PROFESSIONAL DEVELOPMENT PLANNING IN DIFFERENTIATED INSTRUCTION FOR RURAL SOUTH CENTRAL MISSOURI TEACHERS

The undersigned, approved by the Department Chair of Graduate Studies in Education, have examined a dissertation entitled:

PROFESSIONAL DEVELOPMENT PLANNING IN DIFFERENTIATED INSTRUCTION FOR RURAL SOUTH CENTRAL MISSOURI TEACHERS

Presented by John L. Westerman a candidate for the degree of Doctor of Education and hereby certify that in their opinion it is worthy of acceptance.

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PROFESSIONAL DEVELOPMENT PLANNING IN DIFFERENTIATED INSTRUCTION FOR RURAL SOUTH CENTRAL MISSOURI TEACHERS

A Dissertation
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Doctor of Education

By

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DEDICATION

To all the wonderful teachers I have had in life—from Mrs. Gullet in kindergarten to Dr. Perry, the chair of this doctoral committee, and many in between. Teachers have blessed my life. It is my hope there are students out there who will remember me with the same fondness and gratitude.

Also, this is dedicated to my parents who have passed on, and my wife, children, grandchildren, extended family and friends—for their love and encouragement which make learning and accomplishment meaningful.

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Finally, I want to thank God for so many things related to finishing this paper and degree.

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LIST OF ABBREVIATIONS

CCC	Central Comprehensive Center
DESE	Department of Elementary and Secondary Education
DI	Differentiated Instruction
ESEA	Elementary and Secondary Education Act
FRL	Free and Reduced Lunch
IDEA	Individuals with Disabilities in Education Act
IEP	Individual Education Plan
MCDS	Missouri
MDESE	Missouri Department of elementary and Secondary Education
NCLB	No Child Left Behind
NSBA	National School Boards Association
OQS	Office of Quality Schools
PD	Professional Development
SpEd	Special Education
USDOE	United States Department of Education

ABSTRACT

Primarily, this study was designed to provide data in regard to how much teachers understand and practice differentiated instruction. Secondarily, the data provided has the potential of improving efficiency and effectiveness of professional development.

Administrators may use the data gathered to develop professional development opportunities in differentiated instruction in their schools and districts. The study was conducted as a doctoral level guided research project at Southwest Baptist University. Nine small rural south central Missouri school districts cooperated by allowing their teachers to participate. Used to measure teacher understanding and practice in differentiated instruction was the Principles of Differentiation Survey. This Likert scaled twenty-five item study is designed to indicate the level of teacher use and understanding of differentiated instruction principles and whether further professional development in differentiated instruction is needed. Previously used in a study at the University of Arkansas, the survey is based upon six principles of differentiation identified by the researcher in that study.

Responding to this voluntary survey were 249 individual teachers. In designing the study it was assumed different demographic groups within the population of rural south central Missouri teachers would score differently, therefore having different levels of strength and weakness in regard to differentiation knowledge and practice. Statistically, the groups identified were homogenous in their scoring of the survey. However, data beneficial toward promoting differentiated instruction by planning effective and efficient use of professional development resources were ascertained. Recommendations geared toward those findings were generated by the data and the review of literature in regard to professional development benefiting differentiated instruction.

CHAPTER ONE

INTRODUCTION

Introduction

The purpose of this study has been to learn if and to what degree teachers understand and practice differentiated instruction. Administrators may use the data gathered to develop professional development opportunities in differentiated instruction in their schools and districts. Professional development plans for different groups of teachers may be differentiated based upon data gathered indicating the degree to which teachers understand and use specific principles of differentiation.

Differentiated instruction is an approach to planning and delivering classroom instruction taking into account individual student differences in ability, learning style, culture and socio-economic background. Differentiated instruction is assessment driven and student centered, valuing quality over quantity (Levy, 2008). Differentiated instruction has moved to the forefront of pedagogical discussion as a result of several forces on the national education scene. The Common Core Standards, Title I of the Elementary and Secondary Education Act (ESEA), and the various manifestations of the Individuals with Disabilities Education Act (IDEA) have all been aligned to No Child Left Behind (NCLB). Central to NCLB is the introduction of scientifically proven methodology and differentiated instruction into American education (USDOE, 2007).

Differentiated instruction is any instructional strategy enabling teachers to acknowledge and support individual differences in learning (Tomlinson & McTighe, 2006). Differentiated instruction is designed to maximize learning by considering students' individual differences in

culture, learning styles, abilities and academic readiness. Addressing the academic and cultural diversity of a classroom population requires teachers to offer different ways for students to explore curriculum and demonstrate learning. It requires teachers to equally value all students and the different methods required to best facilitate their learning. With differentiated instruction, the teacher aims to create learning situations matching students' current abilities and preferred learning styles while stretching their abilities and encouraging them to try new ways of learning (Tomlinson & McTighe, 2006).

Planning for differentiated instruction involves making informed decisions about the learning environment, instructional time, content, materials and resources, instructional strategies and evaluation procedures. A proactive, flexible and student centered approach is the key to providing instruction that maximizes opportunities for all students to learn (Kanevsky, 2011).

Laurie Boen (2010), in a mixed methods study, explored how two classes in one elementary school implemented Response to Intervention (RtI). Response to Intervention (RtI) is differentiated instruction. Response to Intervention is a multi-tier approach to the early identification and support of students with learning and behavior needs. Response to Intervention is scientifically based methodology (CCC, 2010a). The RtI process begins with high-quality instruction and universal screening of all children in the general education classroom. Struggling learners are provided with interventions at increasing levels of intensity to accelerate their rate of learning (Boen, 2010). Boen's research found the teachers in the study in agreement with the principles of differentiation and applied modifications for variations in pacing, learner readiness and levels of knowledge.

Multi-ethnic communities and schools were studied by Taylor and Whittaker (2003) to ascertain how differentiated instruction is carried out in racially and ethnically mixed schools.

Poverty and socioeconomic factors of the students is explored and the culture of the multiethnic school is explored, yet the size of the school and factors of rural influence are not studied. Other research oriented to rural education looks at: what makes rural schools successful; of the set of school-level factors that influence student performance, which ones do successful rural schools consider important to their success; and what characteristics describe a successful rural school (Barlay and Beesley, 2007). Archambault and Westburg (1997) conducted a multi-site case study to describe 10 elementary schools and classrooms with a reputation for implementing differentiated practices to meet the needs of high ability students. However, the schools themselves were not compared to one another based upon setting, demographics or resources.

All public schools in Missouri are monitored by the Department of Elementary and Secondary Education via the Missouri School Improvement Program (MSIP). A consortium of nine rural south central Missouri school districts cooperate with one another in continually improving and meeting the Missouri School Improvement Standards. Until 2011, the consortium cooperatively contracted a curriculum specialist to assist the districts in developing curriculum meeting the Missouri Standards and improving Missouri Assessment Program (MAP) scores. For the 2013-2014 school year, the consortium cooperated in professional development activities by holding a Professional Development Day. Each year the professional development activity is hosted by one of the nine districts on a rotating basis. In addition, the League cooperates in developing and holding academic and athletic extra-curricular activities. Superintendents in the League are devoted to the task of developing quality professional development opportunities for their teachers. State and NCLB promoted methods of teaching, such as differentiated instruction, are being used by schools within the Frisco League to varying degrees (Frisco League, January, 2013).

Both NCLB and IDEA have necessitated the adoption of differentiated instruction by school districts seeking federal funding (USDOE, 2011). No Child Left Behind, the Common Core Standards, Title I of the Elementary and Secondary Education Act (ESEA), and the various manifestations IDEA all influence the debate about differentiation. No Child Left Behind requires states to measure and compare the academic proficiency of designated subgroups. For a school or district to be tracked and assessed based upon a subgroup there must be a minimum of 30 students in that subgroup. Two of the subgroups, the Free and Reduced Lunch subgroup and the Individual Education Plan (IEP) subgroup, are tracked by MAP in each of the Frisco League districts. These two subgroups are greatly affected by factors which research indicates can be improved with differentiation of learning (Berkeley, Bender, Peaster, & Saunders, 2009).

All of the nine rural south central Missouri school districts have large populations of Free and Reduced Lunch students. Combining all of the students of the Frisco League, over 70 percent of the students enrolled are listed as members of the Free and Reduced Lunch subgroup (MCDS, 2013). This is the standard of poverty used by ESEA to ascertain which schools get Title I aide. Title I, Part A of the Elementary and Secondary Education Act (ESEA) provides financial assistance to school districts and schools with high numbers or high percentages of children from low-income families to help ensure all children meet challenging state academic standards. Federal funds are currently allocated through four statutory formulas based primarily on census poverty estimates and the cost of education in each state (USDOE, 2011).

The other subgroup tracked by the Missouri Assessment Program in all of the nine districts is the IEP subgroup which includes students with Individual Education Plans (IEP). In Missouri, districts are held to an upper limit of 14 percent of enrolled students being serviced with IEPs in the special education programs of the district. All of the nine rural districts

cooperating districts are near the 14 percent mark with approximately 840 students having IEPs (MCDS, 2013).

The IEP is a function of special education which originated under PL 94-142 in 1975. In 2004, PL 108-446 directly amended PL 94-142 by adding language from the No Child Left Behind Act of 2001, allowing for differentiated instruction in the form of Response to Intervention (RtI) in general education classrooms as an alternative to self-enclosed learning disability groups (Washburn-Moses & Bouck, (2007). The Individuals with Disabilities Improvement Act of 2004 further created a need for regular classroom teachers to use RtI and other differentiated instruction strategies by aligning IDEA with NCLB. This resulted in RtI being used as part of special education evaluation (United States Department of Education, 2007). Eligibility requirements for services other than general classroom based services through the IEP process were rewritten to require more differentiated strategies to be used in the course of the regular academic program, thereby creating education for all children including those who previously were in high incidence disability groups (Washburn-Moses & Bouck, 2007).

Problem Statement

Research indicates implementation of differentiated instruction principles increases academic achievement of students but teachers may not have similar knowledge of or be practicing the principles, incidentally leading to a lack of agreement as to the most efficient and effective implementation of differentiated instruction.

To improve student learning, using differentiated instruction in the most cost and time effective manner possible, professional development needs to be differentially targeted to specific groups of teachers based upon need. A problem for administrators is ascertaining data to assist them in developing cost effective professional development opportunities in differentiated

instruction in their schools and districts. Primarily, the study is designed to provide data in regard to how much teachers understand and practice differentiated instruction. Secondarily, the data provided has the potential of improving efficiency and effectiveness of professional development (Frisco League Minutes, January 28, 2013).

A question on the minds of superintendents is how familiar teachers are with the concepts of differentiation and whether teachers use differentiation practices in the classroom. Superintendents need to know if teachers need further professional development in differentiation of instruction and if so, in what areas of differentiated instruction (Frisco League Minutes, December, 2013). This study was designed to deliver data to assist superintendents seeking answers.

All teachers in the league need to support and be familiar with differentiated instruction (Frisco League, December, 2013). There were 516 teachers in the nine district academic and athletic consortium in a position to use differentiated instruction with students. This included teachers of all subjects and disciplines for grades kindergarten through twelve (MCDS, 2013). A culture of differentiated instruction, which includes the majority of faculty buying in to the concept, is necessary so the needs of all students in all educational opportunities are met (Flannery, 2013). Teachers of the core subjects of Language Arts, Math, Science and Social Studies as well as guidance counselors, Title I remedial math and reading, and special education teachers were all routinely in a position to use differentiated instruction concepts and methods. Music, art, health, physical education, family and consumer science, vocational and library media educators were also candidates for using differentiation. Practically all teachers are in a position to practice differentiation (Wormelli, 2007).

Rationale for Study

Meaningful targeted professional development is a prime way to improve student learning (Dufour & Marzano, 2011). Financial resources dedicated to professional development are limited (Frisco League, January, 2013). Administrators wanted to know how to best use the resources they have to provide professional development which affects learning to the greatest degree (Frisco League, December, 2013). Surveying teachers in order to learn what they need to learn about differentiated instruction enables administrators to target professional development where it needs to be.

Primarily, the study can provide data in regard to how much teachers understand and practice differentiated instruction. Administrators can use the data gathered to develop professional development opportunities in differentiated instruction in their schools and districts. Secondarily, the data provided has the potential of improving efficiency and effectiveness of professional development. Professional development plans for different groups of teachers may be differentiated based upon data gathered indicating the degree to which specific groups of teachers understand and use specific principles of differentiation.

Differentiated instruction has emerged as the model for including all children in the learning process and has become a staple of pedagogical practice as a result of legislated educational reforms (USDOE, 2011). For all students to do well on standardized tests of basic educational standards, all students must be afforded the opportunity to learn (Eaker, Dufour & Burnette, 2002). Differentiation creates opportunities for all to learn (Archambault and Westburg (1997). Certain key principles of differentiation must be understood and practiced for differentiated instruction to occur (Boen, 2010). Professional development is the best way to improve teacher effectiveness in the classroom (Dufour & Marzano, 2011). Just as teachers must

differentiate instruction with students in the classroom, superintendents and principals need data to indicate how to differentiate instruction for their teachers (Egan, 2009).

Differentiated instruction is an educational philosophy encompassing principles and practices of lesson planning and delivery so individual student differences in ability, learning style, culture, and socio-economic background are considered and addressed. Student achievement among subgroups first identified under No Child Left Behind such Free and Reduced Lunch (FRL) and Individual Education Plan (IEP) is greatly affected by factors which research indicates can be improved with differentiation of learning (Berkeley, Bender, Peaster, & Saunders, 2009).

Nine rural south central Missouri school districts cooperate in professional development activities throughout the year and annually hold a Professional Development Day on a rotating basis at one of the nine districts. In addition, elementary principals and secondary principals hold separate monthly meetings to discuss, brainstorm and share with the aim of improving their schools. Superintendents also meet monthly, along with the MSIP Area Supervisor and the DESE federal programs supervisor assigned to the region. School improvement is the major focus of those meetings. Superintendents in the Frisco League are devoted to the task of developing quality professional development opportunities for their teachers. (Frisco League, January, 2013).

In a meeting of the nine district consortium superintendents expressed a desire to know two things: Whether professional development in differentiated instruction is needed and if so, which teachers need it and specifically what those teachers ought to learn. They questioned: whether elementary teachers need the same PD as secondary; if teachers who began their careers

prior to implementation of revised ESEA and IDEA guidelines need the same PD as those who began prior; and whether subject matter taught required different PD.

This was non-experimental research and no experimental manipulation of the independent variables, to elicit a cause effect relationship to dependent variables, took place (LaFountain & Bartos, 2002). For example, some subjects may have already received training or education in differentiated instruction (IV) prior to measuring their level of commitment and practice (DV) via, in this instance, the Principles of Differentiation Survey. In this case the IV (training or education in differentiation) was treated as the IV because of its status as coming first and therefore presumably influenced how the subjects scored on the Principles of Differentiation survey (DV).

Independent Variable (IV)

The IV in this study was teachers' previous exposure to principles of differentiation. Having learned the basic concepts of differentiated instruction through either teacher preparation courses or professional development potentially affected the dependent variable. Not all teacher training programs teach differentiation concepts or methods. It may be the teachers have not been taught the value and practice of differentiating instruction for a diverse range of students. If teachers have not learned the basic concepts and methods of differentiation, then professional development tailored to ameliorate that problem is needed (Dee, 2011).

Dependent Variable (DV)

The dependent variable (DV) is the level of understanding and use of differentiated instruction principles and methodologies. This level of understanding is measured by the Principles of Differentiated Instruction Survey introduced in Chapter II. For each subject, a score has been derived from the survey of twenty-five questions using a four point Likert scale.

Null Hypothesis

It is hypothesized teachers surveyed are not in agreement with nor do they utilize the principles of differentiated instruction as measured by the Principles of Differentiated Instruction Survey.

In order for the he null hypotheses to be rejected, the mean average of the scores of all survey participants must be higher than 75 on a scale of 25 to 100. The score of 75 was determined by the following logic: Scoring for most items is 4 points for Strongly Agree, 3 points for Agree, 2 points for Disagree and 1 point for Strongly Disagree. Because of wording, the scores for items 1, 3, 5, 8, 16, 21, and 29 are reversed with 1 point for Strongly Agree, 2 points for Agree, 3 points for Disagree and 4 points for Strongly Disagree. An average score of 25, or 25 items multiplied by 1 point, translates to strong disagreement with the six principles of differentiation. A score of 50, 25 items multiplied by 2 points, indicates disagreement. A score of 75, 25 items multiplied by 3 points, indicates agreement. Therefore and this is why 75 was set as the threshold for the null hypothesis. Calculating averages is an effective method of measuring and grouping individual responses (LaFountain & Bartos, 2002).

Limitations of Study

There were two limitations in this research in the beginning. First, the study measured the commitment and use of differentiated instruction in nine rural schools in the Ozarks with student populations ranging from of 450 to just over 1000 students. In doing so, the generalizability to teachers in larger school urban schools may have been limited.

The second limitation was the inter-reliability alpha coefficient the Principles of Differentiation Survey had in its debut study.

Delimitations of Study

The first limitation created by applying this study to small rural districts is delimited by combining the data from all nine Frisco League schools with a combined student population of 6009 students. The data were treated as if coming from one pool of teachers numbering 516 teachers. This is comparable to the size of most suburban Missouri school districts (MCDS, 2013).

The second limitation of inter-reliability of the instrument has been delimited by increasing the sample size. Boen (2010) originally developed the Principles of Differentiation Survey (Appendix A) to be used in a mixed methods study with a small group of thirty-four teachers. In the Boen study, when the Cronbach alpha for the Principles of Differentiation Survey was calculated it yielded an alpha of .202 indicating poor internal reliability. It was suggested in the original study that one reason for this low alpha value was the small sample size of thirty-four. Numerous researchers have noted low sample sizes can be unstable. Research indicates a minimum of 300 subjects is generally acceptable (Rouquette & Falissard, 2010). The sample size in this particular study was seven times larger than the original study sample. Increasing the sample size had the potential of increasing the coefficient of reliability significantly and enabled the researcher to ascertain whether or not this instrument is a viable tool to be used in the future assessment of teacher commitment and practice of differentiation (Rouquette & Falissard, 2010).

Definition of Terms

Annual Performance Report (APR). The annual performance reports show how well each public school and school district is meeting the state's education standards. The reports are used to review and accredit Missouri's school districts (MDESE, 2013).

Adequate Yearly Progress (AYP). This is an accountability plan required under NCLB in which states must define their procedures for reporting a school's performance and the system in place to hold schools accountable for increasing student achievement (Central Comprehensive Center, 2010b).

Assessments. Measures of student achievement used to guide improvements in student learning such as quizzes, tests, writing assignments and other items that teachers administer on a regular basis in their classrooms. Assessments also include large-scale high stakes state and district level tests. All are used to collect data that drive the instructional decisions of teachers based upon student need (Levy, 2008).

Common Core State Standards (CCSS). Also known in Missouri as the Missouri Learning Standards, the Common Core State Standards are a set of high quality academic expectations in English, language arts, and mathematics. The CCSS define both the knowledge and skills all students should master by the end of each grade level to be on track for success in college and a career. They were created through a state-led initiative and have been adopted by a majority of the states (MDESE, 2013).

Differentiated Instruction. Differentiated instruction is carefully modified and adapted instructional strategies and assessments for essential concepts, principles, and skills to meet the learning needs of individual students (Lee, 2009).

Differentiation. Differentiation is the act of practicing differentiated instruction (Lee, 2009).

Individualized Educational Plan (IEP). An individualized educational plan is the school district designation for the subgroup of students with disabilities.

Elementary and Secondary Education Act (ESEA). Originally enacted in 1965, this act has been amended several times, most recently in 2001 and 2004 when it was reauthorized under the title, No Child Left Behind. Titles I through VII are funded through this act which aims to shorten the achievement gaps between students by providing each child with fair and equal opportunities to achieve an education (USDOE, 2011).

Free and Reduced Lunch (FRL). Free and reduced lunch is the designation for the subgroup of students who are economically disadvantaged.

Individuals with Disabilities Act (IDEA). The Individuals with Disabilities Education Act (IDEA) is a law ensuring services to children with disabilities throughout the nation. IDEA governs how states and public agencies provide early intervention, special education and related services to more than 6.5 million eligible infants, toddlers, children and youth with disabilities. *(United States Department of Education, 2007).*

No Child Left Behind (NCLB). ESEA reauthorization of 2004 which requires standardized testing for all public school students and introduces incentives for schools to adopt differentiated instruction (Berkeley, Bender, Peaster, & Saunders, 2009).

Professional Learning Communities (PLCs). Professional Learning Communities are collaborative teams whose members work together to achieve a common goal. Teachers in this case focus on the learning of each student and collaborate on assessment data and instructional practices in order to improve student performance achievement. Each member of the team is held accountable. These PLCs are normally created by grade level and/or content area (Dufour & Marzano, 2011).

Response to Intervention (RtI). RtI is a framework integrating data based decisions and interventions with a multi-tiered proactive learning centered standards based system to increase student learning for all children (Boen, 2010).

Title I. Title I, Part A, Improving the Academic Achievement of the Disadvantaged Program of the Elementary and Secondary Education Act, first enacted in 1967, was amended in 2001 and 2004 to coincide with NCLB. Title I funds are targeted to high-poverty schools and districts and used to provide educational services to students who are educationally disadvantaged or at risk of failing to meet state standards. Originally it was a remedial program for targeted populations but now provides schoolwide services (USDOE, 2011).

Summary

Primarily, the current study is designed to provide data in regard to how much teachers understand and practice differentiated instruction. Secondarily, the data provided has the potential of improving efficiency and effectiveness of professional development. Differentiated instruction maximizes learning by considering students' individual and cultural learning styles and recognizing some students will require teachers to adjust learning expectations. Addressing the academic and cultural diversity of a classroom population requires teachers to offer different ways for students to explore curriculum and demonstrate learning. It requires teachers to equally value all students and the different methods required to best facilitate their learning (Egan, 2009).

The Common Core Standards, Title I of the Elementary and Secondary Education Act (ESEA), and the various manifestations of the Individuals with Disabilities Education Act (IDEA) have all been aligned to No Child Left Behind (NCLB). Central to NCLB is the introduction of differentiated instruction into American education (USDOE, 2007). All public

schools in Missouri are monitored by the Department of Elementary and Secondary Education via the Missouri School Improvement Program (MSIP).

The sample population includes teachers from nine rural south central Missouri districts which cooperate with one another in continually improving and meeting the Missouri School Improvement Standards. The districts cooperate in professional development activities throughout the year and annually hold a Professional Development Day on a rotating basis. Superintendents are interested in developing quality professional development opportunities for their teachers. Differentiated instruction has been slow to catch on among teachers in some of the surveyed districts (Frisco League, 2013).

This was non-experimental research and no experimental manipulation of the independent variables, in order to elicit a cause effect relationship to dependent variables, took place (LaFountain & Bartos, 2002). For example, the subjects have or have not already received training or education in differentiated instruction (IV) prior to measuring their level of commitment and practice (DV) via, in this instance, the Principles of Differentiation Survey. In this case the IV (training or education in differentiation) was treated as the IV because of its status as coming first and therefore presumably influences how the subjects score on the Principles of Differentiation survey (DV). The null hypothesis is: teachers surveyed are not in agreement with nor do they utilize the principles of differentiated instruction as measured by the Principles of Differentiated Instruction Survey.

Data were gathered in this study to inform administrators in selecting and planning professional development opportunities in differentiated instruction in their schools and districts. Professional development plans for different groups of teachers can be differentiated based upon

data gathered indicating the degree the groups understand and use specific principles of differentiation.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

Three major themes were examined in the course of this literature review: the history and growing importance of differentiated instruction, the essential elements of differentiated instruction, and how professional development can enhance differentiated instruction.

Students are not uniform in their abilities, experiences, and needs. Differentiated instruction is any instructional strategy recognizing and supporting individual differences in learning. Differentiated instruction maximizes learning by: considering students' individual and cultural learning styles; recognizing some students will require adjusted expectations; and offering different ways for students to explore curriculum and demonstrate learning, as well as accepting these different methods are of equal value. With differentiated instruction, the teacher creates learning situations matching students' current abilities and learning styles while stretching their abilities and encouraging them to try new ways of learning (Tomlinson & McTighe, 2006).

Learning style, language proficiency, background knowledge, readiness to learn, and other factors can vary widely within a classroom of students. Regardless of their individual differences, however, students are expected to master the same concepts, principles, and skills. Helping all students succeed in their learning is an enormous challenge requiring innovative thinking (Barley & Beasley, 2007).

History of Differentiated Instruction

This review of literature began with a history of differentiated instruction and the learning theorists who figure prominently in the development of differentiation. Secondly,

consideration shall be given to how differentiation has emerged as methodology supported by practicing educators. Finally, in this section on the growing importance of differentiated instruction, the influence of legislated educational reform is examined.

Learning theorists.

By necessity, and without being named such, an early form of differentiated instruction was a staple of the American one-room school houses of the 19th century. In that environment children of different ages and different levels of readiness were grouped and regrouped as needed to meet the learning needs of the schools as well as the capability of a single teacher. As student populations grew, children were grouped according to age and grade levels, resulting in whole class instruction being the norm, though levels of instruction were tiered in reading and math in first and second grades. By the early 1950s critics began to emerge who felt the one size fits all approach was less than satisfactory. Carleton Washbourne (1953) wrote about the varied abilities, interests and developmental levels of public school students, questioning how teachers might utilize those differences. Virgil Ward coined the phrase differentiated instruction in the 1960's (Ward, 1961). He believed differentiated instruction was necessary for gifted students. Ward's intentions were for differentiated instruction to be used for meeting the needs of gifted students whose potential he believed was being lost in the one size fits all approach being used in most classrooms (Ward, 1987).

Learning theory has influenced the development of differentiated instruction (Dweck, 2006). The three most often discussed learning theorists mentioned by differentiation researchers are the Russian, Lev Vygotsky (1896-1934), Jerome Bruner (1915-), and Jean Piaget (1896-1980,) a cognitivist whose theory some view as being antithetical to differentiation (Santrock, 2004).

Jean Piaget was a stage theorist who came up with the well-known four-stage theory of cognitive development. Those stages consisted of the sensory-motor period, ages 0-2; pre-operational stage, ages 2-7; concrete operational stage, 7-11; and the formal operational stage, age 11 plus. Piaget believed development is the combined result of: maturation of the brain and nervous system experiences that help children adapt to new environments - adaptation: an organism's ability to fit in with its environment through the process of assimilation and accommodation. Social cognitivists have criticised Piaget for underestimating the abilities of children and the impact of culture on cognitive development. The theory of Piaget in essence promotes that a child's cognitive development must precede learning (Santrock, 2004).

Lev Vygotsky pioneered the social constructivist theory of learning. Vygotsky's work emphasizes the important role of social interaction in cognitive development. In fact, Vygotsky's theory goes even further to explain the importance of culture and how it shapes cognitive development and how language affects learning and intellectual development (Peterson, 2008). Vygotsky's theories and those who adhere to them place great emphasis on the role of social influences to learning and development of cognition. Learning is essential to culturally and developmentally healthy cognitive development. In effect, Vygotsky's work indicates social learning precedes cognitive development (Vygotsky, 2007).

Much is made by social constructivists of the differences between Piaget and Vygotsky. Vygotsky's theory supports cultural/social interaction as being necessary to promote learning and cognitive development. The social constructivists contend Piaget's theory of cognitive development underestimates and discounts the need for socio-cultural influences on learning (Santrock, 2004). However, Piaget and Vygotsky are not incompatible as some promoters of differentiation would lead us to believe (McLeod, 2007). It is possible to find many instances of

Piaget stating both individual psychological and sociological influences are important to cognitive development (Cole & Wertsch, 1996). Vygotsky recognized individual activity as being crucial to cognitive development, especially in the realm of speech (Landry, et.al, 2002)

Lev Vygotsky created two important concepts relative to differentiated instruction and learning. The first concept is the need for social interaction with a skillful tutor, referred to as a more knowledgeable other (MKO). The MKO can be either an adult teacher or a peer who has more knowledge and/or experience. The other major concept developed by Vygotsky is the zone of proximal development (Verenikina, 2003). The zone of proximal development is that area of knowledge or skill acquisition lying between what the child already knows and what they do not yet know. Within the zone of proximal development are the skills too difficult for a child to master on their own without the direction and support of an MKO. The idea is a child is only able to take the next step in their cognitive development if another person – typically an adult – supports and prompts them to do so. This sort of assistance has been called scaffolding (Vygotsky, 1998).

Jerome Bruner and associates expanded upon Vygotsky's zone of proximal development introducing the concept of scaffolding. Scaffolding requires an MKO to guide a student through structured interactions, in gradually approximating a desired final outcome. The context of scaffolding is one in which the MKO helps students develop cognitive skills. An important aspect of scaffolding is a gradual withdrawal of support as the child's knowledge and confidence increase. Bruner's theories lead teachers to become facilitators of mastery learning rather than the instrument by which students learn (McLeod, 2012). Mastery learning and scaffolding are closely tied to the work of Benjamin Bloom (Verenikina, 2003).

Bloom's taxonomy suggests a system of coding in which people form a hierarchical arrangement of related categories (Guskey, 2005). Each successively higher level of categories becomes more specific as knowledge is acquired. Bloom's work gave rise to the development of the Mastery Learning concept based first upon the feedback, corrective and enrichment process and secondly upon instructional alignment (Guskey, 2005).

Howard Gardner and his Multiple Intelligence Theory have become prominent in the differentiated instruction literature (Wormelli, 2007). According to Gardner's theory, people have varying degrees of ability in regard to eight different types of intelligence. Those intelligences are verbal, linguistic, musical/rhythmic, logical/mathematical, visual/spatial, bodily/kinaesthetic, naturalistic, intrapersonal and interpersonal. With individual students having different ways of learning based upon which intelligences are predominant in them. This allows teachers to approach the facilitation of learning by creating pathways which best fit the ways in which their students learn (Chapman & King, 2012).

Growing acceptance of differentiated instruction.

A rather common approach to differentiation and school improvement of learning is the Response to Intervention model. Response to Intervention (RtI) is a multi-tier approach to the early identification and support of students with learning and behavior needs (CCC, 2010a). The RtI process begins with high-quality instruction and universal screening of all children in the general education classroom. Struggling learners are provided with interventions at increasing levels of intensity to accelerate their rate of learning (Boen, 2010). These services may be provided by a variety of personnel, including general education teachers, special educators, and specialists. Progress is closely monitored to assess both the learning rate and level of performance of individual students. Educational decisions about the intensity and duration of

interventions are based on individual student response to instruction. Response to Intervention is designed for use when making decisions in both general education and special education, creating a well-integrated system of instruction and intervention guided by child outcome data (Kingore, 2011). For RtI implementation to work well, the following essential components must be implemented with fidelity and in a rigorous manner: (1) All students receive high-quality, research-based instruction in the general education classroom. (2) Universal screening and progress monitoring provide information about a student's learning rate and level of achievement, both individually and in comparison with the peer group. These data are then used when determining which students need closer monitoring or intervention. Throughout the RtI process, student progress is monitored frequently to examine student achievement and gauge the effectiveness of the curriculum. Decisions made regarding students' instructional needs are based on multiple data points taken in context over time. (3) A multi-tier approach is used to efficiently differentiate instruction for all students. The model incorporates increasing intensities of instruction offering specific, research-based interventions matched to student needs. (4) Schools implementing RtI provide parents information about their child's progress, the instruction and interventions used, the staff who are delivering the instruction and the academic or behavioral goals for their child (Berkley et al, 2009; CCC, 2010a)

Federal initiatives.

Stakes have been raised for the use of differentiated instruction in America's schools including the schools of the Frisco League. The United States Congress has enacted legislation, beginning with the 1997 IDEA, and culminating with the alignment of both ESEA and IDEA to NCLB in 2004, progressively redirecting education toward differentiation in the classroom

(USDOE, 2007). Two very important programs in any public school, including those in the Frisco League, are Title I and Special Education (MCDS, 2013).

At-risk funding is tied to poverty and differentiation of services. Title I, Part A (Title I) of the Elementary and Secondary Education Act (ESEA) provides financial assistance to local educational agencies (LEAs) and schools with high numbers or high percentages of children from low-income families to help ensure that all children meet challenging state academic standards. Federal funds are currently allocated through four statutory formulas that are based primarily on census poverty estimates and the cost of education in each state (USDOE, 2011). In Missouri, Title I funds are distributed in relation to the percentage of free and reduced lunch numbers of each district. Additionally, Title I funding is used by the federal government to encourage states and school districts implement standards based education such as the Common Core State Standards, a key component of differentiated instruction. These guidelines require districts and states to test all students in grades three through eight each year in math and language arts. Student achievement scores for each school and district are reported each year and specific subgroups populated by a minimum of thirty students are also reported (Hyde & Webber, 2004). These scores make up the performance portion of the annual MSIP Annual Performance Report (APR), by which each district and state is judged. Under the growth formula currently in place districts are expected to improve each year on Annual Yearly Performance (AYP) in their math and language arts scores (MDESE, 2013). Two of the subgroups, the FRL subgroup and the IEP subgroup, are tracked by MSIP in each of the Frisco League districts (MCDS, 2013).

All schools in the survey sample have large populations of free and reduced lunch students. Over 70 percent of the populations of the Frisco League schools are listed as free and

reduced lunch. This is the standard of poverty used by ESEA to ascertain which schools get Title I aide. Title I, Part A of the ESEA provides financial assistance to local educational agencies (LEAs) and schools with high numbers or high percentages of children from low-income families to help ensure that all children meet challenging state academic standards. Children of poverty are greatly affected by factors which research indicates can be improved with differentiation of learning (Berkely, Bender, Peaster &Saunders, 2009).

Requirements for Title I funding changed in 2001 and 2004 as a result of legislation promoting scientifically proven methodology and differentiated instruction. By tying Title I more closely to NCLB the emphasis for improving education among disadvantaged children changed from being a targeted program which removed and isolated students needing remediation from the regular population. A schoolwide program was introduced to upgrade the entire educational program of each participating school so that all students are to be served in classrooms where differentiated instruction is foundational as the method of instruction in the classroom (USDOE, 2011).

In 1975, Public Law 94-142, also known as the Education for All Handicapped Children Act, was signed into law after two very prominent 1972 U.S, Supreme Court cases: Pennsylvania Association for Retarded Children (PARC) v. Commonwealth of Pennsylvania and Mills v. Board of Education, District of Columbia. The courts determined in both cases that education is a right of all citizens and children with disabilities are entitled to a free and appropriate education the same as nondisabled children. PL 94-142 included a Bill of Rights for children with disabilities and their families. Six principle guarantees of that legislation were: the right to a free and appropriate education (FAPE); the right for students with disabilities to be educated as much as possible with nondisabled children in a least restrictive

environment (LRE); an individual education program (IEP); procedural due process; a nondiscriminatory multidiscipline assessment prior to educational placement; and parental participation in the decision making process (USDOE, 2007).

PL 94-142 has been amended. In 1986 it was changed to included toddlers and infants. In 1990 the act was renamed the Individuals with Disabilities Act (IDEA) and the concept of developing, for each student, Individual Transition Plans (ITP) by age 16 was introduced. But, in 1997 major changes came to the IDEA regulated process for children with disabilities (USDOE, 2007).

The 1997 IDEA changes effected behavioral discipline and expanded the range of assessment strategies and tools in gathering better functional and developmental data. Major IEP process changes such as the requirements for: regular educators to take part in the IEP process, planning involvement and progress in the general education environment, the development of benchmarks and measurable goals, considering assistive technology, and expanding related services for the vision impaired. Also, States are required to offer mediation services in the event of disputes. IEP afforded students were required to participate in statewide and district wide assessment programs or be given a relevant alternative assessment (USDOE, 2007).

In 2004, PL 108-446 directly amended PL 94-142 by adding language from the NCLB of 2001 regarding highly qualified teachers, meeting the needs of those with limited English proficiency and emphasizing core academic subjects. It created a pilot for experimenting with three-year IEPs, and did away with the benchmark requirements of 1997. But, the 2004 amendments most significantly allowed for differentiated instruction in the form of Response to Intervention (RtI) in general education classrooms as an alternative to self-enclosed learning disability groups (Washburn-Moses & Bouck, (2007).

A second congressional act, in regard to IDEA in 2004, further created a need for regular classroom teachers to use RtI and other differentiated instruction strategies by aligning IDEA with NCLB. This resulted in RtI being used as part of special education evaluation and requiring that RtI interventions be research based interventions and for IEP teams to base all planning on peer-reviewed scientific literature (USDOE, 2007). Eligibility for services other than general classroom based services through the IEP process were tightened to require more differentiated strategies to be used in the course of the regular academic program, thereby creating education for all children including those who previously were in high incidence disability groups (Washburn-Moses & Bouck, (2007).

The Elements of Differentiated Instruction

The literature is consistent in delivering a central message regarding differentiated instruction. It is a philosophy, mindset, set of principles and a collection of inter-related beliefs about how teachers can best take on the role of learning facilitator in behalf of all students. By differentiating instruction, teachers can enhance the learning of all students because of their differences rather than in spite of them. Teachers must recognize their classrooms contain diversity in life experience, ability, levels of past achievement, and learning readiness. This recognition of diversity enables teachers to plan how to address those differences in the delivery of instruction so all students learn (Rock et al., 2008).

Differentiation researchers have learned teachers take on the role of learning facilitators in which they make the learner and the quest of knowledge the center of activity and focus in the classroom. Under this conception, teachers plan lessons from the outset that address the variance in student learning in a classroom. Teachers no longer develop one-size-fits-all lessons that they adjust slightly to meet various needs. Instead, they plan for variance. Tiering lessons so there are

at least three levels of rigor presented or making sure all learning styles are addressed by presenting material kinesthetically, auditorily, and visually are but two ways a teacher can plan in advance for student variance (Peterson, 2008).

Planning for differentiated instruction involves making informed decisions about the learning environment, instructional time, content, materials and resources, instructional strategies and evaluation procedures. A proactive, flexible and student centered approach is the key to providing instruction that maximizes opportunities for all students to learn (Kanevsky, 2011).

Learning about one's students and understanding their particular strengths and weaknesses is a first step in successful planning of differentiated instruction. Teachers in any given subject area must identify the level at which individual students are. Standardized test scores and other information found in student records can help determine this information. Also, teachers can administer learning style inventories and by asking students to identify topics that interest them and activities that occupy their non-school time. Consistently utilizing a broad range of formal and informal formative assessment strategies and applying the results for planning purposes, is routine for the differentiating teacher (Koeze, 2007).

Differentiated instruction requires planning, commitment, and acknowledgment that diverse abilities, experiences, and interests have an impact on student learning. There are three steps to take before a teacher can begin to engage in differentiated instruction: Assess students' strengths, weaknesses, interests and learning styles. Identify the areas of curriculum that can be adapted to differentiated instruction. And third, the teacher must self-examine and adapt to the role as a facilitator in a differentiated classroom. Researchers agree it is essential for teachers to continually adjust curriculum and instructional methods to meet the student diversity found in the classroom (Tomlinson et al., 2003).

There is currently a great deal of published research and collective experience in regard to differentiated instruction enabling educators who specialize in differentiated instruction research to identify what works and does not work in curriculum and instructional delivery. While there are commonalities found in the development of identifiable markers of the characteristics of effective differentiated instruction, there are also some slight differences.

Rock, Gregg, Ellis and Gable (2008) stated there are four guiding principles and seven different essential beliefs in regard to differentiated instruction resulting in productive differentiation in the classroom. They identify the guiding principles as being ready to focus, respond, integrate and continually adjust. The teacher is guided by principles which lead them to focus on the essential ideas and skills in each content area while responding to student diversity by continually integrating assessment into the instructional process leading to continual adjustment of pacing, materials and rigor to better meet the learning needs and abilities of the students in the classroom (Rock et al., 2008). The seven essential beliefs Rock and associates identify are:

1. Same aged students differ in life experience and readiness to learn.
2. These differences considerably influence learning.
3. Being challenged beyond one's personal level of experience and readiness increases the level of learning attained by a student.
4. Learning is enhance and more enduring when it can be related to real life.
5. Authentic learning opportunities enhance learning.
6. Learning is enhanced when students feel they are respected and valued by the school, community and especially the teachers.

7. The ultimate goal of education is to recognize and build upon or improve the abilities of each student. (Rock et al., 2008, p. 33)

Rock and associates emphasize adherence to all seven of the above beliefs will lead a differentiating teacher to tailor lesson development and delivery to the diverse needs of student ability, interest and the manner in which they learn best (Rock et al., 2008).

Carol Ann Tomlinson, et al. (2003) identified certain Hallmarks of Effective Differentiation. They base these hallmarks on theory and research. The first and main thing stressed is: teachers must be committed to the philosophy and belief all students can learn and as learning facilitators they must consistently engage in the practice of creating and adjusting curriculum and instructional methods to the needs of the students in the classroom.

The hallmarks are:

1. Effective differentiation of curriculum is proactive and not reactive.
2. Effective differentiation employs flexible use of small teaching-learning groups in the classroom.
3. Effective differentiation varies the materials used by individuals and small groups in the classroom.
4. Effective differentiation uses variable pacing as a means of addressing learner needs.
5. Effective differentiation is knowledge centered.
6. Effective differentiation is learner centered. (Tomlinson, et al., 2003, pp. 131-133)

Principles of differentiation.

Laurie Boen (2010) identified six major principles of practice differentiating educators believe in and utilize. Boen calls these the Principles of Differentiation. They are based very closely on the work of Tomlinson et al (2008).The principles are: the adoption of a proactive curriculum;

utilization of flexible small groups; the use of varied materials; modification of the pace of learning; learner centered delivery and focus; and knowledge centered instructional planning based on standards and goals. These Principles of Differentiation form the basis for Boen's Differentiated Instruction Survey, an instrument used to measure the level of commitment to and practice of differentiated instruction in the classroom. Boen's work and the Differentiated Instruction Survey are integral to this particular study.

Proactive curriculum.

Differentiated instruction works best in schools having a proactive curriculum approach. A proactive curriculum is a standards-based curriculum. The goal of standards-based curriculum development is to provide a scope & sequence of learning activities consistent within each subject discipline, within each grade level, all grade levels in each school, and in all schools in the district. These learning activities have to be tied to achievable outcomes consistent with state standards. The curriculum has to include instructional strategies for achieving these outcomes, as well as a variety of assessments providing students with multiple opportunities to achieve these outcomes (Tomlinson & McTighe, 2006).

In order for a proactive curriculum approach to work teachers must learn about the students with whom they are facilitating the learning of that curriculum. Learning about one's students and understanding their particular strengths and weaknesses is a first step in successful planning of differentiated instruction. Before differentiation can occur, a teacher needs to know what their students already know or how well they are learning during the facilitation of the curriculum during any given unit of instruction. Teachers must identify the level at which individual students are working in the subject area. Standardized test scores and other information found in student records can help determine this information. A learning style

inventory can be given to determine how a class of students optimally learns. An instrument can Student interests can be learned through a variety of assessments including an interest inventory tool found in most guidance departments, or by regularly asking students to identify topics that interest them and activities that occupy their non-school time.

In a proactive curriculum approach, teachers plan lessons, but are flexible and willing to modify how it is taught based on how the students are responding. Teachers take responsibility for the academic success of their students. Students within the same classroom may be assigned different work. Pre and post assessments are made for each lesson (Boen, 2010).

Differentiation requires more than a teacher developing a single lesson for everyone in the class and modifying it for individual students on the spot rather than planning in advance for variance of student need. A teacher must do more than make slight changes to the one-size-fits-all method of lesson planning and must encompass forethought, planning and address the variety of student need if effective learning is going to occur for everyone (Tomlinson et al., 2008).

Also important is student motivation and interest in what is being presented. Nolen (2007) studied sixty seven children during literacy activities over a three year period, beginning in first grade and ending in third grade. He determined that students' interest in the plot and characters of a story, as well as reading a favorite author, in a particular genre or about a favorite topic greatly increased reading motivation in these particular students. Among teachers who differentiate and those who do not, there is a difference of opinion regarding whether or not motivating a student to learn is a responsibility of the teacher and whether motivation makes a difference. However, research would indicate that motivation is a major function of learning. Educational psychologists consider a student's motivation to be a central ingredient in the recipe for learning and achievement. A study by Shiefle, Schaffner, Moller & Wigfield (2008) supports

the notion student motivation impacts learning more than other factors such as prior knowledge, or intelligence. In learning to read, the level of motivation is a greater indicator of success or failure than the quality of materials and teacher strategies.

Flexible small groups.

Students vary in the environmental and interactive structures in which they learn best. Individual study works best for some while whole class instruction is a better fit for others. A third way is small group interaction. There are actually several ways a teacher can structure groups: whole class, half class, teams of varying sizes, small student led groups, partners, triads, one-on-one mentoring, temporary pullout groups, anchor activities to which students return after working in temporary groups, and learning centers (Wormelli , 2007).

The Tomlinson et al (2008) paper references a meta-analysis of group size and the effect of small groups verses whole class groups on learning. Students in small within class learning groups of three to four in size achieved more than students not learning in small groups. The study also indicated students, in classrooms where small groups were used, more positively viewed learning and measured higher on self-concept measures than students in classrooms where small groups were not used. An interesting finding of the meta-analysis was that low ability students learned better in heterogeneous groups, medium ability students fared better in homogeneous groups and high ability students did well in either group. The researchers posited teachers have more flexibility to address learner variance in small groups than in whole class instruction. It was opined by the researchers that variance in attitudes, abilities and learning styles leads to the need to change the composition of the small groups often.

Flexible grouping began in the American one-room school houses of the 19th century. In that environment children of different ages and different levels of readiness were grouped and

regrouped as needed to meet the learning needs of the schools as well as the capability of a single teacher. As school community populations grew there became enough students to regroup them according to age and grade levels, resulting in whole class instruction becoming almost exclusively the instructional delivery system of grades three through twelve. Some schools continued to differentiate levels of instruction in reading and math in first and second grades, and then beginning in third grade students were tracked into whole class groups of like abilities and readiness. Under tracking, schools assigned students to classrooms according to their overall achievement, so a given classroom was primarily composed of students with high, average, or low academic achievement. However, these groups often became permanent and whole class instruction was the norm. People in different tracks were simply taught different things. There was often stigma attached to such groups. In some cases tracking was used for social rather than academic reasons and it has fallen out of favor (Zittleman and Sadker, 2006).

Flexible temporary grouping is different than tracking. Flexible grouping takes place in academically, culturally and racially heterogonous classrooms. Teachers who use flexible grouping strategies often employ several organizational patterns for instruction. Students are grouped and regrouped according to specific goals, activities, and individual needs. When making grouping decisions, the dynamics and advantages inherent in each type of group must be considered. Both teacher-led and student-led groups can contribute to learning. Today, classrooms are filled with children from an increasing variety of cultural and economic backgrounds. As part of a national push for citizens who can think, solve problems, work with others, and learn on the job, educators are taking a close look at the implications of using whole group and ability group instruction exclusively. Informally grouping and regrouping students in a

variety of ways throughout the school day can make a teacher's job easier and students more productive (Hougen, 2004).

A differentiating teacher tiers assignments in a variety of ways for a variety of purposes such as: by readiness, challenge/complexity, learning preferences, level of abstraction, learning resources, or degree of instruction.

Use of varied materials.

Using the right materials with the right people and in the right way is essential in maximizing the impact of knowledge based learning. For a variety of reasons teachers will use different materials to teach the same concepts to different students. For example, if a class has diverse academic skill levels, the teacher may want to use materials consisting of varied reading skill levels in order to enable less skilled readers to learn the concepts being taught. In that same class there may be advanced students who may want to go beyond the traditional text offered to the general class population and read additional works. Or, there may be a film that perfectly captures aspects of the planned curriculum better meeting the needs of some students (Lumby, 2011).

When there are varied levels of readers in elementary classrooms, tiering often takes place and three small flexible groups in the same classroom may each be using different leveled readers. Tomlinson (2005) suggests a variety of strategies and materials in teaching reading: flip books, split journals, books on tape, and highlights on tape, digests, Cliff Notes, not taking organizers, varied texts, varied supplemental materials, and highlighted texts. Tomlinson suggests using varied presentation materials to reach auditory, kinesthetic and visual learners.

When choosing materials for a lesson or unit, the teacher will often choose one or two broad concepts or skills that lend themselves to being taught at different degrees of complexity. They will then brainstorm ideas for activities, tasks, and assessments that address a specific

concept or skill. A range of learning preferences, abilities, and interests will be covered. And a variety of materials will be used to maximize the experience for all learners (Dunphy, 2010). Research shows students learn better when materials are tailored to the learning styles and abilities of the members of the small group. Also, students learn more when instructional materials are varied for each group rather than assigning the same materials to everyone. In other words, teachers "should match instructional materials to the specific instructional needs of groups (Tomlinson et al, 2008).

Using materials and strategies that appeal to the interest and motivation of students to engage in learning is key to successful differentiation. It is important that teachers pay attention to and attempt to increase student motivation to learn. For example, eagerness to read a certain selection due to a desire to satisfy one's individual interest can lead to a more habitual readiness to read and is therefore defined by some researchers as a motivating factor. Generating student interest in a subject increases the likelihood that a student will engage in reading about that subject. Reading ability is strengthened via the old adage practice makes perfect. Also, subject matter is learned and more likely to be retained as well. By selecting reading materials or authors of interest to the students, greater motivation to read will occur (Shiefle, Schaffner, Moller & Wigfield, 2008).

Modification of the pace of learning.

Differentiated instruction is an instructional theory allowing teachers to face this challenge by taking diverse student factors into account when planning and delivering instruction. Based on this theory, teachers can structure learning environments that address the variety of learning styles, interests, and abilities found within a classroom (Dunphy, 2010).

Differentiated instruction is based upon the belief that students learn best when they make connections between the curriculum and their diverse interests and experiences, and that the greatest learning occurs when students are pushed slightly beyond the point where they can work without assistance. This point differs for students who are working below grade level and for those who are gifted in a given area (Edwards, 2013).

Rather than simply teaching to the middle by providing a single avenue for learning for all students in a class, teachers using differentiated instruction match tasks, activities, and assessments with their students' interests, abilities, and learning preferences. The differentiating teacher must self-examine and redefine their role in a differentiated classroom. They must find new ways to vary instructional delivery methods. Targeting identified learning styles such as auditory, visual, and kinesthetic learning can enhance the approach a teacher takes in facilitating learning. A successful teacher will develop a general plan for the use of time, space, and materials in the classroom. On any given day, not all students will be working on the same assignment at the same time. A differentiating teacher must have a plan for student access to necessary materials, where individuals or groups will work, and how much time can be allotted to specific tasks. Identify alternative methods of assessing student performance and understanding. Assessment results should increase teacher understanding of students' abilities, interests, and needs, and should be incorporated into future planning (Roe, 2010).

Teachers need to pace instruction to the needs of the learners in classroom. Low level students may not be able to keep up when the pace is aimed at mid and high level students high level students are frustrated at the slow pace when the pace is aimed at lower level learners. What has been found to be more effective is to be flexible in the amount of time allotted for achievement in the classroom (Tomlinson et al., (2008)).

Learner centered.

Differentiated instruction requires planning, consistent perseverance, and recognition that diverse abilities, experiences, and interests tremendously impact student learning. There are three steps to take before a teacher can begin to engage in differentiated instruction: Assess students' strengths, weaknesses, interests and learning styles. Identify the areas of curriculum that can be adapted to differentiated instruction. Third, the teacher must self-examine and redefine their role in a differentiated classroom (Howery, 2013).

Learning about one's students and understanding their particular strengths and weaknesses is a first step in successful planning of differentiated instruction. Identify the level at which individual students are working in your subject area. Standardized test scores and other information found in student records can help determine this information. Teachers may administer a learning style inventory to determine how students learn, whether it be auditory, kinesthetic or visual. An instrument can be obtained through the guidance department at your school. Determine student interests. On a regular basis, ask students to identify topics that interest them and activities that occupy their non-school time (Howery, 2013).

Students learn in ways and at different paces, therefore, teachers need to plan for and offer different learning experiences to increase the likelihood of student success in learning. The student is the center of the classroom. Teachers need to know their students' readiness, learning preferences, and interests. Instruction must be consistently adjusted, modified, or adapted to specifically respond to these differences (Kanevsky, 2011).

Knowledge centered.

In 2012, the Missouri Department of Elementary and Secondary Education adopted the Common Core Standards. Each state's department of education adopts standards consisting of instructional

goals and objectives for each subject and identifies the major concepts, principles, and skills students should learn. Developed by educators across the country, including Missouri where the Common Core State Standards have been rebranded the Missouri Learning Standards, provide the standards students are expected to sequentially learn at each grade level. The rationale is this: learning outcomes improve when students, parents and teachers are on the same page, working toward shared goals. The standards are structured so students learn basic and higher-order skills, including problem solving and critical thinking. The standards reflect the knowledge and skills students need to know to achieve their goals. They are research and evidence based. They are designed to prepare students to live and work in a global society. The standards do not require schools to use specific curriculum or teaching methods – those decisions are made at the local level by school boards, superintendents, principals and teachers. The standards were developed in order to: establish consistent learning goals for all students; provide a clear roadmap of academic expectations at each grade level; prepare students for post-secondary education and a globally competitive workforce; be academically rigorous; attainable for students; and practical for teachers and districts (Office of Quality Schools, 2012)

In a knowledge based instructional program it is understood that students learn in different ways and at different paces, therefore, teachers plan for and offer different learning experiences to increase the likelihood of student success in learning. The focus is on acquiring a depth of knowledge of standards and goals rather simply covering the curriculum without learning the content. While learning time is flexible there is a routine established as a means of creating order and utilizing classroom time most efficiently. Instruction must be consistently adjusted, modified, or adapted to specifically respond to their students' readiness, learning preferences, and interests (Smith, 2011).

A differentiating teacher allows for testing out of content, skills or processes. Then eliminates or compacts curricular activities. The teacher then provides "instead of" learning opportunities that go beyond the regular curriculum and/or capture the students' interests (Koeze, 2007).

In a knowledge centered classroom or school, grades should reflect the attainment of learning goals. Learning progress, work habits, attitudes are also reported, but in a different manner. Grading integrity is a component of differentiated instruction. Whether a grading system is honest and whether it adequately measures and reports in an honest way the academic achievement of the students being graded are two very important standards for grading (Sadler, 2010). Sadler (2010) researched this topic by looking at grading methods and components in higher education. Sadler was concerned that certain assessment practices have worked their way into teaching, learning and assessment contexts over a considerable period of time. He found that in higher education these dubious practices include components counted as student achievement that in fact have nothing to do with the students' quality, depth and extent of knowledge or competence.

Grading integrity is also a problem in K-12 education in America. A lack of integrity in grading in K-12 education is represented in the very widespread practice of including learning progress, work habits, attitudes and behavior in the matrix used to assign grades rather than assigning grades that reflect attainment of learning goals (Heacox, 2009).

In addition to the problem with grade integrity many educators have the notion that in order to fairly apply a grading system, all students must be graded equally. They must be graded on the same assignments using the same criteria. In many schools in the United States, equality in grading is attempted by structuring grading scales in a one size fits all approach. In an effort to

be fair our educational system has adopted the notion that everyone must receive equal treatment in classroom assignments, length of time to complete those assignments and the grading of those assignments (Kilic & Cakan, 2006).

Additionally, grade point averages have become high stakes with competition in scholarships and class ranking taking precedence over learning and achievement. Grading systems, most specifically the structure of such, can have a significant effect on the learning process, according to research conducted in the European Union (Dahlgren, Fejes, Abrandt-Dahlgren, & Trowald 2009).

Wormelli (2006) deals extensively with effective assessment and grading in the differentiated classroom. Among other things, Wormelli encourages teachers to: follow the research and allow students to redo assignments in order to encourage the mastery of learning; vary how they teach students of various abilities and allow assignments to vary among students in the same class; create fair tests that measure the level of rigor and depth of learning; and make sure all recorded grades are accurate, consistent, meaningful, and supportive of learning. Wormelli is joined by fellow differentiation specialists who suggest grading should indicate progress toward learning instead of reflecting what they call an arbitrary and an inconsistent collection of academic and nonacademic factors that might include test results, compliance with homework policies, subjective evaluations of effort, and points for class participation (Marzano, 2000).

Traditional assessments and grading are based upon learning a series of facts geared toward successfully passing a test. Once the test is completed, regardless of the grade, the class and hence each student in that class, moves on whether or not mastery of the subject matter is achieved. All students in a particular class are expected to learn, understand and master the same

material and concepts at the same time and at the same pace and with the very same instruction. It is suggested by differentiated instruction leaders that the traditional methods of teaching, assessing and grading have failed a large segment of the school population (Anderson, Mascall, Stiegelbauer & Park (2012). Differentiated instruction advocates believe grades must become informational and descriptive relative to a student's mastery of educational material (Berbaum, 2009).

Meaningful grades are derived from mastery of standards. It is based largely upon the work of Benjamin Bloom in the 1970s. Bloom was studying the variation of grades in classes and saw a vast difference between those who had higher grades and those with lower ones. In an effort to create more balance, Bloom considered how those with the lower grades could be given the chance to do better on tests by receiving the help they needed. He originated a model of knowledge based learning called mastery learning. Under this model, a unit of material is taught, and students' understanding is evaluated before they are able to move on to the next unit. This method is successful in improving grades and lessening the divide between students (Dufour & Marzano 2011).

Mastery learning ensures the ultimate goal of any course - the understanding and learning of new material - is achieved. It also gives students who are struggling opportunities for improvement not available in the more traditional models. It provides clear, individualized feedback that can help each student realize what they are missing and how to attain it. It also helps those who are already doing well to develop their potential more fully through further activities. Mastery learning shows students the focus is not on their grade, but on what they learn (Levy, 2008).

Professional Development Enhancing Differentiated Instruction

In essence, effective professional development focuses on instructional strategies impacting student achievement followed up by coaching and mentoring which sustains the selected strategies (Allison, 2011).

John Hattie's (2012) meta-analyses research in teacher/educational practices found evidence professional development with the highest impact on student learning is oriented toward teaching teachers to: develop high expectations for each and every student; provide better feedback to students; developing more effectual teacher-student relationships; employ strategies to improve meta-cognition; accelerate learning; teach study skills; teaching learning strategies to students; and avoid labeling students. Another practice with high impact on student learning is providing formative evaluation to teachers. These are all practices integral to effective and productive differentiated instruction.

Hattie's research is supported by what differentiated instruction professional development providers have reported in regard to teacher requests for professional development. Differentiated instruction trainers from the South Central Missouri Professional Development Center working with teachers from nearly 100 school districts report teachers attending their workshops often express verbally and in written workshop evaluations a desire for specific strategic training in differentiated instruction that is immediately practicable in the classroom (Anderson, 2013b).

A review of the research indicates the most effective and practically enduring professional development occurs when it is practiced on the job, so to speak. Job embedded professional development, following initial learning of ideas, concepts and strategies is the most

effective way of learning to practice and apply differentiated instruction, or any new pedagogical approach (Allison et al, 2011).

The South Central Regional Professional Development Center (SCRPDC) offers differentiated instruction workshops with four specific emphases: Differentiated instruction is the foundation of good teaching. Differentiation is for all students. Student differences need to be understood and appreciated by their teachers, and assessment and instruction are inseparable. Then, once the groundwork in those four areas has been laid, professional development instructors begin building teacher knowledge of differentiated instruction strategies (Anderson, 2013a). These four areas are based on Tomlinson's Hallmarks of Differentiation: Effective differentiation employs flexible use of small teaching-learning groups in the classroom. Effective differentiation varies the materials used by individuals and small groups in the classroom. Effective differentiation uses variable pacing as a means of addressing learner needs. Effective differentiation is knowledge centered. Effective differentiation is learner centered (Anderson, 2013b). In concert with these strategy workshops, the SCRPDC teaches workshops on coaching and mentoring (Anderson, 2012a).

Teachers find professional development to be relevant when it is something they can apply in the process of doing their everyday work as educators. Job embedded professional development follows up traditional workshops with collaborative projects, written reflections, and mentoring or coaching in the application of what is learned in the workshop. This follow-up professional development consisting of coaching or mentoring within the classroom context leads to the adoption of new techniques by the developing differentiation educator (Quick, Holzman & Chaney, 2009).

Strategies designed to promote the six principles of differentiation are as follows.

Professional development leading to a proactive curriculum.

A proactive curriculum approach is one in which the teacher writes lesson plans based upon curriculum relating back to standards of learning. The teacher is responsible for facilitating learning for a diverse group of students who are experientially, developmentally and motivationally varied. Different levels of learning readiness, interest and ability exist thereby requiring the teacher to create within a lesson or unit different levels of expectations for task completion or even different assignments in response to learning readiness, interests and learning profiles A three level planning pyramid is a common staple among differentiating teachers and is generally the method taught in most professional development opportunities (Lawrence-Brown, 2004). Various methods of pre-assessment allow a teacher to know where particular students fall in regard to the varied tiers of learning designed for any particular lesson or unit (CCC, 2010a). So, common professional development topics promoting a proactive curriculum approach would include: learning to tier lessons to meet the needs of at least three various tiers of learning; learning to assess students in a variety of ways in addition to written question answer type assessments; developing the art of scaffolding in order to help students build upon prior knowledge regardless of where they currently are; learning to assess student interest and create lessons motivating students to engage in the learning process; and developing different assignments designed to teach the same concepts (Rock et al, 2008; Roe, 2010; Strahan et al, 2012; Vatterott, 2009).

Flexible small groups.

Generally in the classroom, whole group instruction or assessment occurs which enables a teacher to divide students into groups based upon whether they need to review material or concepts, be re-taught taking into account different learning styles or from a different

perspective, practice--as in math skill development, or enrichment. Professional development addressing flexible grouping includes: the cognitive science and learning theory explaining how differentiation, and ultimately learning, is enhanced by flexible grouping; the advantages and disadvantages in grouping; learning when and how grouping facilitates instruction; learning which activities lend themselves to group work; assigning appropriate activities for heterogeneous groups; assigning appropriate activities for homogeneous groups; how to choose or form groups; how to keep the groups rotating and varied; developing pre-assessment, formative assessment and post-assessment strategies; and how to manage group behavior and climate (Hougen, 2004; Anderson, 2013a).

There are a myriad of flexible group types: teams, whole class, half class, partners, trios, one on one instruction, small groups, anchor groups and learning stations to name a few. Mentoring and coaching in the use of these various types is an effective way enhancing learning through professional development (Anderson, 2013b).

Use of varied materials.

There are many reasons why a variety of instructional materials are used in a differentiated classroom. Variety of student readiness, interest, learning styles, cognitive levels, physical handicaps, diversity of prior knowledge or experience among students, multi-cultural diversity, personalities and level of concept rigor are just some of the reasons why using a variety of materials to teach a lesson or unit is useful to student learning (Howery, McClellan & Pedersen-Bayus, 2013).

Creativity is a central tenant of efforts to improve the diversity of instructional materials in the classroom. Textbooks, internet search engines, film, creating videos, graphic organizers, making posters, braille readers, audio books, using game formats, drawing, blogging online,

using word walls, using traditional manipulatives and flashcards, building models, listening to a podcasts, or using simple notebooks and ink pens can all be used to their maximum level of usefulness given the right circumstances and the right student needs (Anderson, 2013b; Columbo & Columbo, 2007; Lawrence-Brown, 2004; Lucking Christmann & Wighting, 2009; Tomlinson & Imbeau, 2011).

Professional development of instructional material diversity is a primary focus of federal Title School Improvement funding. Teachers are being retrained in schools across the country to adopt technology as a method of instructional delivery. Electronic instructional devices such as laptops, pads, and even cell phones are becoming common place in many American schools as students gravitate to the technology faster than teachers can keep up with the pace of online possibilities for learning (Allison et al., 2011). Coaching and mentoring in the use of technology are key components in professional development aimed at improving differentiated instruction (Wormelli, 2006).

Modification of the pace of learning.

The purpose of an effectively differentiated classroom is for all students to achieve mastery, but not necessarily in the same way or at the same pace. Teachers must learn that requiring all students to carry an equal workload is not the goal of educators. Understanding and mastering concepts and academic skills is the goal (Wormelli, 2006). One of the keys to sound classroom management as well as sound instructional practice is maintaining an appropriate instructional pace. If the pace is too slow, then students lose interest and turn to other thoughts. If the pace is too fast, they become frustrated and turn to other thoughts. However, because of the diversity of learning readiness, and ability, and ability not all students can learn at the same pace. This is why the concept of tiering instruction spoken of in the section on proactive curriculum

oriented professional development is also vital to teachers learning to properly differentiate the pace of instruction (Noddings, 2009).

Additionally, workshops and readings teaching the concept of instructional scaffolding are helpful to learning how to modify pace and still facilitate the mastery of academic content. The interactional support of scaffolding when done properly enables a student to build upon past learning in increments he/she is able to manage and comprehend based upon that student's unique set of circumstances. This applies to both the gifted learner as well as learners in the other two tiers of learning found in a three level planning pyramid (Kingore, 2011).

Learner centered.

In learner centered professional development, as in all differentiated instruction professional development, the learner is the center of decisions in regard to planning, assessment, materials used, instructional pace and instructional approaches. Learner centered professional development prepares teachers to take into account student readiness, ability, interests, talents, learning profile and prior knowledge (Egan, 2009).

Learner centered professional development helps teachers learn about the different styles of learning such as auditory, visual or kinesthetic based learning (Egan, 2009). Wormelli (2007) promotes a system recognizing four types of learners: those who respond well to experiences, those who do well viewing and listening to the facts, those who prefer to learn by doing and those who like to make discoveries on their own. Both Egan and Wormelli indicate that students learn when the correct approach for their style of learning is applied (Wormelli, 2009).

Professional development to enhance understanding of cognitive development is helpful to cultivating the learner based principle. For example, understanding Piaget's concrete

operational and formal operational cognitive development levels would enable teachers to manage delivery of abstract concepts (Willis, 2007).

A teacher hoping to improve understanding and utilization of the learner based principle of differentiation could participate in professional development with various topics of interest. Learning to assess student interests and prior knowledge enables teachers to develop and deliver lessons geared to the needs of their particular student population (Kingore, 2007a). Learning to give meaningful feedback to students in order to further guide their learning has the potential of highly impacting student learning (Hattie, 2009). Professional development training in motivating students to be enthusiastic about learning is learner centered (Sullo, 2009). Learning to create a climate conducive to learning while at the same time managing the classroom well is important learner centered professional development (Sagor, 2009).

Knowledge centered.

The aim of knowledge based learning is for learners to achieve mastery of standards based content (Boen, 2010). In the case of Frisco League teachers, the Missouri Learning Standards are the learning standards by which Missouri schools are judged. The common Core Standards on which the Missouri Learning Standards are now based are highly dependent upon Bloom's Taxonomy and Blooms understanding of how knowledge is acquired. Each school is responsible for developing its own curriculum and each teacher is responsible for developing lesson plans to deliver that curriculum (MDESE, 2013).

Professional development promoting and practicing mastery learning is the way to create genuine learning along every step of a course of study. This model is called mastery learning. In a mastery learning classroom, a unit of material is taught, and students' understanding is evaluated before they are able to move on to the next unit (Dufour & Marzano). Good

professional development in regard to the principle of knowledge centered learning requires teachers to first determine what knowledge they want their students to acquire at the end of a unit or course. If all students must meet the same standards of learning and differentiated instruction is predicated on the belief that all students can learn then, teachers must learn to present instruction to a population of diverse learners in a way that works best for all. This requires teachers to learn to motivate students by addressing a variety of student interests and learning styles by providing various materials and tier assignments at varied levels of difficulty while scaffolding to various degrees using flexible grouping and modified paces of learning (Anderson & Krathwohl, 2001; Tomlinson & Imbeau, 2010).

Professional development to promote knowledge based learning should train teachers to use a mastery of the standards approach. In a mastery approach, teachers break down their class curriculum into small units of material to be covered in one to two weeks. After learning the first unit, student mastery of the material is assessed. Rather than signifying the end of their time on this unit, the assessment is a guide to the teacher regarding the level of understanding the students have of the unit. He or she then identifies the areas of weakness and also the areas where the student may not need any help. Detailed feedback is given to the student, and corrective activities are assigned on those topics that are lacking. Students can be given practice exercises, study guides, group work or complimentary resources, like information on the web, to help them improve. Students are then given a chance to be reassessed via an instrument such as a quiz, paper or project similar to the content of the first one. Only when the student masters that particular unit can they move on to the next one. Students who showed mastery at their first evaluation are given enrichment exercises like special projects, tasks or academic games to further or broaden their knowledge of the material (Anderson, 2013b). Grades are assigned that

reflect learning goals. Learning progress, work habits, and behavior are also reported, but in a different manner than being a part of the student's grade (Heacox, 2009). While the mastery approach is very effective, it is very complex and may require supportive mentoring and coaching for the teacher over an extended period of time (Allison, 2011; Anderson, 2013b).

Knowledge based learning is mastery learning. Mastery learning ensures the ultimate goal of any course - the understanding and learning of new material - is achieved. It also gives students who are struggling opportunities for improvement that are not available in the more traditional model. It provides clear, individualized feedback that can help each student realize what they are missing and how to attain it. It also helps those who are already doing well to develop their potential more fully through further activities (Levy, 2008).

The complexity of a knowledge centered approach to education combined with the rigor of the introduction of the Common Core Standards is daunting for many teachers (Frisco League, 2013b). Teachers need specific strategic training in differentiation followed by coaching and mentoring in the practice of differentiation strategies (Anderson, 2013b).

Data for Planning Effective Differentiated Professional Development.

To assist administrators in targeting professional development planning on the teachers who need it, certain demographic groups are identified: subjects taught *(Washburn-Moses & Bouck, 2007);* completing teacher preparation coursework prior to or after IDEA and ESEA changes of 2001 (Dee, 2011). and grade levels taught (OQS, 2012).

Subjects taught.

Core subject teachers may use differentiation more than other subject teachers. Core curriculum classes such as English, Math, Science and Social Studies are the classes in which differentiated instruction first began to be heavily used in Missouri schools (OQS, 2012). School

wide programs were authorized and promoted via Title I in order to upgrade the entire educational program of each participating school so all students could be served in classrooms where differentiated instruction is foundational as the method of instruction in the classroom (USDOE, 2011*).* In 2004, PL 108-446 directly amended PL 94-142 by adding language emphasizing core academic subjects, promoting differentiated instruction in the form of RtI in general education classrooms as an alternative to self-enclosed Learning Disability groups (Washburn-Moses & Bouck, 2007). These changes in IDEA and ESEA led federal and state agencies to promote differentiated instruction in the core subjects and eligibility standards for IEP services were tightened to require more differentiated strategies to be used in the course of the regular academic program (Washburn-Moses & Bouck, 2007).

Began teaching before verses after 2001.

Some teachers began teaching in the years when students in IEP and Title I related programs would leave the regular classrooms and go to separate classrooms to receive instruction. Both IDEA and ESEA underwent fundamental changes when they were aligned to NCLB. IDEA was aligned in 2004 and ESEA in 2003. The great emphasis on differentiation in the mainstream classroom since these changes has required teachers to use tiering in planning lessons in order to meet the needs of all students, regardless of ability levels (Dee, 2011).

Grade levels taught, elementary verses secondary.

Response to Intervention (RtI) has been emphasized as an option for schoolwide programs and training in such began in Missouri Regional Professional Development Centers as early as 2003 (Office of Quality Schools, 2012). These early programs were almost exclusively elementary based focusing on Communication Arts and Math. Funding for school improvement through federal Title programs accompanied this push. Less emphasis on differentiated

instruction has been made for secondary programs. Elementary teachers therefore are more likely to have been trained in and be experienced in differentiated instruction.

Summary

The literature is consistent in delivering a central message regarding differentiated instruction. It is a philosophy, mindset, set of principles and a collection of inter-related beliefs about how teachers can best take on the role of learning facilitator in behalf of all students. By differentiating instruction, teachers can enhance the learning of all students because of their differences rather than in spite of them. By recognizing learners in the classroom are diverse with different life experiences, abilities, levels of past achievement, and learning readiness, and planning for how to address those differences in the delivery of instruction, all students learn. Teachers take on the role of learning facilitators in which they make the learner and the quest of knowledge the center of activity and focus in the classroom. Learning style, language proficiency, background knowledge, readiness to learn, and other factors can vary widely within a single class group. Regardless of their individual differences, however, students are expected to master the same concepts, principles, and skills.

Both NCLB and IDEA have necessitated the adoption of differentiated instruction by school districts seeking federal funding (USDOE, 2011). NCLB, the Common Core Standards, Title I of the Elementary and Secondary Education Act (ESEA), and the various manifestations IDEA all influence the debate about differentiation. NCLB requires states to measure and compare the academic proficiency of designated subgroups. For a school or district to be tracked and assessed based upon a subgroup there must be a minimum of 30 students in that subgroup. Two of the subgroups, the Free and Reduced Lunch subgroup and the Individual Education Plan (IEP) subgroup, are tracked by MAP in each of the Frisco League districts. These two subgroups

are greatly affected by factors which research indicates can be improved with differentiation of learning (Berkeley, Bender, Peaster, & Saunders, 2009).

Laurie Boen (2010) identified six major principles of practice differentiating educators believe in and practice. Boen calls these the Principles of Differentiation. They are based very closely on the work of Tomlinson et al (2008).The principles are: the adoption of a proactive curriculum; utilization of flexible small groups; the use of varied materials; modification of the pace of learning; learner centered delivery and focus; and knowledge centered instructional planning based on standards and goals. These six principles encompass certain beliefs and practices which are adopted by teachers when they have been properly educated in differentiated instruction (Nichols & Zhang, 2011).

The use and understanding of differentiation principles can be enhanced through professional development. In essence, effective professional development focuses on instructional strategies impacting student achievement followed up by coaching and mentoring which sustains the selected strategies (Allison, 2011). In this study, for purposes of improving professional development planning, specific demographic groups were identified based upon: subjects taught *(Washburn-Moses & Bouck, 2007)*, completing teacher preparation coursework prior to or after IDEA and ESEA changes of 2001 (Dee, 2011), and grade levels taught (Office of Quality Schools, 2012).

In the survey employed the intent was to learn the level of understanding and use of differentiated instruction. This was non-experimental research and no experimental manipulation of the independent variables, in order to elicit a cause effect relationship to dependent variables, took place. For example, the subjects had already received training or education in differentiated instruction (IV) prior to measuring their level of understanding and use of differentiation (DV)

via, in this instance, the Principles of Differentiation Survey. In this case the IV (training or education in differentiation) was treated as the IV because of its status as coming first and therefore presumably influences how the subjects' scores on the Principles of Differentiation survey (DV).

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

Introduction

This section explains the procedures used to collect and statistically treat data regarding the level of commitment to and practice of differentiated instruction of teachers in grades K-12 of schools in rural south central Missouri. To improve student learning, using differentiated instruction in the most cost and time effective manner possible, professional development needs to be differentially targeted to specific groups of teachers based upon need. A primary emphasis of this study is to provide data in regard to how much teachers understand and practice differentiated instruction. Secondarily, the data provided has the potential of improving efficiency and effectiveness of professional development (Frisco League Minutes, January 28, 2013).

Participants

The Missouri Comprehensive Data System (2013) reports there are 603certificated staff working in Frisco League schools, serving 6009 students in grades PK-12. However, that number includes administrators and some teachers who are counted twice due to splitting their time between schools. Only those 516 teachers actually in a position to practice differentiation as part of their assigned faculty position are included in the population. This includes teachers of the core subjects of language arts, math, science and social studies as well as guidance counselors, Title I remedial math and reading and special education teachers are included in this study. Also included are music, art, health, physical education, family and consumer science, vocational and library media educators. Participants must meet the minimum requirements for

certification in Missouri including the completion of a Bachelor's degree, a prescribed amount of undergraduate coursework with specified teacher education courses and internships, and passing standardized tests. All teachers meeting the aforementioned standards for public school educators are candidates for using differentiation because differentiated instruction is a philosophy and way of addressing the needs of all students in all educational opportunities (CCC, 2010a).

Sampling Procedure

The population of interest included 516 teachers in nine rural south central districts who were in a position to facilitate learning using differentiation (Frisco League Minutes, December 18, 2013). This includes teachers of all subjects and disciplines, including math, language arts, social studies, science, keyboarding, guidance counseling, vocational teachers, P.E., Art, Music, library/media, special education, and Title I remediation teachers. The researcher allowed all members of the population of interest to participate therefore no sampling procedure was needed.

Research Setting

There are nine districts in the study of varying sizes, though no one district has more than 1097 K-12 students. There are 5,732 students in grades K-12 plus an additional 277 preschool students. In total, there are 6009 students PK-12. Each district also operates a preschool ranging from ten students in the smallest preschool to fifty-five in the largest preschool. Combined, the districts have 603 certified personnel with 516 meeting the criteria for this study (MCDS, 2013).

Stoutland R-II has two schools, a preschool of 35 students combined with an elementary K-6 school consisting of 270 resident students and 26 certified faculty and a secondary school for grades 7-12 consisting of 198 students and 21 certified faculty. Of the 47 faculty members

listed in the Missouri School Directory, 42 meet the criteria set for the sample size of this survey. Nearly ninety-six percent of the students in Stoutland schools are white (MCDS, 2013).

Crocker R-II has two schools, a preschool of 34 students combined with an elementary K-6 school consisting of 330 resident students and 28 certified faculty and a secondary school for grades 7-12 consisting of 218 students and 25 certified faculty. Of the 53 faculty members listed in the Missouri School Directory, 47 meet the criteria set for the sample size of this survey. Ninety-seven percent of the students in Crocker schools are white (MCDS, 2013).

Newburg R-II has two schools, a preschool of 29 students combined with an elementary K-6 school consisting of 243 resident students and 28 certified faculty and a secondary school for grades 7-12 consisting of 218 students and 23 certified faculty. Of the 51 faculty members listed in the Missouri School Directory, 46 meet the criteria set for the sample size of this survey. Nearly ninety-six percent of the students in Newburg schools are white (MCDS, 2013).

Laquey R-V has three schools, a preschool of 10 students combined with an elementary K-5 school consisting of 321 resident students and 34 certified faculty, a grades 6, 7 and 8 middle school serving 160 students with 22 certified faculty, and a high school for grades 9-12 consisting of 217 students and 24 certified faculty. Of the 80 faculty members listed in the Missouri School Directory, 64 meet the criteria set for the sample size of this survey. Nearly ninety-one percent of the students in Laquey schools are white (MCDS, 2013).

Dixon R-1 has three schools, a preschool of 55 students combined with an elementary K-5 school consisting of 536 resident students and 43 certified faculty, a grades 6, 7 and 8 middle school serving 233 students with 22 certified faculty, and a high school for grades 9-12 consisting of 328 students and 30 certified faculty. Of the 95 faculty members listed in the

Missouri School Directory, 75 meet the criteria set for the sample size of this survey. Over 90 percent of the students in Dixon schools are white (MCDS, 2013).

Iberia R-V has two schools, a preschool of 21 students combined with an elementary K-6 school consisting of 404 resident students and 35 certified faculty and a secondary school for grades 7-12 consisting of 346 students and 31 certified faculty. Of the 66 faculty members listed in the Missouri School Directory, 60 meet the criteria set for the sample size of this survey. Over ninety-eight percent of the students in Iberia schools are white (MCDS, 2013).

Licking R-VIII has two schools, a preschool of 20 students combined with an elementary K-6 school consisting of 496 resident students and 37 certified faculty and a secondary school for grades 7-12 consisting of 387 students and 39 certified faculty. Of the 76 faculty members listed in the Missouri School Directory, 70 meet the criteria set for the sample size of this survey. Over ninety-eight percent of the students in Licking schools are white (MCDS, 2013).

Richland R-IV has three schools, a preschool of 32 students combined with an elementary K-6 school consisting of 333 resident students and 30 certified faculty, a grades 7 and 8 junior high serving 104 students with 19 certified faculty, and a high school for grades 9-12 consisting of 175 students and27 certified faculty. Of the 76 faculty members listed in the Missouri School Directory, 60 meet the criteria set for the sample size of this survey. Ninety-five percent of the students in Richland schools are white (MCDS, 2013).

Plato R-V has two schools, a preschool of 41 students combined with an elementary K-6 school consisting of 297 resident students and 26 certified faculty and a secondary school for grades 7-12 consisting of 319 students and 33 certified faculty. Of the 59 faculty members listed

in the Missouri School Directory, 52 meet the criteria set for the sample size of this survey. Nearly ninety-five percent of the students in Plato schools are white (MCDS, 2013).

Research Design

The Principles of Differentiation Survey was used in this study (Appendix A). This Likert scaled twenty-five item study is designed to indicate the level of teacher use and understanding of differentiated instruction principles and whether further professional development in differentiated instruction is needed. The twenty-five questions on the Principles of Differentiation Survey are meant to measure the understanding and use of differentiated instruction principles and methods. The methods and practices measured in the survey are built upon principles by which successful differentiation practitioners operate in the classroom. Previously used in a study at the University of Arkansas, the survey is based upon six principles of differentiation identified by the researcher in that study (Boen, 2010). Permission to use the Principles of Differentiated Instruction Survey was received from the author, Dr. Laurie Boen on November 11, 2013 (Appendix B).

The District Superintendent Approval to Conduct Research was presented to the participating superintendents on January 29, 2014 (Appendix C). Presentation of the Proposal to Conduct Research was held on January 30, 2014. Permission to conduct said research was received from the Southwest Baptist University Research Review Board on February 13, 2014 (Appendix D). The actual Surveys and Informed Consent Letter (Appendix E) and Informed Consent Signature Page (Appendix F) were delivered beginning late the afternoon of February 13 and ending February 17, 2014. The surveys were hand delivered to each of the nine superintendents with enough hard copies of the research instrument for all teachers in each of their schools. The research instrument consisted of two pages printed front and back on a single

piece of paper. It contained instructions, a demographic section and a twenty-five item survey of beliefs and practices. The principals of each school in each district were given instructions to distribute the Informed Consent Form and the Principles of Differentiated Instruction at their next weekly faculty meeting and allow enough time for everyone to complete it. The principals then gathered the surveys and placed them in a stamped envelope, addressed to and provided by the researcher. Administrators were asked to begin returning them by February 24, 2014. All were received by February 28, 2014. A total of 249, individual teachers responded.

It was assumed an independent variable of previous exposure to differentiation would affect a dependent variable of how well teachers score on the Principles of Differentiation Survey (Boen, 2010). The data acquired from this study may guide the nine superintendents both in their capacities as district superintendents and as directors of the Frisco League consortium in providing professional development opportunities in differentiated instruction, thereby improving instruction for all children in their districts' schools. A sample size, equal to the population being studied, was utilized in order to give the superintendents a quantitative description of trends, attitudes and opinions of that sample population in regard to differentiation (Whipple, 2012).

Instrumentation

The Principles of Differentiation Survey (Appendix A) consists of twenty-five items measuring teacher belief or commitment to six principles of differentiation and instructional and curriculum practices supporting those principles. Subjects were asked to report their level of agreement or disagreement with each statement using a four point Likert scale of strongly Agree, Agree, Disagree and Strongly Disagree.

Data were disaggregated into separate subgroups groups: elementary teachers, secondary teachers, those who began before 2001, those who began in 2001 or later, teachers of four different groups of subject matter, and whether or not they already work in a building which has initiated differentiated instruction. The disaggregation is intended to provide data informing administrators which groups of teachers will benefit from professional development aimed at improving the understanding and/or use of each of the six principles of differentiation. For purposes of designing professional development activities for each of those subgroups identified, data was gleaned from the survey indicating strength or weakness in the understanding and/or use of each of the six principles of differentiation: proactive curriculum development, use of flexible groups, the use of varied materials, pacing learning, taking a learner centered approach and taking a knowledge centered approach.

Survey Items

The Principles of Differentiation Survey consist of 25 original questions designed by the originator and author of the survey (Boen, 2010). Items 1, 2, 3, 4, and 16 measure the level of commitment to and the practice of designing a proactive curriculum. Items 5, 6, 7, measure the teacher's belief in and use of flexible grouping. Items 8 and 9 measure the teacher's use and commitment to the use of a variety of materials in the classroom. Items 10, 11, and 12 measure the teacher's willingness to vary the pace of learning based upon learning differences. Items 4, 13, 14, 15, 16, 17, 18, 19, 20 21 and 22 measure the teacher's belief in and use of practices reflecting a learner centered. Items 23, 24 and 25 measure the use of a knowledge (standards) based curriculum with an emphasis on motivating students to reach preset goals.

Validity of Instrumentation

Validity is the extent to which an instrument or item measures what it intends to measure. It is vital for a test to be valid in order for the results to be accurately applied and interpreted. Validity is determined by a body of research that demonstrates the relationship between the item or instrument and the behavior it is intended to measure (Whipple, 2012). Content validity of the Principles of Differentiation Survey was assured in the original Boen study by first pilot testing it with a group of colleagues similar to those in the study. The pilot study participants were asked to critically assess each item of the survey "noting any points of confusion." The pilot study participants' suggestions and critiques were used to improve the test items (Boen, 2010).

Validity of Study

A test has construct validity if it demonstrates an association between the test scores and the prediction of a theoretical trait. The Principles of Differentiation Survey is built upon actual and specific beliefs practices pulled directly from the literature (Boen, 2010).

Reliability of the Study

Reliability refers to the consistency of a measure. A test is considered reliable if the same result is realized repeatedly. This form of reliability is used to judge the consistency of results across items on the same test. Essentially, test items are compared which measure the same construct to determine the test's internal consistency.

Laurie Boen (2010) originally developed the Principles of Differentiation Survey (Appendix A) to be used in a mixed methods study with a small group of thirty-four teachers in two schools where the teachers were known to be pro-differentiated instruction. In Boen's study, the intent was to compare actual practice measured by an instrument called the Differentiation Practice Record, with stated philosophy and intended practices measured by the Principles of

Differentiation Survey. In that study the Cronbach Correlation Coefficient was calculated using the statistical program SPSS, twice.

In the first calculation, the Cronbach alpha was found by combining the variables of both the Differentiation Survey and the Differentiation Practice Report and calculating the average covariance of those items. The combined instruments yielded a Cronbach alpha of .870, indicating the instruments did measure the same construct. However, when the Cronbach alpha for the Principles of Differentiation Survey was separately calculated it yielded an alpha of .202 indicating poor internal reliability. It was suggested by the researcher in the original study was the small sample size of 34 (Boen, 2010).

Cronbachs' coefficient alpha is the most widely used measurement of internal reliability in educational and social science research, cited as being used in 5,590 studies between 1951 and 2004 (Cronbach, 2004). In many of those studies the coefficient alpha is obtained from a sample size of $\leq$ 200. Yet, the general view is the sample coefficient alpha obtained from larger samples tends to produce a more accurate estimate of the population coefficient alpha. Numerous researchers have noted that with low sample sizes alpha coefficients can be unstable. In literature going back to 1994, a minimum sample size of 200 to 400 is advised (Charter, 2003). In 2010, a paper published online and conducted in Paris, France challenged the N/p (ratio of subjects to variables) guideline used to calculate sample size in internal validity studies on measurement scales. The authors posited that no empirical basis existed for a practice which they believe allowed for short sample size. This study was conducted to determine optimal sample size for psychiatric studies. Among other measurement tools, the influence of sample size on the precision of Cronbach's alpha coefficient was examined. The common 10:1 *N/p* ratio rule is not upheld by this study and results suggest short scales do not allow smaller sample size. Their

finding was that a minimum of 300 subjects is generally acceptable especially when the number of items calculated is small (Rouquette & Falissard, 2010).

An increase in sample size in this Southwest Baptist University study had the potential to increase the coefficient of reliability significantly indicating whether or not this instrument is a viable tool to be used in the future assessment of teacher commitment and practice of differentiation. An honest appraisal of internal reliability is more assured with a larger sample size (Sijtsma, 2008).

Statistical Treatment of Data

In order for the null hypotheses to be rejected, the mean average of the scores of all survey participants must be higher than 75 on a scale of 25 to 100. The score of 75 was determined by the following logic: Scoring for most items is 4 points for Strongly Agree, 3 points for Agree, 2 points for Disagree and 1 point for Strongly Disagree. Because of wording, the scores for items 1, 3, 5, 8, 16, 21, and 29 are reversed with 1 point for Strongly Agree, 2 points for Agree, 3 points for Disagree and 4 points for Strongly Disagree. An average score of 25, or 25 items multiplied by 1 point, translates to strong disagreement with the six principles of differentiation. A score of 50, 25 items multiplied by 2 points, indicates disagreement. A score of 75, 25 items multiplied by 3 points, indicates agreement. Calculating averages is an effective method of measuring and grouping individual responses (LaFountain & Bartos, 2002).

In order to measure the reliability of this instrument addressing treatment of collected data, the Cronbach's Alpha Coefficient was computed. Cronbachs' coefficient was used previously when this survey was applied to a smaller sample size (Boen, 2010). If, with this larger sample size the alpha coefficient increases to at least .70, then the instrument has internal reliability (Charter, 2003).

An average and a t-test will be calculated to find out if there is a significant difference in use and/or understanding based on: whether they began teaching prior to or after 2001; whether they are elementary or secondary teachers; and which subjects they teach. A t-test tells us whether any difference between any two variables within each pair is statistically significant (LaFountain & Bartos, 2002).

Additionally, in the interest of using data gathered from this survey to plan professional development opportunities for teachers, data were disaggregated in regard to the six elemental principles identified in the Principles of Differentiation Survey. Averages and specific item scores in regard to each of the six principles of differentiation will also be evaluated. Data gathered with the aim of planning effective professional development training can contribute to improved student learning (Nichols, J., & Zhang, G. (2011).

Rationale for Selected Statistical Treatment

Calculating an average score for all participants returning surveys measures the level of use and understanding of differentiated instruction by the group as a whole. Calculating averages is an effective method of measuring and grouping individual responses (LaFountain & Bartos, 2002). Mathematical averages also are effective in measuring extraneous data to be disaggregated (LaFountain & Bartos, 2002). In order to have information to guide future planning for professional development, averages using the same method as used for the entire sample were computed for each of the demographic groups identified in order to indicate their levels of use and understanding of differentiation. Averages for each of the groups in regard to use and understanding of each of the six principles of differentiation were calculated and disaggregated. This allows for differentiation of professional development consistent with the learner centered approach differentiating teachers take with students (Dufour & Marzano, 2011).

Cronbach's alpha coefficient is the most widely used measurement of internal reliability in educational and social science research, cited as being used in 5,590 studies between 1951 and 2004 (Cronbach, 2004).

In order to test for statistical difference between various demographic groups t-tests were calculated. The t-test was used to ascertain statistical differences based upon: whether participants began teaching prior to or after 2001; whether they are elementary or secondary teachers; and which subjects they teach. This informs as to which groups use and/or understand differentiation and which do not. The intent was to enable administrators to differentiate professional development as needed by various subgroups. A procedure such as the t-test is an effective method for measuring statistical significance of differences between two variables (LaFountain & Bartos, 2002).

Explanation of Data Treatment for Variables

Appendix B consists of a data collection tool which guided the scoring of answers. Scoring for most items were 4 points for Strongly Agree, 3 points for Agree, 2 points for Disagree and 1 point for Strongly Disagree. Because of wording, the scores for items 1, 3, 5, 8, 16, and 21 are reversed with 1 point for Strongly Agree, 2 points for Agree, 3 points for Disagree and 4 points for Strongly Disagree. The data were entered into an Excel spreadsheet with subject identifiers on the vertical axis and item results recorded on the horizontal axis. The data required for ascertaining the effect on the DV for each subject also were coded on the horizontal axis. Mean averages, standard deviations, variance and Cronbach's alpha coefficient for inter-reliability were computed by the Excel program, the Cronbach's alpha coefficient. This is standard treatment for data collected in a survey of this nature (LaFountain & Bartos, 2002).

Summary

This Chapter on methodology explains the procedures used to collect and statistically treat data regarding the level of commitment to and practice of differentiated instruction of teachers in grades PK-12 of the Frisco League districts and schools. The researcher in this study sent surveys to a population of 516 rural south central Missouri elementary and high school teachers in a position to regularly facilitate learning using differentiated instruction. All 516 teachers, serving a nine district combined Frisco League of 6009 students, served as the sample population (MCDS, 2013). A sixty percent return was anticipated for a total of 309 completed surveys (LaFountain & Bartos, 2002).

This study measured teacher understanding and use of the six principles of differentiation through the use of a Likert scaled twenty-five item survey. An independent variable of previous exposure to differentiation will affect a dependent variable of how well teachers score on the Principles of Differentiation Survey (Nichols & Zhang, 2011). Additional data is available for disaggregation, for purposes of improving professional development planning for specific demographic groups based upon subjects taught (Washburn-Moses & Bouck, (2007); completing teacher preparation coursework prior to or after IDEA and ESEA changes of 2001 (Dee, 2011).; and grade levels taught (Office of Quality Schools, 2012).

CHAPTER FOUR

ANALYSIS OF DATA

Introduction

Primarily, the study was designed to provide data in regard to how much teachers understand and practice differentiated instruction. Secondarily, the data provided has the potential of improving efficiency and effectiveness of professional development. Professional development plans for different groups of teachers may be differentiated based upon data gathered indicating the degree specific groups of teachers understand and use specific principles of differentiation.

The purpose of this chapter is to present the findings of this study involving 249 certificated teachers who participated in the Likert scaled twenty-five item Principles of Differentiation Survey, based upon six principles of differentiation, and previously used in a University of Arkansas study (Boen, 2010). The study is designed to indicate the level of rural South Central Missouri teacher use and understanding of differentiated instruction principles.

Principals in each of the rural south central Missouri schools were asked to introduce the Principles of Differentiated Instruction Survey at a faculty meeting. The Principles of Differentiated Instruction Survey can be found in Appendix A. The sample population included 100 percent of the entire population of 516 teachers in a nine district academic and athletic conference who are in a position to differentiate learning in the classroom. This includes teachers of all subjects and disciplines, including math, language arts, social studies, science, keyboarding, guidance counseling, vocational teachers, P.E., Art, Music, library/media, special education, and Title I remediation teachers. Responding to this voluntary survey were 249 individual teachers. Using a 95 percent confidence interval, the minimum number required for

this sample population of 516 was 221 participants. Two hundred forty nine of those eligible participated in the study.

Results

Permission to use the Principles of Differentiated Instruction Survey was received from the author, Dr. Laurie Boen on November 11, 2013 (Appendix D). The twenty-five questions on the Principles of Differentiation Survey measure the understanding and use of differentiated instruction principles and methods. The methods and practices measured in the survey are built upon principles by which successful differentiation practitioners operate in the classroom. The actual Surveys and Informed Consent Letter (Appendix H) were delivered beginning late the afternoon of February 13 and ending February 17, 2014. All were returned to the researcher by February 28, 2014. A total of 249, or 48 percent, responded.

The Principles of Differentiated Instruction appears to have sound internal reliability. The Cronbach's formula for inter-reliability yielded an alpha of .93635. This is well above the threshold of .70 generally referenced. A limitation has been noted noted in regard to the inter-reliability alpha coefficient found in the debut study of the Principles of Differentiation Survey.

Table 1
Percentage of Respondents by Demographic

Percentage	N	Demographic
57	143	Teach grades PK-6
32	80	Teach grades 7-12
10	26	*Checked both PK-6 & 7-12
60	149	Began teaching prior to 2001
40	100	Began teaching after to 2001.
63	157	Teach one or more core subjects.
13	33	Teach special education or Title funded classes.
7	18	Teach career/vocational or guidance counseling classes.
11	27	Teach "specials (Music, Art, Physical Education…
6	15	*Did not indicate what they teach.
66	164	Work in a building where RtI or other Differentiated Instruction strategies have been introduced.

*Treated separately after receipt of data, this was not an original demographic group.

Data were disaggregated to provide data in the study's secondary focus of professional development planning. Nine items were used as a means of identifying teacher groups in need of particular professional development in particular principles/areas of differentiated instruction. Groups are disaggregated based upon grade levels taught, whether the teachers began teaching before or after 2001, the subjects they teach and whether Differentiated Instruction has been introduced in their building. Two additional groups presented themselves in the course of data collection: those who marked both K-6 and 7-12 teaching levels and those who did not indicate what they teach. Table 1 reports the numbers and percentage of representation of the groups in this study. Well over half of the teachers surveyed are elementary teachers and were the majority of the 66 percent indicating they work in a building in which RtI or other differentiated instruction strategies have been introduced. Sixty percent of all teachers surveyed began teaching prior to 2001. Sixty-three percent of teachers surveyed teach core subjects.

Analysis of Data

The null hypothesis predicted teachers surveyed would not be found to be in agreement with nor utilize the principles of differentiated instruction as measured by the Principles of Differentiated Instruction Survey. The null hypothesis was not rejected.

The mean average of all teachers taking the survey is 73.77 on a scale of 25 to 100 points possible. For each subject, a score has been derived from the survey of 25 questions using a four point Likert scale. Each of the 25 questions on the survey is worth 1 to 4 points. Except for six specific questions reversed coded due to the language used in the item, a subject received 1 point for to strongly disagree with a statement they received one point, 2 points for disagree, 3 points for agree and 4 points for strongly agree. A score of 75 represents an average score of 3 points for agreement on each of the 25 items. Conversely, a score of 50 represents an average score of 2

points on each of the 25 items. The average score of 73.77 is lower than the 75 points required to represent agreement with and utilization of the Principles of Differentiation.

Table 2
Data Based on Previous Exposure to Differentiated Instruction

Demographic Item	Number Responding	Percent of Total	Group Mean
Work in a building where RtI or other D.I. strategies have been introduced.	165	66	73.21
Did not indicate working In a building where D.I. has been introduced.	84	34	74.87

The t-test between these two mean averages yielded a p = .60 > *p* = .05

No statistically significant difference between group average scores exists.

Independent Variable

Previous exposure to differentiated instruction is the IV. Even though there was no manipulation of the IV in this study, in the disaggregated data section, respondents who work in buildings where RtI or some other form of differentiated instruction has been implemented were asked to identify (Table 2). Sixty-six percent of the respondents surveyed stated they worked in a building where RtI or other differentiated instruction strategies have been introduced. However, there is no statistically significant difference between those who had this previous exposure and those who did not indicate so. Using a 95 percent confidence interval, the t-test between the two groups resulted in $p = .60 > p = .05$.

Dependent Variable

The dependent variable is the level of understanding and use of differentiated instruction principles and methodologies as measured by the Principles of Differentiated Instruction Survey (Appendix A). In this study those who work in a building which has instituted differentiated instruction scored a group average score of 73.21 not statistically different than a theoretical

score of 75 set as the standard for rejecting or accepting the null hypotheses in this study. It should be noted only 34 percent of the respondents, 84 individuals, did not mark the box on the survey indicating they work in a building where differentiated instruction has been instituted (Table 2).

Analysis of data in regard to demographic groups.

Data were disaggregated into separate subgroups: elementary teachers, secondary teachers, those who began before 2001, those who began in 2001 or later, teachers of four different groups of subject matter, and whether or not they already worked in a building which has initiated differentiated instruction.

Table 3
Data Based on Grade Levels Taught

Demographic Item	Number Responding	Percent of Total	Group Mean
PK-6 Teachers	142	57	73.40
7-12 Teachers	79	32	74.11
PK-12	25	10	75.31

The t-test between PK-6 and 7-12 average scores yielded a $p = .71 > p = .05$
The t-test between PK-6 and PK-12 average scores yielded a $p = .65 > p = .05$
The t-test between 7-12 and PK-12 average scores yielded a $p = .54 > p = .05$

No statistically significant difference in group average scores exists.

Differentiated instruction began in rural Missouri in the elementary schools because that is where most of the Title I funds are expended (Frisco League Minutes, January 2013). Missouri's DESE federal programs staff has promoted differentiation since at least 2003 in Missouri. So, it was assumed elementary teachers would be more likely to practice differentiation than high school teachers. Scores of PK-6 and 7-12 teachers are statistically similar (Table 3). Using a 95 percent confidence interval in all three tests the t-test between PK-6

and 7-12 group averages resulted in $p = .71 > p = .05$, between PK and Both resulted in $p = .65 > p = .05$, and between 7-12 and Both yielded in $p = .54 > p = .05$.

Table 4
Data Based on Teachers' Subject Areas

Demographic Item	Number Responding	Percent of Total	Group Mean
Teaches one or more core subjects (math, language arts, science or social studies).	156	67	74.09
Teaches special education or Title funded classes.	33	14	75.52
Teaches career/vocational or guidance counseling classes.	18	8	73.17
Teaches specials (Music, Art, Physical Education, keyboarding, etcetera).	27	11	69.48

The t-test between Core & SpEd/Title mean scores yielded a $p = .56 > p = .05$
The t-test between Core & Career mean scores yielded a $p = .78 > p = .05$
The t-test between Core & Specials mean scores yielded a $p = .10 > p = .05$

No statistically significant difference in means exists.
Fifteen subjects did not indicate subject(s) taught. N for this subject area comparison is 234.

Four categories of subjects taught by participating teachers were included on the survey (Table 4). Teachers of core subjects such as math, language arts, science and social studies made up 63 percent of the participants in this survey. The core group, by far the largest with 67 percent of the respondents, averaged 74.09 on the survey. The core subjects, as the largest group were the anchor group by which the other three group average scores were compared using t-tests.

The special education/Title I category made up 14 percent with an average group score of 75.09. Using a 95 percent confidence interval a t-test between this category and the core group resulted in $p = .56 > p = .05$.

The career/vocational group made up just 8 percent with an average group score of 73.17. Using a 95 percent confidence interval a t-test between this category and the core group resulted in $p = .78 > p = .05$. No statistically significant difference in means exists.

The specials group of music, physical education, art, keyboarding, etcetera made up 11 percent with an average group score of 73.17. Using a 95 percent confidence interval a t-test between this category and the core group resulted in $p = .10 > p = .05$. No statistically significant difference in means exists.

Table 5
Data Based on When Teachers Entered the Classroom

Demographic Item	Number Responding	Percent of Total	Group Mean
Began Teaching Before 2001	150	60	73.42
Began Teaching After 2001	99	40	74.33

The t-test between Pre-2001 & Post 2001 mean scores yielded a $p = .60 > p = .05$

No statistically significant difference in group average scores exists.

Another question held by the researcher was whether those teachers who began after 2001would be better prepared and attuned to differentiation than those who began teaching prior to 2001. That question arose out of the fact that by 2001 many of the elements of what would become NCLB in 2003 had already arrived in the classroom via ESEA and IDEA. Table 5 indicates there is no statistical difference between those who began teaching prior to 2001 and those who began after. A t-test was conducted using a 95 percent confidence interval resulting in $p = .60 > p = .05$. One and one half times as many individuals beginning prior to 2001 responded to the survey as those beginning after NCLB.

Table 6

Principles of Differentiation Survey Principle/Item Match-Up

Principle 1: Proactive Curriculum…Items 1, 2, 3, 4

Principal II: Flexible Small Groups…Items 5, 6, 7

Principal III: Use of Varied Materials…Items 8, 9

Principal IV: Modification of the Pace of Learning…Items 10, 11, 12

Principle V: Learner Centered…Items 13, 14, 15, 16, 17, 18, 19, 20, 21, 22

Principle VII: Knowledge Centered…Items 23, 24, 25

Analysis in regard to principles of differentiation.

Laurie Boen (2010) identified six major principles of practice differentiating educators believe in and utilize. Boen calls these the Principles of Differentiation. They are based very closely on the work of Tomlinson et al (2008).The principles are: the adoption of a proactive curriculum; utilization of flexible small groups; the use of varied materials; modification of the pace of learning; learner centered delivery and focus; and knowledge centered instructional planning based on standards and goals. These Principles of Differentiation form the basis for the Differentiated Instruction Survey. Each of the twenty-five questions in the survey belongs in one of the six principles (Table 6). By knowing how respondents scored on specific items one is able to specifically pinpoint the kind of professional development teachers require to better understand and practice differentiated instruction. Originally, in planning this study it was conceived different groups of teachers would score better or worse on specific principles and therefore the prescription for professional development activities for each group would differ. However, in this particular study the groups are rather homogeneous in how they scored the survey. All teachers scored the survey similarly with no significant differences among groups.

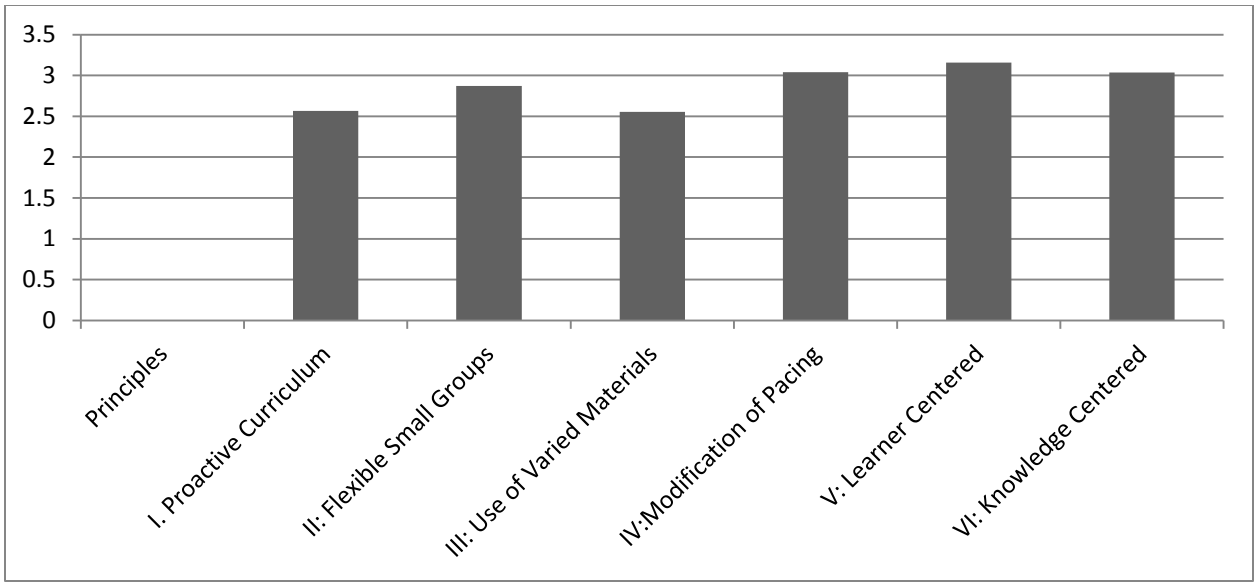

Figure 1 Average Score for Items by Principle of Differentiation

Any differences in how principles are scored are in specific principles of differentiation for the entire sample group. Figure 1 shows the two weakest areas are in the principle of proactive curriculum and the principle of using varied materials and indicate a slight weakness in the principle of using flexible small groups.

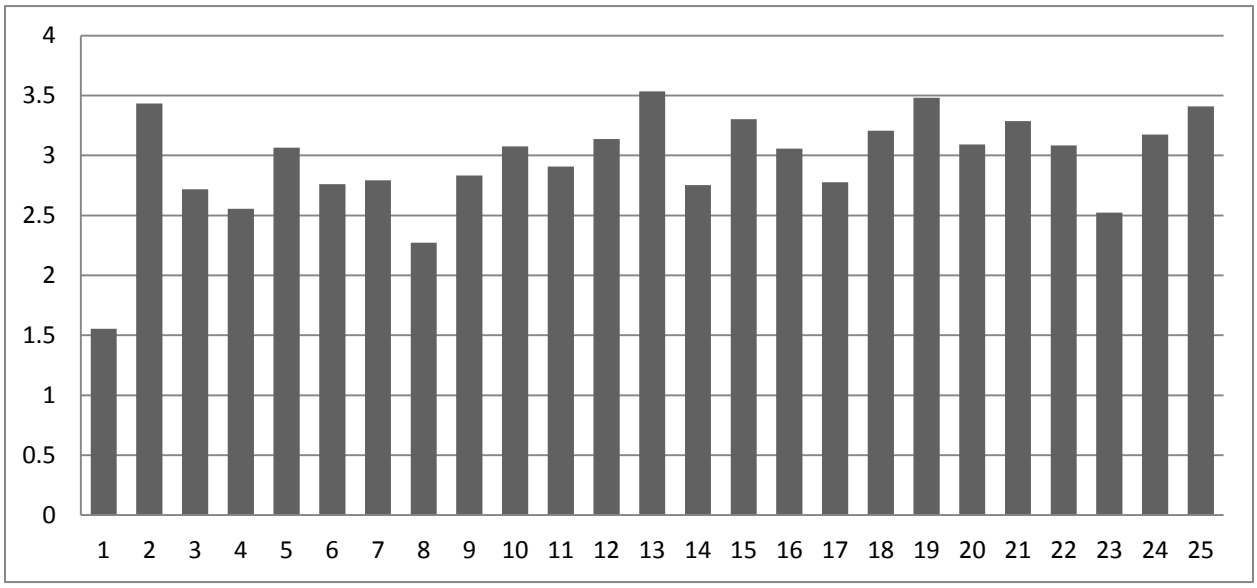

Figure 2 Point Average per Question

By further analyzing the data and focusing on the average score per item a clearer picture of the needed professional development targets begins to emerge (Figure 2). In this study there

were eleven averaged item scores under 3.0 points. Agreement with an item on the survey equaled 3.0 points. Anything under 3.0 signified some level of disagreement. The items with the lowest average scores are, in order beginning with the lowest, numbers 1, 8, 23, 4, 3, 14, 6, 17, 7, 9, and 11. Next, we must categorize the low average score items by the Principle of Differentiation to which they belong.

Table 7
Breakdown of Low Scoring Items by Principle of Differentiation

	*Average Points
Proactive Curriculum	
1. I usually plan a lesson and make on the spot modifications as I teach.	1.55
3. All students need to complete the same assignments.	2.71
4. The first step in planning my unit of instruction is the post assessment.	2.55
Flexible Small Groups	
6. It is best to change learning groups regularly.	2.75
7. Much learning in my classroom occurs through social interactions.	2.79
Use of Varied Materials	
8. Grade level materials are sufficient in my classroom to motivate my students.	2.27
9. Learning materials are a motivator for student success.	2.83
Modification of the Pace of Learning	
11. Pacing can be used as a teaching strategy.	2.9
Learner Centered	
14. Instruction is controlled by prior knowledge in the classroom.	2.75
17. Questions should be an assessment of knowledge.	2.77
Knowledge Centered	
23. I use the year-long plan that is based on state standards my school supplies.	2.52

*Four points were possible for each item. This is a mean average. All responses to each item were added together and divided by number of respondents answering. to arrive at the average points scored.

Table 7 categorizes the items by Principle of Differentiation. Three out of four of the proactive curriculum items, items1, 3 and 4 were three of the lowest scored items. Two out of three of the flexible small group items, items 6 and 7, are low. Both items in the varied material category, items 8 and 9 are low scorers. One of the three items in the modification of pace category, item 11 was barely under 3.0. The learner centered principle has ten items and only

two were scored low. Only item 23 of the three items in the knowledge centered category was low.

Deductive Conclusions

The null hypothesis predicted teachers surveyed would not be found to be in agreement with nor utilize the principles of differentiated instruction as measured by the Principles of Differentiated Instruction Survey. The null hypothesis was not rejected.

A score of 75, 25 items multiplied by 3 points, indicates agreement. The researcher therefore selected a score of 75 or greater as being necessary to reject the null hypothesis. The average score of all teachers taking the survey is 73.77 and is less than the selected score of 75. Therefore the null hypothesis is not rejected. Teachers are not found to be in agreement with the Principles of Differentiation, but in slight disagreement.

The limitation of inter-reliability of the instrument has been delimited by increasing the sample size. Boen (2010) originally developed the Principles of Differentiation Survey (Appendix A) to be used in a mixed methods study with a small group of thirty-four teachers. In the Boen study, when the Cronbach alpha for the Principles of Differentiation Survey was calculated it yielded an alpha of .202 indicating poor internal reliability. It was suggested in the original study that one reason for this low alpha value was the small sample size of thirty-four. Numerous researchers have noted low sample sizes can be unstable. The sample size in this particular study is 7 times larger than the original study sample. Increasing the sample size may give a more accurate coefficient of reliability. This significant increase from .202 to .936 indicates this instrument is a viable tool to be used in the future assessment of teacher commitment and practice of differentiation (Rouquette & Falissard, 2010).

Professional development planning is informed by the item analysis within the principles of differentiation categories. Intergroup homogeneity is strong. The groups share the same weaknesses as well as the same strengths. The teachers who took the survey are similar in regard to their opinions and knowledge of differentiated instruction. No one group more than another appeared to know more about or be more committed to differentiation. However, the survey has provided the data for identifying areas of differentiated instruction needing to be addressed through professional development. By identifying the 11 items scored less on the average at less than 3.0, with 3.0 signifying agreement with an item, and then categorizing those items by the Principle of Differentiation to which it belongs, a picture emerges of where professional development effort is most needed. Three out of four of the proactive curriculum items, items1, 3 and 4 were three of the lowest scored items. Two out of three of the flexible small group items, items 6 and 7, are low. Both items in the varied material category, items 8 and 9 are low scorers. One of the three items in the modification of pace category, item 11 was barely under 3.0. The learner centered principle has ten items and only two were scored low. Only item 23 of the three items in the knowledge centered category was low.

Summary

The primary purpose of the study is to provide data in regard to how much teachers understand and practice differentiated instruction. Using a 95 percent confidence interval, the minimum number required for this sample population of 516 was 221 participants. Two hundred forty-nine certificated teachers participated in the Likert scaled twenty-five item Principles of Differentiation Survey, based upon six principles of differentiation, and previously used in a University of Arkansas study. The average score of the group as a whole is 73.77 0n a scale of 25 to 100.

One hundred forty three of those surveyed teach grades PK-6 while 80 teach grades 7-12. One hundred forty-nine began teaching prior to 2001. One hundred fifty-seven teach core subjects, while 33 teach special education or Title I classes, and 18 are career/vocational/guidance teachers while 27 teach the special classes of art, music and physical education. The largest group of teachers are core subject teachers. No statistically significant differences in average scores on the survey exists between the largest group of core subject teachers and any of the other three subject matter groups.

One hundred sixty-five indicated they work in a building in which RtI or other differentiated instruction has been introduced. However, there is no statistically significant difference between those who had this previous exposure and those who did not indicate so. Using a 95 percent confidence interval, the t-test between the two groups resulted in $p = .60 > p = .05$.

Secondarily, the data provided has the potential of improving efficiency and effectiveness of professional development. In this study there were eleven averaged item scores under 3.0 points. Agreement with an item on the survey equaled 3.0 points. Anything under 3.0 signified some level of disagreement. Three out of four of the proactive curriculum items, items1, 3 and 4 were three of the lowest scored items. Two out of three of the flexible small group items, items 6 and 7, are low. Both items in the varied material category, items 8 and 9 are low scorers. One of the three items in the modification of pace category, item 11 was barely under 3.0. The learner centered principle has ten items and only two were scored low. Only item 23 of the three items in the knowledge centered category was low.

The Principles of Professional Development Survey has a Cronbach's alpha coefficient of .936 which is greater than the threshold of .70 necessary for inter-reliability.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Introduction

There were initially two major goals set in the beginning of this study. One was to provide data in regard to how much teachers understand and practice differentiated instruction. This would inform administrators whether or not precious and limited professional development resources should be spent on differentiated instruction. A secondary benefit was to enable administrators to target professional development resources more efficiently and more effectively.

Meaningful targeted professional development is a prime way to improve student learning (Dufour & Marzano, 2011). Efficiency is sought in being able to target resources more wisely and effectiveness comes with teachers receiving the professional development they need. Ultimately it is hoped all of this will result in eventually in deeper and more rigorous learning for rural south central Missouri public school students.

This study was predicated upon the belief differentiated instruction is needed in south central Missouri school districts. An original concern of the researcher was the familiarity of south central Missouri teachers with the concepts of differentiation and whether they use differentiation practices in the classroom. Another concern was whether those same teachers actually need further training in differentiation and if so, what more they need to learn about differentiated instruction. The professional development budget includes the cost of instruction, materials, and travel costs as well as the cost of hiring substitute teachers to cover classes while faculty are absent for professional development. In order to improve student learning professional development needs to be differentially targeted to specific groups of teachers based

upon need. Administrators needed data from which to develop cost effective professional development opportunities in differentiated instruction in their schools and districts.

This chapter includes data leading to improved planning of professional development in regard to differentiated instruction principles and practices. Administrators may use this data and the related recommendations for as they plan professional development opportunities in their schools and districts.

Conclusions

The researcher determined the instrument used in this study is valid and reliable and data now exist describing what rural south central Missouri teachers know and practice in regard to differentiated instruction. The researcher also determined the data may be used to plan and provide appropriate and targeted professional development efficiently and effectively now exists.

Should the author of the Principles of Differentiated Instruction Survey wish to pursue it, the survey could become a valuable instrument to be used by building principals in diagnosing strengths and weaknesses in teacher skillsets and directing those same teachers to appropriately oriented professional development. It is a viable tool for future assessment of teacher commitment and practice of differentiation.

The data exist for planning.

On the Principles of Differentiation Survey, the average score of the 249 participants was 73.77. Surveyed teachers had to score above 75 in order to reject the null hypotheses teachers do not understand or utilize differentiated instruction as measure by the Principles of Differentiation Survey. Had the hypotheses been rejected the need for professional development in differentiated instruction would have been eliminated. The survey results indicate professional development in differentiated instruction is necessary.

In designing the study it was assumed different demographic groups within the population of rural south central Missouri teachers would score differently, therefore having different levels of strength and weakness in regard to differentiation knowledge and practice. There were nine subgroups groups disaggregated: elementary teachers, secondary teachers, those who began before 2001, those who began after 2001, teachers of four different groups of subject matter, and whether or not they already worked in a building which has initiated differentiated instruction. However, when t-tests were applied to the averages of the compared groups, no statistically different combinations were discovered. Two hundred-thirty five of the 249 survey respondents scored between 60 and 90 points.

One may ask how the homogeneity of this group taking this survey came about. Less than half of the eligible teachers in the south central Missouri sample population participated in the survey. It could be those who are more attuned to recent trends in educational pedagogy were the teachers voluntarily participating in the survey. Over the years there have been workshops on differentiation. Most schools have instituted RtI in their elementary schools. A few have formally introduced RtI in K-12 to some degree. As recently as October, 2013 the researcher hosted a differentiated instruction oriented Frisco League Professional Development Day with several presenters working with subgroups of teachers. About the same number as participated in this survey participated in that event. Whatever the reason, the teachers who took participated in this study are statistically equal in their knowledge and practice of differentiated instruction as measured by the survey.

However, the same process for ascertaining the professional development needs of subgroups can be applied to the group at large with just as much success in identifying and prescribing the appropriate professional development activities. By analyzing which items were

scored the weakest and which were scored the strongest a realization of where professional development resources need to be expended begins to evolve. Professional development planning is informed by the item analysis within the principles of differentiation categories. Intergroup homogeneity is strong. The groups share the same weaknesses as well as the same strengths.

One aspect of item analysis involves adding together the actual score each of the participants received for each item and dividing by the number of people participating, obtaining an average score for each item. In this particular survey a 4 point Likert scale was used so the scores for each item run along a continuum of 1 to 4 points. In this survey the lowest average item score was 1.55 and the highest was 3.53.

In this study there were eleven averaged item scores under 3.0 points. Agreement with an item on the survey equaled 3.0 points. Anything under 3.0 signified some level of disagreement. The scores are as follows: Item 1 = 1.55, Item 8 = 2.27, Item 23 = 2.52, Item 4 = 2.55, Item 3 = 2.71, Item 6 = 2.75, Item 14 = 2.75, Item 17 = 2.77, Item 7 = 2.79, Item 9 = 2.83 and Item 11 = 2.9.

Placing low scoring items where they belong among the six principles of differentiated instruction continuum enables the researcher or school administrator to make sense of specific deficits in differentiation understanding or practice and plan accordingly for professional development. Three out of four of the proactive curriculum items, Item 1, Item 3 and Item 4 were three of the lowest scored items. Two out of three of the flexible small group items, Item 6 and Item 7, are low. Both items in the varied material category, Item 8 and Item 9 are low scorers. One of the three items in the modification of pace category, Item 11 was barely under 3.0. The

learner centered principle has ten items and two were scored low. One item, Item 23, of the three items in the knowledge centered category was low.

Individual items can be quite illuminating. The lowest scored item is Item 1: I usually plan a lesson and make on the spot modifications as I teach. Item 1 was one of the six reverse coded items. Strong agreement with this statement resulted in 4 points and strong disagreement resulted in 1 point. Only 18 individuals scored the item in disagreement or strong disagreement. All 231 of the other respondents were in agreement or strong agreement. This uniformity indicates there is a shared misconception that waiting until one gets to class to plan modifications for out of the norm students is appropriate pedagogy. However, the principle of proactive curriculum calls for a teacher to pre-plan various lesson tiers, usually a total of three, with different levels of rigor or different materials or different pacing or different approaches of presentation. When planning lessons, teachers must look ahead to anticipate student differences and plan accordingly. Waiting until a lesson has been introduced and then modifying it on the spot to accommodate for student differences is not proactive curriculum development.

How administrators may use this data to plan professional development opportunities for their teachers is provided in the Recommendations section.

Recommendations

Based upon the data gathered from this survey it is recommended the following professional development activities be provided. The recommendations are prioritized. Proactive curriculum is addressed first because of the lowest scoring item being in that principle category along with two more of the four items in the proactive category also being low scorers. Professional development resources can be used where they will have the greatest effect on

improving instruction. Following proactive curriculum are prioritized recommendations as indicated by the data.

First priority, professional development leading to a proactive curriculum.

The professional development recommendations for promoting a proactive curriculum approach would include: learning to tier lessons to meet the needs of at least three various tiers of learning; learning to assess students in a variety of ways in addition to written question answer type assessments; developing the art of scaffolding in order to help students build upon prior knowledge regardless of where they currently are; learning to assess student interest and create lessons motivating students to engage in the learning process; and developing different assignments designed to teach the same concepts (Rock et al, 2008; Roe, 2010; Strahan et al, 2012; Vatterott, 2009).

Three of the four items used to assess commitment to the practice of the proactive curriculum were scored by the group below level of agreement with the principle. The lowest scored item in the survey was in regard to planning lessons proactively, rather than waiting until class to make adjustments. A proactive curriculum approach is one in which the teacher writes lesson plans based upon curriculum relating back to standards of learning. The teacher is responsible for facilitating learning for a diverse group of students who are experientially, developmentally and motivationally varied. Different levels of learning readiness, interest and ability exist thereby requiring the teacher to create within a lesson or unit different levels of expectations for task completion or even different assignments in response to learning readiness, interests and learning profiles. A three level planning pyramid is a common staple among differentiating teachers and is generally the method taught in most professional development opportunities (Lawrence-Brown, 2004). Various methods of pre-assessment allow a teacher to

know where particular students fall in regard to the varied tiers of learning designed for any particular lesson or unit (Central Comprehensive Center (2010a).

Second priority, professional development leading to the use of flexible small groups.

The professional development recommendation for improving the use of small flexible groups is attendance in workshops where grouping is modeled followed by intermittent mentoring and coaching over a period of a school year. There are a myriad of flexible group types: teams, whole class, half class, partners, trios, one on one instruction, small groups, anchor groups and learning stations to name a few. Mentoring and coaching in the use of these various types is an effective way enhancing learning through professional development (Anderson, 2013b).

Two of the three items assessing commitment to the principle of flexible small groups were scored by the group below level of agreement with the principle. Generally in the classroom, whole group instruction or assessment occurs which enables a teacher to divide students into groups based upon whether they need to review material or concepts, be re-taught taking into account different learning styles or from a different perspective, practice--as in math skill development, or enrichment. Professional development addressing flexible grouping includes: the cognitive science and learning theory explaining how differentiation, and ultimately learning, is enhanced by flexible grouping; the advantages and disadvantages in grouping; learning when and how grouping facilitates instruction; learning which activities lend themselves to group work; assigning appropriate activities for heterogeneous groups; assigning appropriate activities for homogeneous groups; how to choose or form groups; how to keep the groups

rotating and varied; developing pre-assessment, formative assessment and post-assessment strategies; and how to manage group behavior and climate (Hougen, 2004; Anderson, 2013a).

Third priority, professional development leading to use of varied materials.

There are a number of professional development recommendations to be made for improving the use of varied materials. Books by Tomlinson, Heacox and Wormelli are loaded with suggestions for varying materials, the adoption of technology and opportunities to be mentored and coached in improving the use of technology are two recommendations with the most potential. Creativity is a central tenant of efforts to improve the diversity of instructional materials in the classroom. Textbooks, internet search engines, film, creating videos, graphic organizers, making posters, braille readers, audio books, using game formats, drawing, blogging online, using word walls, using traditional manipulatives and flashcards, building models, listening to a podcasts, or using simple notebooks and ink pens can all be used to their maximum level of usefulness given the right circumstances and the right student needs (Anderson, 2013b). Teachers are being retrained in schools across the country to adopt technology as a method of instructional delivery. Electronic instructional devices such as laptops, pads, and even cell phones are becoming common place in many American schools as students gravitate to the technology faster than teachers can keep up with the pace of online possibilities for learning (Allison et al., 2011). Coaching and mentoring in the use of technology are key components in professional development aimed at improving differentiated instruction (Wormelli, 2006).

Both of the two items used to assess commitment the principle of using varied materials were scored by the group below level of agreement with the principle. There are many reasons why a variety of instructional materials are used in a differentiated classroom. Variety of student readiness, interest, learning styles, cognitive levels, physical handicaps, diversity of prior

knowledge or experience among students, multi-cultural diversity, personalities and level of concept rigor are just some of the reasons why using a variety of materials to teach a lesson or unit is useful to student learning (Howery, McClellan & Pedersen-Bayus, 2013).

Fourth priority, professional development related to modification of the pace of learning.

Workshops and readings teaching the concept of instructional scaffolding are helpful to learning how to modify pace and still facilitate the mastery of academic content. The interactional support of scaffolding when done properly enables a student to build upon past learning in increments he/she is able to manage and comprehend based upon his/her unique set of circumstances. This applies to both the gifted learner as well as learners in the other two tiers of learning found in a three level planning pyramid (Kingore, 2011).

The purpose of an effectively differentiated classroom is for all students to achieve mastery, but not necessarily in the same way or at the same pace. Teachers must learn that requiring all students to carry an equal workload is not the goal of educators. Understanding and mastering concepts and academic skills is the goal (Wormelli, 2006).

Fifth priority, professional development leading to learner centered learning. Skills in learner centered teaching are enhanced by professional development in: assessment of student interests and prior knowledge; learning to give meaningful feedback to students; motivational psychology; and classroom management.

Learner centered professional development prepares teachers to take into account student readiness, ability, interests, talents, learning profile and prior knowledge (Egan, 2009). Teachers in the survey group did quite well in this category which is good because this principle is at the center of all differentiated instruction.

Sixth priority, professional development leading to knowledge centered learning.

This recommendation is to learn and apply the concept of mastery learning. Professional development to promote knowledge based learning should train teachers to use a mastery of the standards approach. Teachers need specific strategic training in mastery learning followed by coaching and mentoring in the practice of differentiation strategies. The South Central Missouri Regional Professional Development Center conducts workshops throughout the year on this very subject.

In a mastery approach, teachers break down their class curriculum into small units of material to be covered in one to two weeks. After learning the first unit, student mastery of the material is assessed. Rather than signifying the end of their time on this unit, the assessment is a guide to the teacher regarding the level of understanding the students have of the unit. He or she then identifies the areas of weakness and also the areas where the student may not need any help. Detailed feedback is given to the student, and corrective activities are assigned on those topics that are lacking. Students can be given practice exercises, study guides, group work or complimentary resources, like information on the web, to help them improve. Students are then given a chance to be reassessed via an instrument (quiz, paper or project) similar to the content of the first one. Only when the student masters that particular unit can they move on to the next one. Students who showed mastery at their first evaluation are given enrichment exercises like special projects, tasks or academic games to further or broaden their knowledge of the material. While the mastery approach is very effective, it is very complex and may require supportive mentoring and coaching for the teacher over an extended period of time.

The item assessing the use of the learning standards as presented by the teacher's district was the third lowest scored item in the study. This aspect of the knowledge based standard is the most important. It is the aim of knowledge based learning for learners to achieve mastery of standards based content (Boen, 2010). Knowledge based learning is mastery learning. Mastery learning ensures the ultimate goal of any course, which is the understanding and learning of new material is achieved. Mastery learning also gives students who are struggling, opportunities for improvement not available in the more traditional model. Mastery learning provides clear, individualized feedback helping each student realize what they are missing and how to attain it. Mastery learning also helps those who are already doing well to develop their potential more fully through further activities (Levy, 2008). Professional development promoting and practicing mastery learning is the way to create genuine learning along every step of a course of study.

Summary

The Principles of Differentiated Instruction Survey served its purpose well. It is a valuable instrument in diagnosing strengths and weaknesses in teacher skillsets and directing those same teachers to appropriately oriented professional development. It is a viable tool for future assessment of teacher commitment and practice of differentiation.

This study achieved what it set out to do. There were initially two major goals set in the beginning of this study. One was to provide data in regard to how much teachers understand and practice differentiated instruction. This would inform administrators whether or not precious and limited professional development resources should be spent on differentiated instruction. The second goal was to enable administrators to target professional development resources more efficiently and more effectively. Data now exist describing what rural south central Missouri teachers know and practice in regard to differentiated instruction and the ability to use this data

to plan and provide appropriate and targeted professional development efficiently and effectively now exists. Specific recommendations, based upon the scoring of the Principles of Differentiation Survey and the literature have been made.

In essence, effective professional development focuses on instructional strategies impacting student achievement followed up by coaching and mentoring which sustains the selected strategies (Allison, 2011).

John Hattie's (2012) meta-analyses research in teacher/educational practices found evidence professional development with the highest impact on student learning is oriented toward teaching teachers to: develop high expectations for each and every student; provide better feedback to students; developing more effectual teacher-student relationships; employ strategies to improve meta-cognition; accelerate learning; teach study skills; teaching learning strategies to students; and avoid labeling students. Another practice with high impact on student learning is providing formative evaluation to teachers. These are all practices integral to effective and productive differentiated instruction.

This study has provided data in regard to how much teachers understand and practice differentiated instruction. Administrators may use the data gathered to develop professional development opportunities in differentiated instruction in their schools and districts. Professional development plans for teachers can be differentiated based upon data gathered indicating the degree to which specific groups of teachers understand and use specific principles of differentiation.

REFERENCES

Allison, E. (2011). Leadership through coaching and 100 day projects. *Activate: A leader's guide to people, practices and processes* (pp. 25-42). Englewood, CA: Lead and Learn Press.

Anderson, L. W., Krathwohl, D. R., & Bloom, B. S. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. New York: Longman.

Anderson, S., Mascall, B., Stiegelbauer, S., & Park, J. (2012). No one way: Differentiating school district leadership and support for school improvement. *Journal of Educational Change, 13*(4), 403-430. doi:10.1007/s10833-012-9189-y

Anderson, W. (2012). *Differentiated instruction*. [PowerPoint slides]. Retrieved from South Central Missouri Regional Professional Development Center. Rolla, MO.

Anderson, W. (2013). *Differentiated instruction*: *twenty-five plus strategies for the classroom*. [PowerPoint slides]. Retrieved from South Central Missouri Regional Professional Development Center. Rolla, MO.

Archambault Jr., F. X., & Westberg, K. L. (1997). A multi-site case study of successful classroom practices for high ability students. *Gifted Child Quarterly***,** *41*(1), 42-51. doi:gcq.sagepub.com/content/41/1/42.short.

Barley, Z. A., & Beesley, A. D. (2007). Rural school success: what can we learn? *Journal of Research in Rural Education, 22*(1), 1-16. doi: jrre.psu.edu/articles/221.

Berbaum, K. A. (2009). *Initiating differentiated instruction in general education classrooms with inclusion learning support students: a multiple case study* (Doctoral dissertation). (ED526746). Retrieved from ERIC database.

Berkeley, S., Bender, W. N., Peaster, L. G., & Saunders, L. (2009). Implementation of response to intervention: A snapshot of progress. *Journal of Learning Disabilities*, *42*(1), 85-95. doi:10.1177/0022219408326214

Bloom, R. M. (2010). *Implementation practices of differentiated instruction in the upper elementary and middle school math classroom: A discovery through grounded theory* (Doctoral dissertation). Retrieved from ERIC database. (ED514476)

Boen, L. A. (2010). Differentiated instruction within a response to intervention framework, a mixed-methods study (Doctoral dissertation). Retrieved from ProQuest Dissertations and Thesis. (305185028)

Central Comprehensive Center at the University of Oklahoma. (2010). *The response to intervention knowledgebase*. Retrieved from http://c3ta.org/knowledgebases/RtI.html

Central Comprehensive Center at the University of Oklahoma. (2010). *The school improvement knowledgebase*. Retrieved from http://c3ta.org/knowledgebases/School_Improvement.html

Clinkenbeard, P. (2012). Motivation and gifted students: Implications of theory and research. *Psychology In The Schools*, *49*(7), 622-630. doi:10.1002/pits.21628

Cole, M. and Wertsch, J. V. (1996). Beyond the individual-social antimony in discussions of Piaget and Vygotsky. Human Development, 39, 250-256.

Columbo, M. W., & Columbo, P. D. (2007). Blogging to improve instruction in differentiated science classrooms. *Phi Delta Kappan*, *89*(1), 60-63.

Dahlgren, L. O., Fejes, A., Abrandt-Dahlgren, M., & Trowald, N. (2009). Grading systems, features of assessment and students' approaches to learning. *Teaching in Higher Education*, 14(2), 185-194. doi: 10.1080/13562510902757260

Dee, A. (2011). Preservice teacher application of differentiated instruction. *Teacher Educator, 46*(1), 53-70. Retrieved from http://www.eric.ed.gov/ERICWebPortal/detail?accno=EJ909832

Dufour, R., & Marzano, R. J. (2011). *Leaders of learning: How district, school and classroom leaders improve student achievement.* Bloomington, IN: Solution Tree Press.

Dunphy, S. P. (2010). *The effect of explicitly differentiated reading instruction groups on eighth-grade students' achievement, behavior, and engagement in a school seeking to reestablish adequate yearly progress benchmarks* (Doctoral dissertation). Retrieved from ERIC database. (ED522969)

Dweck, C. S. (2006). *Mindset: The new psychology of success.* New York, NY: Random House.

Eaker, R., DuFour, R., & Burnette, R. (2002). *Getting started: Reculturing schools to become professional learning communities.* Bloomington, IN: Solution Tree Press.

Edwards, S. (2013). Preparing new teachers for contemporary middle grades schools. Middle School Journal [serial online]. March 2013; 44(4):14-20.

Egan, K. (2009). Learning in depth. In Scherer, M. (Ed.) *Engaging the whole child: Reflections on best practices in learning, teaching and leadership.* Alexandria, VA: Association for Supervision and Curriculum Development.

Flannery, T. (2013). Why require coaches to be certified? *High School Today, 7*(1): 22-25.

Frisco League. (2013, January 28) *January superintendents' meeting* [Meeting minutes]. Meeting presented at Waynesville, MO.

Frisco League. (2013, December 18) *December superintendents' meeting.* [Meeting minutes]. Meeting presented at St. Robert, MO.

Guskey, T.R. (2005). Formative classroom assessment and Benjamin S. Bloom: theory, research

and implications. Lexington, Ky. University of Kentucky. Retrieved on January 2, 2014 from: http://files.eric.ed.gov/fulltext/ED490412.pdf

Hartnell, B. J. (2011). *Standards-based curriculum, differentiated instruction, and end of course assessments* (Doctoral dissertation). Retrieved from ERIC database. (ED526408)

Hattie, J. (2009). *Visible learning: a synthesis of over 800 meta-analyses relating to achievement.* New York, NY: Routledge, Taylor & Francis Group.

Hattie, J. (2011). *Visible learning for teachers.* New York, NY: Routledge, Taylor & Francis Group.

Heacox, D. (2002). *Differentiating instruction in the regular classroom: How to reach and teach all learners, grades 3-12.* Minneapolis, MN: Free Spirit Publishing Company.

Heacox, D. (2009). *Making differentiation a habit: How to ensure success in academically diverse classrooms.* Minneapolis, MN: Free Spirit Publishing Company.

Heid, C., & Webber, A. (2004). *School-level implementation of standards-based reform: Findings from the follow-up public school survey on education reform*. Washington, DC: U.S. Department of Education.

Hougen, M. (2004). *Flexible grouping: Teaching all the kids all the time*. [PowerPoint slides]. Retrieved from www.austincc.edu/teacher/files/documents/L9_FlexiblegroupingRF.ppt

Howery, K., McClellan, T., & Pedersen-Bayus, K. (2013). "Reaching every student" with a pyramid of intervention approach: one district's journey. *Canadian Journal of Education, 36*(1), 271-304.

Kanevsky, L. (2011, October). Deferential differentiation: what types of differentiation do students want?. *Gifted Child Quarterly, 55*(4), 279-299.

Kilic, G., & Cakan, M. (2006). The analysis of the impact of individual weighting factor on individual scores. *Assessment & Evaluation In Higher Education, 31*(6), 639-654. doi:10.1080/02602930600760843

Kingore, B. (2011). Differentiating instruction to promote rigor and engagement for advanced and gifted students. *Tempo, 31*(3), 9-15.

Koeze, P. A. (2007). *Differentiated instruction: The effect on student achievement in an elementary school* (Doctoral dissertation). Retrieved from http://commons.emich.edu/theses/31

LaFountain, R. M., & Bartos, R. B. (2002). *Research and statistics made meaningful in counseling and student affairs.* Pacific Grove, CA: Brooks/Cole.

Landry, S. H., Miller-Loncar, C. L., Smith, K. E., & Swank, P. R. (2002). The role of early parenting in children's development of executive processes. Developmental Neuropsychology, 21, 15-41

Lawrence-Brown, D. (2004). Differentiated instruction: Inclusive strategies for standards-based learning that benefit the whole class. *American Secondary Education, 32*(3), 34-62.

Lee, C. C. (2009). *Doors of change: Capacity building to differentiated instruction* (Doctoral dissertation). Retrieved from ERIC database. (ED515346).

Levy, H. M. (2008). Meeting the needs of all students through differentiated instruction: Helping every child reach and exceed standards. *The Clearing House, 81*, 161-164.

Lucking, R. A., Christmann, E. P., & Wighting, M. J. (2009). Podcasts and blogs. *Science Scope, 33*(3), 64-67.

Lumby, J. (2011). Enjoyment and learning: Policy and secondary school learners' experience in England. *British Educational Research Journal*, *37*(2), 247-264. doi:10.1080/01411920903540680

Marzano, R. (2000). *Transforming classroom grading.* Alexandria, VA: Association for Supervision and Curriculum Development.

McLeod, S. A. (2007). Lev Vygotsky. Retrieved from http://www.simplypsychology.org/vygotsky.html

Missouri Department of Elementary and Secondary Education. (2013). *Missouri school improvement program.* Retrieved from http://dese.mo.gov/divimprove/sia/msip/

National School Boards Association. (2000). *Exploring new directions: Title I in the year 2000.* Retrieved from http://www.nsba.org/bookreports/title1/toc.htm

Nichols, J., & Zhang, G. (2011). Classroom environments and student empowerment: An analysis of elementary and secondary teacher beliefs. *Learning Environments Research, 14*(3), 229-239. doi:10.1007/s10984-011-9091-1

Nolen, S. B. (2007). Young children's motivation to read and write: Development in social contexts. *Cognition and Instruction*, 25(2/3), 219-270. doi:10.1080/07370000701301174

Noddings, N. (2009). All our students thinking. In Scherer, M. (Ed.) *Engaging the whole child: Reflections on best practices in learning, teaching, and leadership.* Alexandria, VA: Association for Supervision and Curriculum Development.

Office of Quality Schools (2010). *Missouri school improvement program: Professional learning communities.* Missouri Department of Education, Jefferson City, MO. Retrieved from http://dese.mo.gov/divteachqual/plc/pdf

Office of Quality Schools (2012). *Missouri response to intervention conceptual framework.* Missouri Department of Education, Jefferson City, MO. Retrieved from http://dese.mo.gov/3tieredmodels/rti/documents/ConceptualFrameworkofRtIinMissouri.pdf

Parker, C. C. (2011). *An investigation of differentiated instruction: Closing the achievement gap for elementary English language learners* (Doctoral dissertation). Retrieved from ERIC database. (ED524382)

Peterson, T. J. (2008). The spill-over effect: An examination of differentiated curriculum designs in a heterogeneous classroom (Doctoral dissertation). University of Southern California. Retrieved from ProQuest (UMI 3325095).

Quick, H., Holzman, D., & Chaney, K. (2009). Professional development and instructional practice: Conceptions and evidence of effectiveness. *Journal of Education for Students Placed at Risk (JESPAR), 14*(1), 45-71.

Robertson, V. S. (2009). *Drop out or persist: The influence of differentiated instruction and teacher behavior on college freshmen and GED students* (Doctoral dissertation). Retrieved from ERIC database. (ED513024)

Rock, M. L., Gregg, M., Ellis, E., & Gable, R.A. (2008). REACH: A framework for differentiating classroom instruction. *Preventing School Failure, 52* (2), 31-47. Retrieved from http://libres.uncg.edu/ir/uncg/f/M_Rock_REACH_2008.pdf

Roe, M. (2010). The ways teachers do the things they do: Differentiation in middle level literacy classes. *Middle Grades Research Journal, 5*(3), 139-152.

Rouquette, A., & Falissard, B. (2010). *Sample size requirements for the internal validation of psychiatric scales*. Paris, France : Unité INSERM U669, Paris Sud Innovation Group in

Adolescent Mental Health. Retrieved from www.hal.inserm.fr/docs/00/63/.../RouquetteFalissard09057_Jan2010.doc

Sadler, D. (2010). Fidelity as a precondition for integrity in grading academic achievement. *Assessment & Evaluation In Higher Education*, *35*(6), 727-743. doi:10.1080/02602930902977756

Sagor, R. (2009). Cultivating optimism in the classroom. In Scherer, M. (Ed.) *Engaging the whole child: Reflections on best practices in learning, teaching and leadership.* Alexandria, VA: Association for Supervision and Curriculum Development.

Santrock, J (2004). A Topical Approach To Life-Span Development. Chapter 6 Cognitive Development Approaches (200 – 225). New York, NY: McGraw-Hill.

Schiefele, U., Schaffner, E., Moller, J., Wigfield, A., Nolen, S., & Baker, L. (2013). Dimensions of reading motivation and their relation to reading behavior and competence. *Reading Research Quarterly*, 47(4), 427-463. doi: 10.1002/PRQ.030

Sijtsma, K. (2008). On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika*, *74*(1), 107-120. doi: 10.1007/s11336-008-9101-0

Skott, J. (2009). Contextualizing the notion of 'belief enactment'. *Journal Of Mathematics Teacher Education*, *12*(1), 27-46. doi:10.1007/s10857-008-9093-9

Smith, J. C. (2011). *Differentiated instruction: exploring implementation at the middle level* (Doctoral dissertation). Retrieved from ERIC database. (ED527965)

Strahan, D., Kronenberg, J., Burgner, R., Doherty, J., & Hedt, M. (2012). Differentiation in action: Developing a logic model for responsive teaching in an urban middle school. *Research in Middle Level Education Online*, *35*(8), 1-17.

Sullo, B. (2009). *The motivated student: Unlocking the enthusiasm for learning.* Alexandria, VA: Association for Supervision and Curriculum Development.

Taylor, L. S., & Whittaker C.R. (2003). *Bridging multiple worlds: Case studies of diverse educational communities.* Boston, MA: Allyn & Bacon

Tomlinson, C. A. (2001). *How to differentiate instruction in mixed ability classrooms, 2nd edition.* Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A. (2003). *Fulfilling the promise of the differentiated classroom: Strategies and tools for responsive teaching.* Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A. (2008). *The differentiated school: Making revolutionary changes in teaching and learning.* Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A., Brighton, C., Hertberg, H., Callahan, C.M., Moon, T., Brimijoin, K., & Reynolds, T. (2003). Differentiating instruction in response to student readiness, interest, and learning. *Journal for the Education of the Gifted, 27*(2/3), 119-145. Reston, VA: The Association for the Gifted.

Tomlinson, C. A., & Imbeau, M. B. (2010). *Leading and managing a differentiated classroom.* Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A., & McTighe, J. (2006). *Integrating differentiated instruction and understanding by design: Connecting content and kids*. Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A., and Strickland, C. (2005). *Differentiation in practice: A resource guide for differentiating curriculum, grades 9–12*. Alexandria, VA: Association for Supervision

and Curriculum Development.

Trela, K., & Jimenez, B. (2013). From different to differentiated: Using "ecological framework" to support personally relevant access to general curriculum for students with significant intellectual disabilities. *Research & Practice For Persons With Severe Disabilities*, *38*(2), 117-119.

United States Department of Education. (2007). *Twenty-five years of progress in educating children with disabilities through IDEA.* Retrieved from www2.ed.gov/policy/speced/leg/idea/history

United States Department of Education (2011). *Improving basic programs operated by local educational agencies*. Retrieved from http://www2.ed.gov/programs/titleiparta/index.htm

Vatterott, C. (2009). *Rethinking homework: Best practices that support diverse needs.* Alexandria, VA: Association for Supervision and Curriculum Development.

Verenikina, I. (2003). Understanding scaffolding and the ZPD in educational research. PDF file. Retrieved September 24, 2013, from http://ro.uow.edu.au/edupapers/381/

Vygotsky, L.S.(1998). Part 2: problems of child (developmental) psychology. In R.W. Reiber (Ed.), The collected works (Volume 5, pp 187-296). Plenum Publishers, New York. Retrieved from http://www.marxists.org/archive/vygotsky/collected-works.htm

Vygotsky, L. S. (2007). Letters to students and colleagues. Journal of Russian and East European Psychology, 45(2), 11-60. doi:10.2753/RPO1061-0405450201

Wasburn-Moses, L., & Bouck, E. (2007). Secondary special education: A comparative study of teachers of "high incidence disabilities". *Mid-Western Educational Researcher, 20*(2), 2-8.

Ward, V. S. (1961). *Finding the gifted: An axiomatic approach.* Columbus, OH: Charles E. Merrill.

Ward, V.S. (1986, August). Theory in the practice of differential education for gifted. *Roeper Review,* 263-271.

Welsh, D. K. (2010). *Effects of differentiated instruction and word attack strategies on struggling readers* (Doctoral dissertation). Retrieved from ERIC database. (ED516480)

White, S. (2011). Activating school improvement. *Activate: A leader's guide to people, practices, and processes* (pp. 133-149). Englewood, CA: Lead and Learn Press.

Willis, J. (2007). *Brain-friendly strategies for the inclusion classroom.* Alexandria, VA: Association for Supervision and Curriculum Development.

Wormelli, R. (2006). *Fair isn't always equal: Assessment and grading in the differential classroom.* Portland, ME: Stenhouse Publishers.

Yıldırım, S. (2012). Teacher support, motivation, learning strategy use, and achievement: A multilevel mediation model. *Journal Of Experimental Education*, *80*(2), 150-172. doi:10.1080/00220973.2011.596855

Zheng, H. (2013). Teachers' beliefs and practices: A dynamic and complex relationship. *Asia-Pacific Journal Of Teacher Education*,*41*(3), 331-343. doi:10.1080/1359866X.2013.809051

Zeibell, J. (2010). *Differentiated instruction*. A position paper. Retrieved from: jillzeibell.files.wordpress.com/2010/

Zittleman, K., & Miller, D. (2006). *Teachers, schools and society: A brief introduction to education.* New York, NY: McGraw-Hill Higher Education.

APPENDICES

Appendix A

Principles of Differentiation Survey

Demographic Data

For items A, B, C, and D please, check only the box to the left of the selected answers which apply to you.

_A1_ I teach grades PK-6.

_A2_ I teach grades 7-12.

_B1_ I started teaching prior to 2001.

_B1_ I began teaching after 2001.

_C1_ I teach one or more core subjects (math, language arts, science or social studies).

_C2_ I teach special education or Title funded classes.

_C3_ I teach career/vocational or guidance counseling classes.

_C4_ I teach "specials (Music, Art, Physical Education, keyboarding, etcetera)."

_D _ I work in a building where RtI or other Differentiated Instruction strategies have been introduced.

Survey

Please, check the box for each item below indicating your level of agreement or disagreement with the statement made.

SA = Strongly Agree A = Agree D = Disagree SD = Strongly Disagree

1. SA A D SD I usually plan a lesson and make on the spot modifications as I teach.
2. SA A D SD I am responsible for the academic success of my students.
3. SA A D SD All students need to complete the same assignments.
4. SA A D SD The first step in planning my unit of instruction is the post assessment.
5. SA A D SD Socialization does not affect the quality of my students' education.

SA = Strongly Agree **A = Agree** **D = Disagree** **SD = Strongly Disagree**

6. SA A D SD It is best to change learning groups regularly.
7. SA A D SD Much learning in my classroom occurs through social interactions.
8. SA A D SD Grade level materials are sufficient in my classroom to motivate my students.
9. SA A D SD Learning materials are a motivator for student success.
10. SA A D SD Required time for learning is flexible.
11. SA A D SD Pacing can be used as a teaching strategy.
12. SA A D SD Routines are an integral part of the pacing of learning in my classroom.
13. SA A D SD I believe all students can learn but in different ways.
14. SA A D SD Instruction is controlled by prior knowledge in the classroom.
15. SA A D SD My work involves setting challenging but achievable goals for my students.
16. SA A D SD Assessment occurs only at the end of an instructional unit.
17. SA A D SD Questions should be an assessment of knowledge.
18. SA A D SD Feedback on assignments is necessary.
19. SA A D SD The educational climate effects learning.
20. SA A D SD Students learn what is personally meaningful to them.
21. SA A D SD Instruction is not related to classroom management.
22. SA A D SD Students have the capacity to help manage learning.
23. SA A D SD I use the year-long plan that is based on state standards my school supplies.
24. SA A D SD It is my responsibility to motivate students.
25. SA A D SD It is my responsibility to communicate clear learning goals.

Thank you! The *Principles of Differentiation Survey* is used with permission and adapted from:

Boen, Laurie A. (2010). ***Differentiated instruction within a response to intervention framework, a mixed-methods study*** **(doctoral dissertation). University of Arkansas.**

Appendix B

Permission to use your survey

John Westerman Mon, Nov 11, 2013 at 4:58 PM
To: Laurie Boen
Cc: Robert Perry

Dr. Boen,
I just reread your dissertation over the weekend.

During a telephone conversation last Spring, you offered to let me use your survey instrument in my guided research project. Does that offer still hold?

I would like to use the "Principles of Differentiation" quantitative instrument which contains 25 items and a Likert rating scale. The demographic data collected would be slightly different than the data you collected in order to meet the needs of the hypotheses I've generated. However, We will stick as closely as possible to the methodology for data collection and analysis that you used. We'll make sure your work is referenced and you receive credit for the instrument's development on both the survey and in the research paper. If you and Dr. Perry agree to this, when it comes time to conduct the survey I will be developing a link and send it our electronically to about 450 teachers.

We may need to pilot the instrument with about 50 teachers since I'm changing the demographic information collected. What are your thoughts?

Oh, and I've received a great deal of positive feedback on your presentation at our Frisco League PD day. The League Superintendents reported they too received positive feedback. Thank you, for sharing with our teachers.

I'm copying Dr. Perry on this email. This morning I was pitching him the idea of creating my own survey, but by the end of the day I came to the realization that I'm probably going to get better results from an instrument that has already had its validity and reliability assessed.

Once again, thanks for everything you've done.

John W.

Laurie Boen Mon, Nov 11, 2013 at 7:29 PM
To: John Westerman
Cc: Robert Perry

Yes, John that is perfectly fine. I would just like to add that I would like access to the raw data (without names of course) if I decide to go further with the research. I would also like to know, and have the opportunity to participate, if you do any presentations on the instrument.

I am so thankful it was beneficial to you and your group!

I hope this finds you well.

L

Appendix C

District Superintendent Approval to Conduct Research

Differentiated Instruction Understanding and Use
Among Rural South Central Missouri Teachers

January 29, 2014

From: John L. Westerman

To: Frisco League Superintendents

Dear Superintendent:

As a doctoral student in Educational Administration at Southwest Baptist University, I am requesting your permission to survey teachers in your schools for a research study critical to the field of educational leadership and my completion of the Southwest Baptist Educational Doctoral Degree program. This project is being supervised by Dr. Robert Perry, Professor, Graduate Education, Southwest Baptist University (800-792-4191).

Participation in this study is completely voluntary. Participation in this study will require your teachers to complete a 25 item Likert scaled survey which will take about 10 minutes of their time. Anonymity is protected as neither individual educators nor schools/districts are identified in the demographic section of this instrument. There is minimal risk to participants.

The information will be used in a doctoral dissertation for Southwest Baptist University and results will be made available to Frisco League administrators for professional development planning. The survey responses may be published in scientific research journals or presented at professional conferences. The dissertation will be available online through ProQuest upon completion and acceptance by Southwest Baptist University. As superintendents of participating schools, you will be receiving a summary of results from this study which you may choose to use in planning professional development in your district schools. Hopefully, the data gathered will be a benefit to your district in regard to professional development planning.

Prior to administering the survey, this project must be reviewed and approved by the RRB Committee at Southwest Baptist University. The committee must believe the research procedures adequately safeguard the privacy, welfare, civil liberties, and rights of your

district teachers.

Your permission, the assistance of your administrators and the participation of your teachers is greatly appreciated.

Respectfully,

John L. Westerman
Doctoral Graduate Student
Southwest Baptist University

I agree to allow this survey to be presented to teachers in my district with an informed consent statement outlining: the nature and purpose of the study, risk to the participants, and benefits participants may expect. Teacher participation is entirely voluntary and no penalty exists for not participating.

Plato R-V _____
Dr. Ben Yocom, Superintendent

Crocker R-II _____
Mr. Gary Doerhoff, Superintendent

Dixon R-1 _____
Mr. Duane Doyle, Superintendent

Iberia R-V _____
Mr. Thomas Gotsch, Superintendent

Laquey R-V _____
Dr. Randy Caffey, Superintendent

Licking R-VIII _____
Dr. John Hood, Superintendent

Newburg R-II _____
Mr. John Westerman, Superintendent

Richland R-IV _____
Mr. Joe Ridgeway, Superintendent

Appendix D

Research Review Board Approval

Terry Cox Thu, Feb 13, 2014 at 2:06 PM

To: John Westerman

Congratulations, after review of your application for research for the project listed below, it has been determined that your project meets the criteria for Exempt status. As per policy 1.15.3 in the faculty guidelines:

"If the project is certified exempt, the principle investigator need not resubmit the project for continuing RRB review as long as there are no modifications in the exempted procedures"

Title of Project: Differentiated Instruction Understanding and Use Among Rural Missouri Frisco League

Teachers, a Descriptive Study

Good luck on your research,

Terry Cox PT, DPT, OCS, FAAOMPT

Research Review Board Chair

Terry Cox PT, DPT, OCS, FAAOMPT

Professor of Physical Therapy

Southwest Baptist University

Appendix E

Informed Consent

Differentiated Instruction Understanding and Use
Among Rural South Central Missouri Teachers

Dear Educator:

This is a research project with the purpose of learning about teacher beliefs and practices regarding differentiated instruction. This is non-experimental research and consists of a nine item demographic section and a twenty-five item Likert scaled survey. Completion should take 10 minutes or less. As a benefit to you and your school, it is hoped this research will aide administrators in future planning for useful and meaningful professional development opportunities.

My name is John Westerman and I am a doctoral student in Educational Administration at Southwest Baptist University, I am inviting you to participate in a research study critical to the field of educational leadership and my completion of the Southwest Baptist Educational Doctoral Degree program. This project is being supervised by Dr. Robert Perry, Professor, Graduate Education, Southwest Baptist University (800-792-4191).

Your personal risk in voluntarily participating in this project is minimal. Confidentiality is respected and maintained. No personally identifiable data shall be generated. Anonymity is protected as neither individual educators nor schools/districts are identified in the demographic section of this instrument.

Your participation is entirely voluntary. No penalty or consequences shall accrue should you choose not to participate or choose to withdraw from participation prior to completion of the survey.

If you would like the disaggregated survey results sent directly to you please contact me at jwesterman@newburg.k12.mo.us and I will happily send you an electronic summary of results. You may also contact me with any questions at that email address or 573-762-2211, extension 1003.

The survey responses may be published in scientific research journals or presented at professional conferences. The dissertation will be available online through ProQuest upon completion and acceptance by Southwest Baptist University.

THIS PROJECT HAS BEEN REVIEWED BY THE SOUTHWEST BAPTIST UNIVERSITY RESEARCH REVIEW BOARD FOR RESEARCH AND RESEARCH RELATED ACTIVITIES INVOLVING HUMAN SUBJECTS (417) 326-1659.

Thank you,

John Westerman
SBU Doctoral Student

Appendix F

Informed Consent Signature Page

Differentiated Instruction Understanding and Use
Among Rural Southeast Missouri Teachers

I agree to participate in this study under the terms as described in the informed consent form received on this date.

_____

Participant Signature Date

Federal law mandates a copy of this informed consent assent be retained for a period of three years by the researcher.

THIS PROJECT HAS BEEN REVIEWED BY THE SOUTHWEST BAPTIST UNIVERSITY RESEARCH REVIEW BOARD FOR RESEARCH AND RESEARCH RELATED ACTIVITIES INVOLVING HUMAN SUBJECTS (417) 326-1659.

VITA

John L. Westerman is the oldest of five children born to Johnnie and Artie Westerman on April 22, 1957, in St. Louis. In 1975 he graduated from high school in Salem, Missouri. From Missouri State University he graduated in 1983 with a B.S. in Psychology/Religious Studies, earned certification to teach in 1984, and in 1988 graduated with an M.S.Ed., Psychology. He graduated from the Nevada Bureau of Alcohol and Drug Abuse with Counselor and Program Director licenses in 1991 and received a License in Clinical Social Work from the State of Missouri in 1992. He earned certification as both an Elementary and Secondary Principal and Special Education Director from the Missouri Department of Elementary and Secondary Education (DESE) through Lincoln University of Missouri in 2002. From Southwest Baptist University (SBU) he graduated in 2006 with an Ed. S. in the Superintendency and completed the requirements for the Doctor of Education Degree in Educational Leadership in April, 2014. He received certification through SBU from DESE as a Superintendent in 2006.

Since 1984 he has worked as a social studies and special education teacher in Exeter, Missouri; Giddings, Texas; and Edgar Springs, and Salem, Missouri. He worked as a mental health counselor, director of a developmental disabilities agency, was Coordinator of Substance Abuse Treatment programs for the State of Nevada Division of Prisons, and for seven years was Clinical Director/CEO of a private agency providing and supervising contract therapy for adolescents in Missouri Division of Youth Services facilities. In 2003 he became a Principal/Superintendent with Green Forest R-2. In 2006, he became Superintendent of Richwoods R-7 and in 2009, Superintendent of Newburg R-2.

John and his wife Donna have an ever-expanding family of children, children-in-law and grandchildren. They are involved in a church where John pastors and both teach Sunday school.