Participant T4 described a time when she helped a student who was not interested by relating all of her lessons to pirates, which that student enjoyed, and she stated "that one particular incident engaged that kid and hooked him, and he has been a different kid ever since."

In contrast, the participants also discussed limitations in their capacity to engage students. When asked to discuss times when they felt they made little progress despite

their best efforts, Participant T1 expressed the concern that "I think the curriculum needs to be so that kids related to it, but every child is different and that is hard to do." Participants T3 and T5 also agreed with this concern.

Working with low performing or students with special needs. Participants T5 and T2 expressed the belief that they could help students with below average intellectual abilities improve their academic performance. Participant T5 commented "as long as the behavior is okay, I figure the more times they have something repeated, not just with me, but the next year and the next year, you never know when the light bulb is going to light." Participant T2 agreed with this statement.

Teachers' sense of efficacy focus group summary. In general, the participants believed that they had experiences when they felt successful as teachers in the following ways: fostering positive teacher/student relationships, managing behavior, providing instructional strategies like learning styles, and engaging students. They also reported that they had experienced other ways in which they were successful as teachers, but they repeatedly expressed the theme that "you never know" when you might be making a difference with a student. The participants indicated that they felt less successful when attempting to influence relationships among students as well as certain behavior problems.

Learning styles focus group. Participants of this group were asked to discuss times when they applied what they know about learning styles to their class. They were asked to discuss times when they were aware of a student's learning styles and they were also asked to discuss times when it was challenging to teach in a way that includes

learning styles (see Focus Group Procedure section for a full list of questions and probes). The characteristics of the participants for this focus group are provided below in Table 17.

Table 17

Learning Styles Focus Group Participant Characteristics

Participant	Sex	Grade/Position	Experience[a]
L1	F	2nd	4
L2	F	1st	<1
L3	F	K	9
L4	F	5th	27
L5	F	Interim (4th)	4

Note. Codes were used in place of participant names. An explanation of the codes used can be found under the Focus Group Results heading.
[a]Years of experience teaching.

Perspectives on considering student learning styles while teaching. *Major themes.* When asked to describe a time when they thought about the learning styles of their students when they prepared for their classes, the five participants all provided examples of times they presented information using various sensory modalities so that all students were able to learn the material in a manner that was consistent with their learning styles. Participant L1 stated "Especially with math, your little kids need that. They need to see it, they need to touch it, they need to understand it, and I think you are trying to hit them with as many learning styles as possible."

Minor themes. While discussing multisensory instruction, participant L3 specifically referenced visual, auditory, and kinesthetic learning styles. For instance,

Participant L3 discussed a phonics program she used with her kindergarten students, "Zoo Phonics, and that program really hits a lot of them because they are seeing it, hearing it, and they're doing it." In addition, Participants L1, L5, and L3 all expressed the belief that their own learning styles influence their instruction. L3 discussed a workshop she attended where the presenter stated that teachers tend to spend more time teaching in ways that are consistent with their learning styles, and she commented "I'm more visual so I think it was a good point she made to watch so that you don't always have visual, you have those other things." Participant L2 shared that her students "are all getting the same thing" in terms of receiving instruction that matches learning styles. In addition, Participant L2 expressed the belief that it is challenging to provide multisensory instruction while teaching writing.

Teachers' perspectives learning styles assessment. *Major themes.* On the topic of identifying students' learning styles, all of the participants expressed the theme that "as teachers we can figure it out." All of the participants discussed experiences when they were able to recognize student learning styles by noticing how students respond to material when it is presented using various sensory modalities such as visual, auditory, and kinesthetic. Participant L5 commented:

> We are doing two digit-by-two digit multiplication right now and they learn four strategies, two of those strategies are very visual things because they are boxes, they use coloring pencils and it really helped me in that moment, pick out the visual learners because they are the ones who responded the best to it and really loved doing it because they understood the math and my more auditory kids, they are kind of more towards the traditional ways and they are like "I don't want to

> mess with that" because they don't need that, they just do it so I think especially in math when there's such varying strategies and you are using all four of them, you can pick out those kids who are visual, auditory, and all that.

The participants also discussed teaching students about learning styles, and they agreed that it is beneficial to talk to older students about learning styles but not younger students. Participant L4 mentioned:

> I have learned to help kids understand their own learning styles. We'll even talk at the beginning of the year: "Hey, some of you, when you hear me say it, you, it's in there. Some of you need to see it. Some of you need to write it down as I say it," and we talk about their learning needs and their styles and so they understand that we will do the lesson in three ways to reach all of them and we talk about when, if I am trying to write and hear you, then I get lost. So I always tell them to do what's the most comfortable and if there are notes they will be there after the lesson cause [*sic*] right now I want you to attend to what's being taught, and other kids need to write as I'm speaking and others it's in there so it's good to verbalize so that they understand their own strengths too.

Minor Theme. Participant L1 indicated that using a survey to assess the learning styles of second grade students is not effective because her students were too young. Participant L1 commented:

> In the past, I have always tried to use one of the surveys that you give them, that like labels their learning styles and they're just not ready yet in second grade. Maybe they'll get there, but we've tried. We just can't even get through the form.

> You know, they don't even know, understand that part of it, even reading it aloud and everything so I let that go, but I think as teachers we can figure it out.

Perspectives on the effects of considering student learning styles when teaching. *Major Themes.* During the discussion, the participants expressed various beliefs regarding the impact learning styles have on their students. The five participants all agreed that matching instruction to a student's learning style can affect his or her academic performance. Participant L1commented, "Maybe you're not teaching their style enough and that's why they are struggling."

Most of the participants (L1, L2, L4, and L5) expressed a belief that low performing students benefit from receiving multisensory instruction more so than high achieving students. The participants provided examples of how this concept applies to mathematics instruction in particular. Participant L4 commented:

> I've had experiences when we are doing problem solving. Often times, I hate to say, "lower children," but the more methodical, they don't trust themselves so they are more methodical and very dependent on the manipulatives and they will solve the problems accurately. It is in their mind how to figure it out, but they will make a careless mistake.

L4 also mentioned this theme while discussing writing. After describing various multisensory writing strategies such as color coding main ideas and elaborations in student writing assignments, Participant L4 commented "but then some kids, even with all that, struggle to write and others are brilliant writers that don't even need all of the color coding."

Minor Themes. As she discussed reading lessons, Participant L5 expressed the belief that students must have instruction that matches learning or they "aren't going to get anything" from the lesson. In addition, Participant L2 expressed the belief that matching learning styles to instruction has a positive impact on student attention.

Participant L2 discussed teaching math to "low" students, and she stated "if you were to give them something auditory they're lost. I mean, immediately their focus is gone, they are not going to be there. They need their kinesthetic hands on kind of learning." Participants L1, L3 and L4 also discussed experiences when students retained information from lessons that used various learning styles for long periods of time. For instance, after Participant L3 discussed the Zoo Phonics program she used with her kindergarten students, Participant L1indicated that she has taught students who experienced this program in kindergarten, and mentioned that "even in second grade still they remember that."

Perspectives on other individual differences among learners. *Minor Themes.* When asked to describe how they take into consideration other individual differences among students besides learning styles, Participant L3 and Participant L1 discussed the importance of "peer conferencing." Participant L4 expressed the belief that student interest levels are also important when considering individual learner differences. Participant L4 stated "you need to engage their learning to just get them hooked so that they're invested in what they are about to learn too." Lastly, Participant L4 expressed the belief that it is important to consider the prior knowledge of students when teaching.

Summary of learning styles focus group. The beliefs of these participants were consistent with the learning styles hypothesis, and they indicated that they provided whole group instruction that presented information in various ways. The participants believed that it is beneficial to teach older students about learning styles, and they tended to think that learning styles have a positive impact on academic achievement.

Common Themes among Focus Groups

During the teachers' sense of efficacy focus group, Participants T2 and T5 expressed the belief that students who seem to have below average intellectual abilities as a young child are capable of academic success later in life. T5 discussed:

> Many years ago, I had a student, and it felt like you were talking to that bulletin board and, I found out down the pipe, my daughter was in the same year, and I said, "Were you ever in class with this kid, ____ [the student]?" "Oh yeah" And this was like tenth, eleventh grade and I said, "How does he read?" The kid couldn't read anything when I had him in fourth grade, "Oh fine." and you see, you never know at what point, the light bulb lights or they turn around.

This belief is fairly consistent with the themes from the self-theories of intelligence focus group. For example, Participant T5 described examples of students who drastically improved their academic performance, yet he does not specifically state that intelligence changes. This is consistent with comments made by all of the participants in the self-theories of intelligence group who provided many examples of academic improvement, yet they did not indicate that intelligence changed.

Participants T5 and T2 expressed the belief that students benefit from receiving instruction that matches their learning styles which is consistent with the beliefs held by the teachers in the learning styles focus group. However, the belief that teaching students about learning styles may be detrimental as students become adults was expressed by Participant T4 of the teachers' sense of efficacy focus group. This belief is not consistent with the beliefs held by teachers in the learning styles focus group. In addition, the participants of the learning styles focus group and the teachers' sense of efficacy focus group discussed the importance of providing a safe environment for students.

CHAPTER V: DISCUSSION

Overview of Quantitative and Qualitative Findings

In general, the combination of the quantitative and qualitative findings of this study provides a comprehensive examination of teachers' beliefs about the three concepts. The quantitative data from the survey provides insight into the belief systems of the general teacher population. In particular, survey data collected from 70 participants revealed various patterns of belief about learning styles in the participant sample. As a result, one might suspect that teachers in the general population hold similar beliefs about learning styles. The quantitative data also revealed significant correlations between beliefs in learning styles and teachers' sense of efficacy as well as incremental self-theories of intelligence and teachers' sense of efficacy. These correlations are important because one might expect that similar relationships among these concepts might exist among the general population of teachers.

The qualitative data collected through focus groups and open-ended survey items is essential to this study because it provides insight into how teachers developed beliefs about all three of the concepts. This information can be used to develop initiatives to help teachers improve their belief systems. For example, many teachers reported observing the positive effects of providing instruction that matched a student's learning style. As a result, initiatives to improve teachers' beliefs may benefit from providing teachers with opportunities to relate new beliefs to their teaching experiences. In addition, the qualitative data gathered in this study provides information from teachers'

first-person perspectives about the ways teachers incorporate these beliefs into the instructional strategies they use. This information was particularly important in this study because there were some inconsistencies between what teachers believe and the instructional strategies they used. For example, the survey results revealed that many teachers held the belief that it is beneficial to assess their students' learning styles, yet very few reported that they actually used this strategy. The following paragraphs discuss both the quantitative and qualitative data as they relate to the various objectives of this study.

Teachers' Beliefs in Learning Styles

The results of this study revealed various beliefs that are considered misconceptions by recent research literature about learning styles while also revealing various beliefs that are considered beneficial by the recent literature. Overall, the qualitative and quantitative results indicated that most of the participants associated learning styles with various sensory modalities. Visual, auditory, and kinesthetic sensory modalities were frequently mentioned by participants. Pashler et al. (2009) posit that the learning styles hypothesis (the notion that instruction should match students' learning styles) is a common learning styles hypothesis discussed by the creators of learning styles assessment instruments. The results of this study indicate that the beliefs of the participants were typically consistent with the learning styles hypothesis, and this is an issue because one might suspect that teachers with these beliefs might be likely to spend time and resources assessing learning styles and providing instruction that matches learning styles.

Pashler et al. (2009) suggest that the assessment of learning styles is the most concerning activity associated with leaning styles because there is very limited empirical evidence to support notion that matching instruction to student learning styles improves learning outcomes. With strong beliefs that favor the assessment of learning styles, one might suspect that the participants are likely to assess their students' learning styles in order to match instruction to their learning styles. However, the results of this study revealed that very few teachers formally assess their students' learning styles. As a result, this study revealed an issue related to teachers beliefs in the assessment of learning styles while also revealing minimal issues related to the extent teachers report assessing learning styles.

Pashler et al. (2009) suggest that providing individualized instruction to fit the individual learning styles of students as indentified by learning styles assessment instruments is not likely to lead to significant improvements in learning outcomes. Many teachers reported that limited time and resources were barriers that prevented them from being able to apply learning styles to instruction. However, some teachers found it practical to provide instruction that included various learning styles, and many teachers reported that they used whole group instruction that incorporated multiple sensory modalities in order to match various student learning styles. Overall, it is beneficial that the majority of teachers do not spend considerable amounts of time assessing learning styles and tailoring instruction to fit the learning styles of their students. In addition, Pasher et al. (2009) suggest providing a variety of instructional strategies may be beneficial because students differ greatly in their instructional needs so varying the instructional presentation for students may be beneficial due to differences in various

aptitudes among students. Nevertheless, some of the teachers reported that they put forth extensive amounts of time an effort to assess or match learning styles, and it is problematic that the dedicated teachers who carry out these procedures may be doing so without significantly improving the learning outcomes of their students.

Another issue related to the assessment of learning styles is the findings from this study that most participants reported a strong belief that it would be beneficial to assess student learning styles and share this information with their students. Additionally, some participants stated that they have shared this information with their students. According to Woolfolk-Hoy et al. (2006), most teachers develop strong beliefs about teaching through their years of experience as students, and these beliefs often persist despite exposure to various ideas and beliefs in college. This is an issue because students might develop misconceptions about learning styles if they are taught about this concept in school, and these misconceptions may persist among future generations of teachers and students until this cycle is broken.

Possible Explanations for Teachers' Beliefs in Learning Styles

The findings of this study point to various possible reasons why teachers have the beliefs about learning styles that they do. Pashler et al. (2009) conjecture several reasons why learning styles achieved the level of popularity they have over the years, and many of those reasons are supported by the findings of this study. Pashler and his colleagues suggest that beliefs about learning styles can be strengthened through observations of what teachers believe to be learning styles. When students are provided various modalities of instruction, Pashler and his colleagues explained that teachers may be

correctly observing improvements in student performance because differences in student aptitudes may lead some students to experience greater academic success when information is presented using certain sensory modalities. Based on the results of this study, one might suspect that the occurrence of this phenomenon is likely because many participants indicated that they had observed differences in student performance after altering the sensory modality used in instruction. In particular, many participants discussed having success after altering the sensory modality of instruction for low performing students or students who received special education.

Pashler et al. (2009) also suggest that learning styles might have become popular partly because the belief in learning styles allows individuals to take less responsibility for undesirable learning outcomes and attribute failures to the lack of opportunity to learn in a manner that is consistent with learning styles. The findings of this study support this notion because numerous survey participants indicated that end of grade tests were difficult for many students because the pencil and paper format was not consistent with their learning styles.

The findings of this study suggests that many teachers slightly favored the idea that learning styles are a more important factor in influencing student learning than other factors that have greater levels of empirical support such as existing knowledge, interest, and motivation (Bransford et al., 2000). This is problematical because these findings suggest that teachers may be slightly more likely to spend their time focusing on learning styles instead of other important factors that influence learning. Consequently, it may be

beneficial to provide training for teachers that reinforce constructive beliefs about these factors instead of learning styles.

Furthermore, some participants reported receiving training that promoted learning styles as an effective educational strategy while other participants reported receiving training that discouraged beliefs in learning styles. Since recent professional development experiences have sent mixed messages about beliefs in learning styles, it is important that school administrators be made aware of the lack of empirical support for learning styles so they can promote training and professional development activities that are empirically based.

The Relationship between Teachers' Sense of Efficacy and Learning Styles

The positive relationship between teachers' sense of efficacy and beliefs in learning styles is an important issue because this suggest that the teachers who are the more likely to be effective (i.e. teachers with high levels of efficacy) are more likely to have strong beliefs in learning styles when there is not enough evidence to support this claim. The results of this study revealed that most participants had strong beliefs that favored learning styles, but they did not report taking the time to assess or provide individualized instruction. After viewing these results, one might suspect that the teachers with the highest levels of efficacy were also the teachers who were the most active in assessing learning styles and providing individualized instruction based on learning styles.

The Relationship between Teachers' sense of efficacy and Incremental Self-Theories of Intelligence

The findings of this study revealed a positive relationship between teachers' sense of efficacy and incremental self-theories of intelligence. It would be beneficial for future studies to investigate this relationship again in order to confirm this correlation. If this relationship is demonstrated in future studies, then this may suggest that teachers' sense of efficacy is also related to teachers' judgments about student ability just as teachers' self-theories of intelligence have been shown to influence teachers' judgments about student ability that are based on performance (Woolfolk Hoy et al., 2006).

Self-Theories of Intelligence

The results of this study suggest that approximately 61.5% of teachers favored incremental self-theories of intelligence, 20% displayed moderate levels of incremental self-theories of intelligence, and 18.5% favored trait self-theories of intelligence. This data revealed that there were more incremental theorists in the participant sample than would be suspected. Dweck and Molden (2005) suggest that most studies indicate approximately 40% of individuals hold incremental self-theories of intelligence, 20% are undecided, and 40% hold trait self-theories of intelligence. The high percentage of teachers with incremental self-theories of intelligence indicates the possibility that the sample may have not been the most accurate representation of the population. Given that teachers with incremental self-theories of intelligence are more effective when servicing students in special education (Woolfolk Hoy et al., 2006), one may suspect that teachers with incremental self-theories of intelligence account for a large percentage of special

education teachers. This may have been the case for this sample given that special education teachers and other specialist made up a large portion of the sample.

On the other hand, there were many participants who were either undecided or trait theorists. This suggests that it would be useful to promote incremental views among these individuals as well because teachers with incremental theories have been associated with more positive outcomes than teachers with trait theories (Woolfolk Hoy et al., 2006). The findings of the self-theories of intelligence focus group revealed uncertainty about intelligence. However, the participants described several factors that they believed influenced student performance such as motivation, effort, peer relationships, teacher-student relationships, and family support. These findings suggest that these teachers have fairly accurate beliefs about the factors that influence academic performance, but it may be beneficial to provide training about intelligence to help teachers such as these in order to promote incremental theories.

Teachers' Sense of Efficacy

Woolfolk-Hoy et al. (2006) suggest that there are numerous dimensions of teachers' sense of efficacy. The modified version Teachers' Sense of Efficacy Scale that was used in this study contains the two following dimensions of teachers' sense of efficacy: student engagement and instructional strategies. However, the finding of the teachers' sense of efficacy focus group revealed that teacher student relationships, behavior management, student engagement, and instructional strategies were dimensions of teachers' sense of efficacy that participants reported having many successes in. However, influencing student-student relationships and working with parents were

dimensions of teachers' sense of efficacy that participants reported having less success in. The focus group findings suggest that these teachers could benefit from more training on influencing on student-student relationships and working with parents. It was problematical that some of the focus group participants discussed using learning styles as an effective instructional strategy. Overall, participants' ratings of teachers' sense of efficacy were high for this sample, and this is a positive belief for these teachers to have. The demographic data from this study revealed that a relatively high number of participants were in their first five years of teaching, and this is consistent with research that suggest that teachers' sense of efficacy declines as teachers stay in the profession longer (Woolfolk-Hoy et al., 2006).

Limitations

There were multiple limitations to this study. This study was limited by the sampling bias which was due to the use of volunteer participants. In addition, the sample was biased due to a disproportionately large percentage of specialist teachers as well as a disproportionately large percentage of participants who held master's degrees. A relatively high number of participants were in their first five years of teaching which may have influenced teachers' sense of efficacy as mentioned previously. One of the schools (the school I worked at as an intern) was also represented more so than the other schools. The use of tutors for the teachers' sense of efficacy focus group was also a limitation because three of the tutors were retired teachers and the other tutor also had experience in various administrative (and teaching) roles at the elementary and high school levels. Consequently, the results of the teachers' sense of efficacy focus group are not highly

relevant to the findings of the survey data because the tutors had greater levels of experience than many of the survey participants. Finally, this study was also limited by the self-theories of intelligence scale. Some of the items were poorly worded and were consequently left blank by the participants. This scale also included many items that were not relevant to the study, and they had to be omitted.

Directions for Future Research

In order to find additional evidence that supports the hypothesis that a positive relationship exists between teachers' sense of efficacy and incremental theories of intelligence, it would be beneficial for future studies to use a more reliable self-theories of intelligence scale. In addition, the correlations between these beliefs could be verified using a larger sample of participants from a wider range of grade levels (i.e. grades six through twelve), and they could be studied in various geographical districts including urban areas.

Another area of future research could include studying the beliefs of the teachers who have very low beliefs in learning styles. It would be beneficial to gather information from the first-person perspectives of these teachers to investigate why they developed these beliefs. By using the findings of this study, researchers could implement training sessions that focus on these issues. Then researchers could measure the effects of this training program on teachers' beliefs in learning styles.

Conclusion

The findings of this study revealed that most teachers possessed strong beliefs that favored the idea that instruction should match learning styles, and they typically provided whole group instruction that involved various sensory modalities in order to match student learning styles. The results of this study are consistent with many of the propositions made by Pashler et al. (2009) as to why learning styles are such popular concepts. Since many teacher hold the belief that instruction should match learning styles, one might suspect that beliefs in learning styles are central for many teachers. However, the instructional strategies teachers reported using in regards to learning styles were not always consistent with the beliefs they held about learning styles, and many of these strategies are consistent with the psychological research on learning and memory. In other words, many teachers are doing the right things (in terms of using instructional strategies that are supported by research) for the wrong reasons (their beliefs in learning styles). Although teachers' beliefs about learning styles may be associated with the use of instructional strategies that are supported by research, one might suspect that teachers would be more effective at providing researched based instruction if their beliefs were also consistent with the research on learning and individual differences.

It is possible that this belief will persist among educators until effective efforts address misconceptions about learning styles are put into place. Woolfolk Hoy et al. (2006) suggest that teachers often feel that they must change the way they view themselves as teachers in order to adopt new beliefs. The findings of this study, which include teacher's first-person perspectives on each concept, provide comprehensive

information about how teachers view themselves in relation to learning styles, self-efficacy, and theories of intelligence. Therefore, the findings of this study should be considered when promoting change in teachers' beliefs systems. The summary of the findings from this study in Appendix F is designed to raise awareness of learning styles issues and promote positive beliefs about effective learning strategies among teachers. This is just one example of many potential methods for promoting these beliefs among teachers.

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APPENDIX A: DEMOGRAPHIC SURVEY

Demographic Survey

Please read each question carefully and fill in the blanks.

1. What school do you currently work at?_____

2. Highest degree earned: ____Bachelor's ____Master's ____Doctorate or higher

3. What grade level do you currently teach?_____

4. Sex: ___Male ___Female

5. How many years of experience do you have as a teacher?_____

6. What subject(s) do you currently teach? _____

APPENDIX B: SURVEY

Learning Styles Survey

Instructions: Please respond to each of the following statements as they apply to you and your experience with teaching. Be sure to only circle one answer. Some statements may be repeated using different wording for technical purposes. Use the following response scale:

	1= Not at all true for me 2= Somewhat true for me 3= Moderately true for me 4= Very true for me
1. It is important to know what style of learning each of your students is using.	1 2 3 4
2. Students learn best when taught in a manner consistent with their learning styles.	1 2 3 4
3. Instead of matching teaching with learning styles, a variety of different teaching methods should be used with all students.	1 2 3 4
4. The academic achievement of students depends more on motivating students than on matching teaching and learning styles.	1 2 3 4
5. An effective teacher can get students to achieve regardless of learning styles.	1 2 3 4
6. Students' retain information better when the teaching they experience matches their learning styles.	1 2 3 4
7. Instruction should match the auditory, visual, or kinesthetic style of a student.	1 2 3 4
8. Matching student preferences for factors such as lighting or room arrangement influences student	1 2 3 4

learning.	
9. Matching teaching methods with student learning styles is **not** likely to have much influence on student achievement.	1 2 3 4
10. Students with all kinds of learning styles are capable of learning when material is represented in a variety of ways.	1 2 3 4
11. The intelligence of students has a greater impact on their academic achievement than learning styles.	1 2 3 4
12. If a lesson is presented in a way that is interesting to students, they will learn regardless of their learning styles.	1 2 3 4
13. I am able to identify students' preferred learning styles from observation in the classroom.	1 2 3 4
14. I regularly think about my students' learning styles when I am planning instruction.	1 2 3 4
15. I know which of my students are visual, auditory, or kinesthetic learners.	1 2 3 4
16. What students already know about a topic is a better guide to effective instruction than knowing their learning style.	1 2 3 4
17. I provide my students with a variety of learning experiences so that all of my students' learning styles are matched.	1 2 3 4
18. Learning styles are **not** a major factor in how I plan my teaching.	1 2 3 4
19. I don't think learning styles are a good use of my time as a teacher.	1 2 3 4
20. Assessing student learning styles would have little impact on my students.	1 2 3 4

21. Informing students about their learning styles can be harmful by leading students to believe that they are only capable of learning information that is presented in a manner that is consistent with their learning styles.	1	2	3	4
22. It is **not** important to present information in a way that matches students learning styles because students are capable of learning in many different ways.	1	2	3	4
23. I assess my students' learning styles, and I share this information with my students.	1	2	3	4
24. I usually do **not** have enough time to accurately identify my students' learning styles.	1	2	3	4
25. I do not know any practical ways to assess my students' learning styles.	1	2	3	4
26. It would require too much work to match student learning styles to specific kinds of instruction.	1	2	3	4
27. Learning styles are part of an effective teaching strategy.	1	2	3	4
28. It is usually easy to teach in way that caters to all of my students' learning styles.	1	2	3	4
29. Students benefit from knowing what their learning styles are because they can eventually learn to study in ways match their learning styles.	1	2	3	4
30. Students are more motivated when they can learn in an environment that matches their learning styles.	1	2	3	4

Teachers' sense of efficacy Survey

Instructions: Please indicate your opinion about each of the statements below. Be sure to only circle one answer. Some questions may be repeated using different wording for technical purposes. Use the following response scale:

	1= Very Little 3= Some influence 5= A great deal				
1. How much can you do to get through to the most difficult students?	**1**	**2**	**3**	**4**	**5**
2. How much can you do to help your students think critically?	**1**	**2**	**3**	**4**	**5**
3. How much can you do to motivate students who show low interest in school work?	**1**	**2**	**3**	**4**	**5**
4. How much can you do to get students to believe they can do well in school work?	**1**	**2**	**3**	**4**	**5**
5. How well can you respond to difficult questions from your students?	**1**	**2**	**3**	**4**	**5**
6. How much can you do to help your students value learning?	**1**	**2**	**3**	**4**	**5**
7. How much can you gauge student comprehension of what you have taught?	**1**	**2**	**3**	**4**	**5**
8. To what extent can you craft good questions for your students?	**1**	**2**	**3**	**4**	**5**
9. How much can you do to foster student creativity?	**1**	**2**	**3**	**4**	**5**
10. How much can you do to improve the understanding of a student who is failing?	**1**	**2**	**3**	**4**	**5**
11. How much can you do to adjust your lessons to the proper level for individual students?	**1**	**2**	**3**	**4**	**5**
12. How much can you use a variety of assessment strategies?	**1**	**2**	**3**	**4**	**5**
13. To what extent can you provide an alternative explanation or example when students are confused?	**1**	**2**	**3**	**4**	**5**
14. How much can you assist families in helping their	**1**	**2**	**3**	**4**	**5**

children do well in school?	
15. How well can you implement alternative strategies in your classroom?	**1 2 3 4 5**
16. How well can you provide appropriate challenges for very capable students?	**1 2 3 4 5**

Theories of Intelligence Survey

Instructions: For each item compare the two statements listed on each row. Some statements may be repeated using different wording for technical purposes. Place a check mark in the box that is next to the statement you agree with more. If you agree with the statement on the left, check the box on the left. If you agree with the statement on the right, check the box on the right.

1. School experiences can increase the amount of information a child knows.			School experiences can make an individual more intelligent.
2. An individual's level of intelligence is a characteristic that changes very little during his/her lifetime.			An individual's level of intelligence is a characteristic that can change during his/her lifetime.
3. A student can become more intelligent by trying harder.			No matter how much effort a student puts forth, his/her level of intelligence will remain the same.
4. Learning often occurs by accident.			Learning takes place when your main purpose is to learn.
5. Mistakes are a common part of the learning process.			Mistakes suggest failure to learn successfully.
6. Students can learn in school through play.			Learning in school must be work.
7. It is more important for students to rate their performance based on their previous performance.			It is more important for students to rate their performance compared to that of their peers.
8. Students learn better when they focus on long term goals that are not compared to the performance of			Students learn better when they focus on immediate goals that allow them to compare themselves to others.

others.			
9. Students are motivated by their satisfaction they gain from learning			Students are motivated by praise or rewards from others.
10. Effort is wasted on a difficult task unless the individual has the ability to complete it successfully.			Students will learn by putting in extra effort in a task even if they are not successful.
11. Students who work very hard to be successful are intelligent.			Students who do not have to try to work very hard to be successful are intelligent.
12. When students are presented something new to learn, they consider how they will go about completing it.			When students are presented something new to learn, they consider if they will be able to complete it or not.
13. Teachers are responsible for providing students with material to learn.			Teachers are responsible for helping students learn on their own.
14. Students prefer having teachers judge their performance.			Students prefer using teachers as resources to help them learn.
15. Students should consider meeting the teacher's standards of performance as their goal.			Students should consider improving learning as their goal.

Additional Questions

Instructions: Please respond to all parts of each question. Remember to respond to each question as it applies to you and your experiences teaching.

1. Think of a time when you applied what you know about learning styles to your teaching, and tell me about this experience.

2. Think of a time when you encountered challenges that prevented you from applying what you know about learning styles to your teaching, and tell me what you can about this experience.

3. Have you attended any training or professional development sessions within the past year that focused primarily on learning styles? If so, briefly summarize what stood out to you about the session(s).

4. Have you experienced a time when a student's academic performance was influenced by his/her learning style? If so, please describe this experience.

THANK YOU FOR YOUR PARTICIPATION!

APPENDIX C: SURVEY INFORMED CONSENT FORM

WESTERN CAROLINA UNIVERSITY

COLLEGE OF EDUCATION AND ALLIED PROFESSIONS

Informed Consent Form

Title of Project:	The Relationships among Teachers' sense of efficacy, Teachers' Self-Theories of Intelligence, and Teachers' Beliefs about Learning Styles
Principal Investigator:	Jeff Kilpatrick
Faculty Advisor:	Dr. Bruce Henderson, Professor of Psychology, Western Carolina University

Purpose: You are invited to participate in a research project designed to study the beliefs that teachers have concerning the following ideas: teachers' sense of efficacy, self-theories of intelligence, and learning styles. In order to gather information from a large number of participants, surveys will be administered to large groups. This study is being conducted by, Jeff Kilpatrick, a school psychology graduate student from the Department of Psychology at Western Carolina University.

Procedure: This study is comprised of a series of brief surveys that will take approximately 15 minutes to complete. It is also asked that participants do not write their names anywhere on any of the survey forms in order to maintain the confidentiality of the response data. There are no foreseeable risks to you for participating in this part of the study.

Consent: By signing this form I agree with all of the following statements: I have been given an opportunity to ask questions about this study and all answers provided were satisfactory. My name and identifying information will not be mentioned anywhere in the data or results of this study. My participation in this study is completely voluntary, and I may stop participating at any point without penalty. If I choose not to participate in the study, I may simply return the blank survey forms. Likewise, if I choose not to respond to specific items on the survey, I can leave those items blank.

If you have any questions regarding either part of this study please discuss them with me at this time. If you would like to discuss this study at another time you may contact me at (828) 773-3081 (jkilpatrick@henderson.k12.nc.us) or you may contact my faculty

advisor, Dr. Bruce Henderson, at (828) 227-3784 (henderson@wcu.edu). Additionally, if you have any concerns regarding the treatment of participants of this study, you can reach the Chair of the Western Carolina University Institutional Review Board through WCU's Office of Research Administration at 828-227-7212. If you would like to receive the results of this survey please provide your email address below your signature. (Please continue to the back of this page to complete the rest of this form).

Please check one of the boxes below to state your preference regarding participation in the survey.

☐ I agree to participate in the survey.

☐ I do not agree to participate in the survey.

By signing below, I understand what is expected of me if I participate in either of the two parts of this study, and my signature also shows that I am at least 18 years old.

_____

Participant's Name (Please Print)

_____ _____

Participant's Signature Date

_____

Email address of participant (only if interested in receiving results)

_____ _____

Signature of Researcher Date

PLEASE NOTE: This study consists of two parts: a survey and focus groups. The focus groups will provide participants the opportunity to discuss their experiences as teachers as well as their thoughts about the topics in greater detail. The focus groups will be scheduled at a time that is convenient for the participants, and efforts will be made to plan focus groups at schools participants are based at. Participation in the focus groups is completely voluntary. Participants who express interest in focus groups will only be asked to participate in one focus group, and each group will take 30-60 minutes.

Please check one of the boxes below to state your preference regarding participation in a focus group.

☐ I am interested in participating in a focus group. Please provide your contact information (email address and phone number) on the line below so that we may contact you for planning a focus group.

_____ _____

Email Address Phone Number

□ I am not interested in participating in a focus group.

APPENDIX D: FOCUS GROUP IFORMED CONSENT FORM

WESTERN CAROLINA UNIVERSITY

COLLEGE OF EDUCATION AND ALLIED PROFESSIONS

Informed Consent Form

Title of Project:	The Relationships among Teachers' sense of efficacy, Teachers' Self-Theories of Intelligence, and Teachers' Beliefs about Learning Styles
Principal Investigator:	Jeff Kilpatrick
Faculty Advisor:	Dr. Bruce Henderson, Professor of Psychology, Western Carolina University

Purpose: You are invited to participate in research project designed to use focus groups to study the beliefs that teachers have concerning one of the following ideas: teachers' sense of efficacy, self-theories of intelligence, and learning styles. Focus groups will provide participants with the opportunity to discuss their experiences as teachers as well as their thoughts about the topics in greater detail.

Procedure: Focus groups will consist of 4-6 participants, and they will be asked a series of open ended questions that will be based on one of the following topics: teachers' sense of efficacy, self-theories of intelligence, and learning styles. Participants will only be asked to participate in one focus group. The total time to complete the focus groups should take approximately 45 minutes to 1 hour. Digital audio recording will be used to collect data from the focus groups. However, no names or identifying information will be presented in the results of this study. There are no foreseeable risks to you for participating in this part of the study.

Consent: By signing this form I agree with all of the following statements: I have been given an opportunity to ask questions about this study and all answers provided were satisfactory. My name will not be mentioned anywhere in the data or results of this study. My participation in this study is completely voluntary, and I may stop participating at any point without penalty. Likewise, I can choose not to respond to specific questions or comments presented during the focus group sessions.

Please check one of the boxes bellow to state your preference regarding participation in a focus group.

□ I agree participate in a focus group.

□ I do not agree to participate in the survey or a focus group.

If you have any questions regarding either part of this study please discuss them with me at this time. If you would like to discuss this study at another time you may contact me at (828) 773-3081 (jtkilpatrick1@catamount.wcu.edu) or you may contact my faculty advisor, Dr. Bruce Henderson, at (828) 227-3784 (henderson@wcu.edu). Additionally, if you have any concerns regarding the treatment of participants of this study, you can reach the Chair of the Western Carolina University Institutional Review Board through WCU's Office of Research Administration at 828-227-7212.

By signing below, I understand what is expected of me if I participate in either of the two parts of this study, and my signature also shows that I am at least 18 years old.

_____ _____

Participant's Name (Please Print) Date

_____ _____

Participant's Signature Date

_____ _____

Signature of Researcher Date

If you would like to receive a summary of the results, once the study has been completed, please write your email address here:

_____

APPENDIX E: MODEL FOCUS GROUP TRANSCRIPT

Date: December 15th, 2011.

Topic: Teachers' Beliefs in Learning Styles.

Participants: Five teachers at _____ Elementary School. Refer to Method section of description of participant characteristics and participant codes. 'M' represents myself as the moderator.

1. M: Think about, you know, your experiences as a teacher or teacher's assistant or whatnot, and tell us about a time when you were thought about the learning styles of your students as you were preparing for class.

2. L3: I know one time. The first time it hit me was when Ms. _____ (former principal?) sent us to Atkinson (different elementary school in district) to watch them do Zoo Phonics and that program really hits a lot of them because they are seeing it, hearing it, and they're doing it.

3. M: What's that program like?

4. L3: We love it here. We have been doing it here at FES this school ever since I have been a teacher so 9 years plus. So what you do is for each letter of the alphabet, there's an animal and there's a signal so they get to move so they see the poster so they get to say it. A is like, "/a/, /a/, /a/, Ally Alligator." And there's a ton of research that backs up how good it is because you are seeing it hearing it, especially for the ESL kids, we have seen a huge, you know, impact there and how it helps them because they can be writing and get stuck and you just do this (makes alligator motion) an you can see it click, and they just keep going.

5. L1: And even in 2nd grade, still, they remember that because they get mixed up with the short 'I' and the short 'E' and they are like "Inny Inchworm" or whatever that guy's name is. It sticks.

6. L3: In 'C' or 'K' they always ask me, "Is it Catina Cat or Kao Kangaroo?" and we just go like this or whatever (makes motions) and they just keep writing. But that's how I started thinking about how they all learn differently is when we got to watch that program and Ms. _____ (the principal) bought us the huge kit and we got to go through it and do it with the whole class.

7. L4: To back up what _____ (participant T3) is saying she was a student teacher when my son who's now in 10th grade was in her 1st grade class.

8. M: Oh yeah?

9. L4: And they were doing sight words with each of the letters, he still remembers that. He'll talk about it. I mean that really, and he's a 10th grader now, but that movement and the association with the sounds, it sticks.

10. L5: I think in my position, I mean moving from being a tutor to, you know, an interim position, and really having almost .5 seconds to figure out everybody's learning style, especially at the fourth grade level they are pretty comfortable with those, at that point and they are starting to grasp how they learn, and we do a lot of like, we are doing two digit by two digit multiplication right now and they learn four strategies, two of those strategies are very visual things because they are boxes. They use coloring pencils and it really helped me in that moment, pick out the visual learners because they are the ones who responded the best to it and really loved doing it because they understood the math, and my more auditory kids, they are kinda [*sic*] more towards the traditional ways, and they are like, "I don't want to mess with that" because they don't need that. They just do it so I think, especially in math when there's such varying strategies and you are using all four of them you can pick out those kids who are visual, auditory and all that.

11. M: I was a little confused because you were talking about tutoring and teaching, so with teaching with your fourth graders, so some of them already know?

12. L5: Yeah I think some of them already know and are comfortable. They may not be able to verbalize it like we are able to verbalize it.

13. L1: But they know to go to the picture.

14. L5: But they know to go to the picture, they know that they need to hear it again, or they know that they need something in front of them. You know, a lot of times because they do a lot of stuff on the document camera and the smart board, some of them have to come closer. If we don't do something on the document camera or the smart board, a lot of this kids come forward and say, "can you put something up there" because they know they need that, you know, if I say the essential question a good majority of them can't dictate it for themselves, they really need to see me writing it down.

15. M: I was also curious, you were saying, as a tutor you have just a split second to figure it out, was there…

16. L1: Literally.

(laughter)

17. M: Do you feel like you were able to figure them out sometimes?

18. L5: You know, I think, sometimes not, I think it kind of depends on the age. You know with my older students, definitely my fourth and fifth graders, you know, know they're comfortable. You know more of the 2nd graders they are still trying to figure out that they need to slow down and focus a little bit, you know so it is more routine and behavior, and I think those things come out later, but I did notice a few tendencies like some even as young as second grade they would instantly look at the board in the room there may have not been anything on that board, but they almost know, they have a sense that they are looking for something to look at so they can write it down so I thought "oh, maybe I should be writing some of this down on the board." Because even in some of those small groups in tutoring, I still think visual aids are still important even though it is not a whole group class instruction.

19. L4: I have learned to help kids understand their own learning styles. We'll even talk at the beginning of the year: "Hey, some of you, when you hear me say it, you, it's in there. Some of you need to see it. Some of you need to write it down as I say it." And we talk about their learning needs and their styles and so they understand that we will do the lesson in three ways to reach all of them and we talk about when, if I am trying to write and hear you then I get lost. So I always tell them to do what's the most comfortable, and if there are notes they will be there after the lesson cause [*sic*] right now I want you to attend to what's being taught. And other kids, need to write as I'm speaking and others it's in there. So it's good to verbalize so that they understand their own strengths too.

20. M: Um-Huh, participant T2?

21. T2: Yes, I am in a similar situation because I went from TA to teacher very quickly so I haven't also, just had the opportunity to kind of figure out everyone but what I have found in math is to have the manipulatives like the cubes or bears or the counters, helps tremendously. They all get excited about it and then once they have it, I am able to tell right away the kids who really need it verses the kids who are happy to have it. They want to have what everyone else has but they don't necessarily need it. We were doing a lesson last week with rods and we're learning subtraction from 10 and so every student had a rod and they're playing a game in pairs so I try to pair up kids who are in the higher end and maybe don't need it with kids who do need it, and it was really interesting to see because the higher end kids would actually get frustrated waiting for the student who had to use the rods to count, but I told those kids, you know, "Help them out." And that worked as well. Just to see one student teaching another student how to do something. I mean really in my class they all get it. I haven't, you know, they're not old enough to say let's figure out your, at least I don't think they are. Perhaps later in the year I could do

something like that. Figure out your learning style. But right now, they are all getting the same thing, everyone does. Sometimes they need it, sometimes they don't, but definitely, the kids who do need it, I am aware of them, and they always get it.

22. M: What are those students like, the ones that really need it?

23. L2: They're the mid to lower kids.

24. M: Okay

25. L2: They are not my high end kids.

26. L1: I think that's usually the case.

27. L2: Yeah

28. L1: Especially with math, your little kids need that. They need to see it, they need to touch it, they need to understand it, and I think you are trying to hit them with as many learning styles as possible.

29. L2: As possible, right. But if you were to give them something auditory they're lost. I mean, immediately they're focus is gone. They're not going to be there. They need, they're kinesthetic hands on, kind of learning.

30. L1: Whereas, your higher kids, they just, they have it in their head

31. M: Have you seen any differences with your higher kids, I mean they are probably learning it well but…

32. L4: Well, I've had experiences when we are doing problem solving. Often times, I hate to say, "lower children," but the more methodical, they don't trust themselves so they are more methodical and very dependent on the manipulatives and they will solve the problems accurately. It is in their mind how to figure it out, but they will make a careless mistake

33. T2: Yeah, I can see that happening

34. T1: Yeah

35. L4: And then it is kind of the hare and the tortuous, the tortuous ends up with the correct answer so it is good for the higher student to realize, test your work, use a higher strategy,

36. L5: And I have definitely seen that this week with this two digit-by-two digit multiplication because my higher kids are all about the traditional methods. I mean, they

are okay with the lattice, they are okay with the box, but they just want to get there. They get bored, but at the same time, I check their work, there is some mistakes with you know, carrying over and regrouping, and these are the things my middle to lower kids are getting because they are taking that time with that lattice box and they are taking that time to make sure everything is in the right place and their addition is right because they know if they get hung somewhere, the answer may not need, so I've really have to challenge my higher level kids to be like, "You may not choose to use the strategy, and eventually that's okay. But hey, we all need to go through the steps of that so we all understand how to go from point 'a' to point 'b'" and not because, as she said, they're coming back and making those careless mistakes.

37. M: Does anybody have anything else along those lines?

39. L1: I was going to say, (participant L2) when you said that yours may not, may be ready at the end of the year to verbalize. In the past, I have always tried to use one of the surveys that you give them, that like labels their learning styles, and they're just not ready yet in second grade. Maybe they'll get there, but we've tried, we just can't even get through the form. You know, they don't even know understand that part of it, even reading it aloud and everything so I let that go.

M: What was it like, not age appropriate?

40. L1: But I think as teachers we can figure it out.

41. L2: Yeah

42. L1: I mean, that was in the beginning, I don't think I need a survey to figure out which kids are visual and which kids are auditory, and which kids are need to hang on kinesthetic and all that, but you know it was worth trying.

43. M: I know, we were saying before, some of the medium or lower kids might need manipulatives or the other methods, but when you are thinking about students who might be auditory, visual, kinesthetic, how can you tell among those students that some somebody is auditory or visual or so forth.

44. T1: I mean kinda like the zoo phonics, that is not hanging on to something. And in math you make up a song or for a word you make up a song, and with spelling we do that a lot or we will make up a cheer for it cause see those kids in the spelling test and they are doing their little cheer and stuff and you know, they are very auditory, and you know they have to chant they can remember it, they know it. And some kids, that doesn't stick at all. For me, it's really hard to teach it because I am not auditory, and I am trying to think "how'd that beat go?" but some of the kids get it.

45. T2: Yeah, I taught fact families to my kids, and I have a song for fact families and it's amazing, we did it 3 weeks ago.

46: T1: Sing it!

47: T2: (Brief demonstration of song) It has hand movements that go with it. I will have to show you. I think last year when I student taught. They fall in love with it, anyway, students who have memorized this song. I brought it out yesterday so students could do a fact family gingerbread house and they were "(demonstrated song)" and there were a few who didn't, and so it was very interesting for me to see the kids who could remember the song and apply it versus those who just couldn't.

48: T1: Yep, that would've been me.

49: T2: I mean even the song couldn't help, and those would have been the same kids who could have benefited from manipulatives or something like that. The higher kids remembered the songs very well which was interesting.

50. I have a lot of visual learners who will refer to the wall often while they're taking quizzes and tests and even my daughter at home, she's in 1st grade now, it's so funny even though we were in our kitchen she looked to where the word family, the word wall was in Ms. _____'s class so she looks at the blank wall in our kitchen and she doesn't see anything and she can spell the words.

51. T1: That's how I am, just looking at where it would've been can help me, and then I see it.

52. T5: That's how I am too.

53: Various participants: Yeah

54: T5: And then, another sign, and I only know this because I knew very early on that I am a visual learner, and my teachers could tell because visual learners tend to look up like there are looking in their head, and their eyes move up.

55: Various participants: Yes, yeah.

56: T1: I am very visual.

57. T5: Like they're looking for the answer, they are looking for the visual mark.

58. M: Have you seen this with students too?

59. T5: I've seen a couple students do it.

60. T3: I've seen my daughter do it at home. She's really struggling with mental math. They have their spelling test in 1st grade and then they flip it and do mental math, and she'll get a 100 on the spelling test, but she's looking up, and it's like "Okay, _____, you have five sticks add 20 more. How many is there?" And I can see her like wanting to have those things to touch or she'll look up like "I'm trying to count 5 and 3." you know.

61. T2: And, you know, I teach 1st grade so I give mental math test, and when I give the test, I can see the kids also who are counting their fingers and just their hands or they are using their number lines. So those are some different methods that help them too that they learn to use. And there are some kids that just go like this, they look up, and they've got it.

62. T5: And I have definitely heard the school of thought that as some kids get older you know fourth and fifth grade, that some educators and administrators don't agree that counting on your hands is a good thing, but I am like yeah, but not really because it's a tangible thing.

63: T2: Shoot I still do it. I admit it.

64: T5: Shoot, I am 31 years old, and I still do it.

65: T4: In fifth grade the drawback to the still needing to count is when they've got so many steps to go through, so we practice the rote memorization because by fifth grade they understand the process of what multiplication is so know we want the association whenever you see three and seven you have 21.

66. T5: Got it and it does take a lot of time.

67. T4: Because, in the younger grades, rote memorization means nothing if they don't understand the concept of it.

68. Various participants: Yeah

69. (More discussion about math strategies)

70. M: Is there anything else, like with what we were talking about before? With knowing who is a different learning style or anything else we might have missed?

71. T4: What helps you meet with kids who are struggling, you might want to reevaluate how to reach that child.

72. T1: Maybe you're not teaching their style enough and that's why they are struggling.

73. T4: Um-hum.

74. M: So, I am not quite sure what you're trying to get to. Are you saying you try different styles after a while when kids are struggling?

75. T4: Right. Like maybe this method is not working for them. Is it you're teaching style? Is it their learning style? Is it an actually learning disability? You wanna [*sic*]make sure you are attempting to reach them in all ways.

76. T1: Yeah, like maybe you thought they were visual, and you're teaching them, and they're struggling and you're making it very visual and their still not getting it. And I am just kinda [*sic*] reevaluating. Alright so maybe we need to try something else.

77. T4: I got me to felt that peer teaching sometimes is very helpful. You let them come up explain something on the smart board and I would say "In kid language." The other kids are like "Oh!" Just sometimes just to see how someone else is thinking helps.

78. T3: I know Ms. _____ (lead teacher) told us in a workshop one time to be careful because you tend to teach what your style is, and she made us all take a quiz to see if we're visual or auditory or kinesthetic. It was neat because we all took it at the same time and shared what we were. I know there was [*sic*] a few people that were more than one, but if she said that research shows that, you know, you tend to teach whatever you are and then you miss those other kids in your class who aren't visual. Like, I'm more visual, so I think it was a good point she made to watch so that you don't always have visual you have those other things.

79. M: So have you seen times where you have caught yourself only doing one style of teaching?

80. T3: Probably some.

81. M: I am not trying to call you out

82. T3: I hope we all try to mix it up

83. T5: There was definitely, when I started in this temporary position, I was all about the SMART Board and the document camera because I love and I respond to that and I do have a lot of visual learners in that class, but then I'm like, just take a break from the SMART Board and do something different and it was really easy to see why that was a good decision because a lot of my learners who weren't getting it from that, you know place they were able to, they responded more to questions they were more engaged with what we were doing and I said, "Ah ha."

84. M: Has anyone had an experience where you just couldn't teach to different styles? Like a certain subject or lack of time?

85. T2: Writing, I would think, writing. I mean maybe there is a way but I am not aware of it, but that seems to be something where you have your different levels of writers, but when it comes to learning styles I don't know a different way to approach it but asking them to write.

86. T1: We do, I, we do a lot of, I mean yeah. I agree, but we do a lot of touch the page, they're not talking, like I give them 3 pages stapled together so I am like, okay, touch the page say what it is going to say on each page and you say it out loud make sure it sounds right and it makes sense then they write it down.

87. T2: Oh, that's good.

88. T1: So that kind of helps them the more auditory.

89. T2: See? That would help.

90. T1: So that they can hear it so that it sounds right but there is not a whole lot of flexibility. You can't make writing hands on can you?

91. T2: It is such a big deal. Exactly, I mean you can. Maybe you can have your literary stations with making the words. I mean maybe those are the learning centers you can have for those students so when it is time for writing they have some hands on experience.

92. T4: In fifth grade we'll give them a rubric so they know their expectations so that is for the visual and we model I show them examples of former students work so then they're hearing it too, we read it aloud, and to take it one step further when we talk about elaboration we'll use highlighters. The main idea is blue, but then each elaboration we will highlight in pink. Are there similes? We will highlight in green just to give them aspects of color just to make it pop out in their mind to see this is the expectations, but then some kids even with all that, struggle to write and others are brilliant writers that don't even need.

93. T1: Writing is difficult.

94. T4: Any of the color coding of…

95. T3: I've heard color enhances learning too. A lot of people really respond to color.

96. T5: I tutored at another school last spring and one of the fourth grade math teachers there, and I think he got somebody from the central office to kind of latch onto it at least for benchmarks for that particular school but they had a yellow pencil, a red colored pencil, and a green colored pencil and the result part of the question they highlighted green, the words that would get them through that process were yellow and the actual

question was done in red and for the visual learners in that class. It was amazing because they just went straight through their colored pencils and they knew exactly how to dissect this word problem and it was hard I think because at the time that he started it there they weren't able to it on EOGs, and he was like if we could do it on EOGs it would help so many kids break down those word problems and be able to get.

97. T2: We did that a couple months ago in math with word problems and they would use a green colored crayon for their "go numbers" so the numbers they would circle in green and then red would be their "stop" which is what they are looking for in all altogether cause was during addition so they would circle that red and when they had to write the number sentence they would look for the numbers in green their go numbers and their answer in some would be red and did help kids too to have that.

98. T1: Mr. _____ (teacher) last year when we started all of this Reading 3D, he always has the EC, I mean he always has a huge low group. Their fluency was really low, and I remember, he would use those colored, those clear covers.

99. T3: Oh, I did that with a boy.

100. T1: It made a huge difference!

101. T3: He gave them to me. They were different shades of blue, and we had this little boy he just couldn't get it couldn't get it he'd have it sometimes, not have it some I put everything in blue or I would lay the blue overhead over it even the work we would run on blue and it was like something made it more focused and I don't know, I never got to hear more research about why that helped him.

102: T1: I know there were different colors too.

103. M: Are we still talking about word problems, is that right?

104. T3: These were like our word wall words and letters and stuff even like math I would just put it on blue paper.

105. T1: Wow.

106. T3: And it really helped him put um Ms. _____ (teacher) was really good about explaining that. Do you remember her? _____? She had a foster student who had some kind of visual problem where everything looked kind of blurry so she put it on blue or I don't know.

107. T1: And his were like clear transparent sheets so he could just put it on top of everything so he just put those on top and they, it was really beneficial.

108. M: Anything else with that topic?

109. M. Another thing to think about if there has been a student who has been in a situation where they couldn't get teaching that is consistent with their learning style. What has that been like?

110. T4: I'll say you will notice the gaps in learning with students who have moved from school to school often or you'll, but I guess you're asking basically a kid who must have just come from a teacher that doesn't meet their style?

111: M: Or even just a brief lesson or one instance in time that you can think of when a student could find their style in whatever is being taught.

112. T4: Well I've had students who rotate and for power hour we do remediation and I have had a student who would like help with their homework because they didn't understand like people say that adding unlike denominators so maybe just hearing a different explanation they were able to get it so I don't know if it was a different approach, a different style, or just a fresh brain in the morning. I'm not sure which option it was.

113. M: Kids are complicated sometimes.

114: T4: But I see having older children in middle school and high school, I think there's less. I don't want to put any middle school or high school teachers down, but I think there's less flexibility in their lessons cause they have such huge classes like 34 kids and so I have noticed that if it's not the style that best meets your own child's learning then they need a lot of help with their homework at night.

115. T1: Yeah, high school is very visual. It is on the board. Copy it. Get it. We're done.

116. T4: Yeah, if you're an auditory learner like my son, he does so well in classes like civics and classes like that because there are so many little videos that teach the subject or they watch CNN news and he can come home and he can recite it practically word for word. Whereas, if you are visual you might have needed notes or a passage to recount what you have read.

117. T5: And there is a lot of research on all levels that if you are teaching a certain passage or whatever that each student at least needs to have three or four opportunities to absorb it, that each student at least needs to have three or four opportunities to absorb it whether that's by listening to it, reading it themselves, listening to it as a group, and Ms _____ [other 4th grade teacher] just touched on that because that is what she does with her reading street is that they read it at least 3 times in that week that they read it so her

comprehension tests are really good because they're getting it, they are getting it three times and in my plans that I had picked up I didn't really see that so I think that's where the gap is, is that we are not reading it enough because we are bogged down with all this other stuff and that, you know, so, and because my visual learners aren't going to get anything for hearing it off the CD, they're only going to get it if they are engaged in reading along with it.

118. M: And also besides learning styles, what are some other ways that you try to reach out individual differences with students besides learning?

119. T1: Besides learning styles?

120. M: Besides learning styles, yeah.

121. T3: I think a big way is to do like conferencing or peer, you know, it's not really a learning style but if they're an interpersonal learner they need to be in a group. They need to hear other people do it and then your low ones do really well if you can get just 10 minutes put your assistant with them, go talk to, especially in writing. That's so hard for kindergartners they are just so scared to even attempt it so we tried it in this group we have this year, I haven't started it yet, we do like books they make books about their favorite things and they start out real simple with things you like and you can build, I've done author studies, even in kindergarten. I've done [unintelligible] books and stuff like that, I think it helps a lot to put them in groups and when I was in college we had to research something in the classroom so that's what I picked was cooperative learning vs. just on your own so Ms. _____ was just great, she helped me and we did a lot of like this is what they did by their selves and hear is the results when you put them in a group and the certain strategy, I can't remember the name of it, but not only did you put them in a group, but you said like, you're the leader, this is your job, you make sure everyone is doing their job you're the cheerleader so you cheer people so everybody had a job that they had to do so they were all working together and it was really neat and I had to present it in front of the whole. Everybody else in my major so it was neat to see how all the kids, high medium low, when they were in a group they had a little bit higher scores when they were in a just by themselves, so I think that's important to remember. Plus we do reading buddies even where kindergartners share with second and like this year Ms. _____ [fifth grade teacher] sends down her like three fifth graders in the mornings whose parents don't read with them at home, they get to go in the hall with the fifth graders and they do word rings letter rings, baggy books, and they probably get 15-20 minutes with those kids one on one. Now I am having, like when the fifth graders come in, everybody wants that to go with them just to have that one on one attention.

122. T1: I agree with you?

123. M: So do you do similar things as participant T3, or are there other things you do with cooperative learning?

124. T1: I would say everything, I think that's what most kids outside of learning styles is very beneficial, it's just the attention, whether they need it through up here or through the teacher. And especially conferencing is really huge too. I mean that one on one conferencing really is beneficial, just obviously there is not a ton of time for it. But anything like that.

125. T4: I think you need to engage their learning too just to get them hooked so that they're invested in what they are about to learn that day too.

126. M: What are some things that you do to get them hooked?

127. T4: When we started the weather unit, we listed all of the things that we thought we already knew about weather and then the questions that we want to know. And as we are learning we'll refer back to that sheet and they will see there we just answered that question and they will get all excited, and they will say "Why did we think that?" And they will realize mistakes in their prior, in what they thought they knew about weather. It's a nice tool that they're engaged in so that they want to learn.

128. T1: It's easy to get them excited too. (participant T1 describes how see gets excited about writing, while she doesn't like it herself) It's easy to motivate little kids, just tell them you love it and they will say "Gosh, I love it too. My teacher loves it, awesome."

129. T4: You have to make your classroom safe too.

130. T1: Yes they need to feel safe definitely, comfortable.

131. T4: I think outside of the lessons I think children need to feel safe in your room. They need to know that they can take risks and its okay to make mistakes.

132. M: Well, it is time to go. Thanks for your help!

APPENDIX F: SUMMARY OF RESULTS FOR TEACHERS

Rethinking Learning Styles

A Summary of the Research Findings from Jeff Kilpatrick's Thesis

Why study teachers' beliefs about learning styles?

While many educational ideas come and go quickly, learning styles have been a popular topic among educators for over 30 years. Most learning styles theories claim that matching instruction with a student's learning style helps them learn better. However, **numerous studies using adequate research methods have failed to produce evidence to support this claim.** This may be shocking to most people because learning styles are such a widely accepted concept. This study researched teachers' beliefs about learning styles in order to answer the question below.

Why are learning styles popular concepts among teachers despite the lack of research to support the claim that learning styles should be assessed and instruction should match learning styles?

Although there is a lack of evidence for the claim mentioned above, learning styles beliefs may be popular because they lead to teacher beliefs and behavior that are consistent with what we know about how students learn (Bransford, Brown, & Cocking, 2000; Reiner & Willingham, 2010) including:

1. All students are unique and instruction should be differentiated to match the needs of all students.

2. All students learn best when what is to be learned is presented in many different ways, leading to elaboration, understanding and better remembering.

3. Students have preferences for the types of instruction they receive based on interest and existing knowledge.

4. The results of this study also revealed that learning styles are popular among educators because **teachers' beliefs about learning styles are often different from learning styles theories in the way they define learning styles**. Learning styles theories claim that learning styles are differences in students' **PREFERENCES** for the way they receive instruction. However, many teachers associate learning styles with differences in students' **ABILITIES** to learn information as well as differences in instructional preferences.

Why does this difference matter? Let's look at the following example:

Billy is a student who has trouble remembering information that he hears. His teacher notices this problem, and she thinks he is a visual learner so she makes sure she provides visual information during her lessons so Billy can follow along. This strategy appears to help Billy.

What is happening in this example according to learning styles theories? Billy might be a visual learner, but his teacher doesn't know this until she administers a learning styles survey to figure this out. **What the learning styles theories recommend for Billy?** Once Billy's teacher assesses his learning style with a survey she must provide Billy with individualized instruction so that he learns things in way that is consistent with his learning style. When Billy's learning style matches the instruction he receives, he learns at his best.

What would the teachers in this study say is happening in this example (according to the finding of this study)? Most teachers would believe Billy is struggling because he was not learning in a way that is consistent with his learning styles (his learning abilities and/or preferences). **What would teachers do?** Most classroom teachers report not having the time to assess his learning style or provide individualized instruction. Therefore, most teachers would focus on providing multisensory instruction to the whole class so that each lesson contains visual components, auditory components, and kinesthetic components. Teachers report that this allows all students to have the opportunity to learn in a way that is consistent with their learning styles.

What is happening in this example according to research on learning and memory? Billy may have a receptive language deficit that makes it hard for him to understand and remember what he heard. This deficit may also be related to the following: attention problems, low motivation, a lack of background knowledge about the subject matter, or various behavioral issues. **What the research would recommend for Billy?** The teacher needs to find more information about this situation to determine the cause of this problem. Using a learning styles survey **would not** be useful because it only provides information about Billy's learning preferences. Research has shown that a student's learning preferences **are not** always consistent with their true abilities. However, research on learning and memory suggests individual differences in students' ability to learn information are real, and multisensory instruction might be beneficial for many different reasons. For example, the visual or kinesthetic activities used during lessons may be engaging to students which might help them improve their motivation. If Billy has memory issues, then seeing visual information on the board might be helpful to him.

Since there is very little evidence for learning styles theories, does this mean teachers are expected to change everything they belief and do in regards to learning styles?

No! Many of the learning styles strategies that teachers reported using were not consistent with the strategies recommended by learning styles theories (learning styles should be assessed and students should receive individualized instruction that matchers their learning styles). Instead, most teachers reported providing multisensory instruction to the whole class, and they reported using many other strategies that are consistent with the research on learning and memory. Although learning styles theories are flawed in some ways, this does not mean that teachers should stop using the good strategies that they use to help students who learn differently. My hope is that this information relieves teachers because it lets them know that they do not have to worry about assessing student learning styles. Instead of worrying about learning styles, teachers can focus on other individual differences such as prior knowledge or motivation. This news may seem surprising in an age when teachers are expected to do more and more, but I can assure you, when it comes to assessing learning styles, it is okay to do less.

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