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The relationship between professional learning and middle school teachers' knowledge and use of differentiated instruction

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ABSTRACT

The Relationship Between Professional Learning and Middle School Teachers'
Knowledge and Use of Differentiated Instruction

by

Andrea McMillan

Doctoral Study Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Education
Teacher Leadership

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ABSTRACT

Self-efficacy beliefs, a component of Bandura's social cognition theory, provided the basis for this study of teachers' participation in professional learning. Training and positive experiences increase teacher efficacy, or the level of effort and persistence educators are willing to exert as they teach. The purpose of this quantitative study was to examine the relationship between teachers' participation in differentiated instruction (DI) in-service opportunities and teachers' knowledge and frequency of use of DI. It was hypothesized that middle school teachers' levels of DI training would be related to teachers' knowledge and use of DI in the classroom. An anonymous survey was used to collect data from 79 teachers. Regression analyses revealed that teachers' levels of DI training were not positively related to teachers' knowledge of DI, but there was a positive relationship between teachers' familiarity and use of content, process, product, and DI strategies. Teachers' education levels influenced their use of DI; however, teachers' experience levels did not. ANOVA was used to compare teachers' use of DI across grade levels, and results indicated that grade levels taught did not affect teachers' use of DI. Descriptive analyses indicated that most teachers were familiar with DI and used many of the DI techniques often; however, most reported that they learned how to differentiate using methods other than staff development. Many teachers reported that they would be willing to participate in future DI training. DI staff development is recommended as a way to educate teachers in additional DI methods. Implications for positive social change include increased DI training opportunities for teachers that can result in increased self-efficacy and instructional changes that can help improve student achievement.

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SECTION 1: INTRODUCTION TO THE STUDY

Introduction

The No Child Left Behind Act of 2001 (NCLB) is landmark legislation designed to close achievement gaps for students across the nation. According to the U.S. Department of Education (USDoE, 2003), four key principles comprise this plan, including "stronger accountability for results, expanded flexibility and local control, expanded options for parents, and an emphasis on teaching methods that have been proven to work" (¶ 1). The NCLB also mandates that classrooms have highly qualified teachers instructing students (USDoE, 2004).

The importance of competent educators using effective instructional methods cannot be underestimated because instruction has the largest influence on student achievement (Schmoker, 2006). All students are unique, so a "one-size-fits-all" instructional model will not work to meet the needs of every learner.

> Curriculum, teaching, and assessment offered only in a single, standard form can make it difficult for students from unique backgrounds to master the material and succeed; if there is no flexibility to respond to students' unique needs, these students may lose interest, fail, and drop out. (Hawley & Rollie, 2002, p. 33)

Differentiated instruction (DI) is an approach to teaching that meets the challenges of diversity in heterogeneous classrooms, but teachers' use of differentiation varies. Teachers' knowledge and use of DI was examined to determine whether there was a relationship between these factors and teachers' training.

Educators who use DI adjust instruction based on students' learning requirements (Tomlinson, 2001). According to Chapman and King (2005), DI "focuses on the diverse needs of the individual learners" (p. 20) and provides "personalized experiences [that]

give students access to all of the information and skills they can assimilate in their learning journeys" (p. 20). Personalized instruction helps students succeed in the classroom.

Three principles of teaching and learning provide the foundation for differentiation (Tomlinson, 1999). The first principle notes differences in human intelligence. Students' ability to think, learn, and create varies based on what students learn and how they learn it. The second principle describes methods students use to construct meaning from experiences. New information is grouped around ideas connecting something students already understand to something new they are learning. The third principle of teaching and learning links levels of learning tasks to students' learning zones. In order for students to learn continually, there must be appropriate levels of complexity and challenge in learning situations. DI provides teachers with opportunities to develop many types of intelligences, to help students link new information to prior knowledge, and to provide stimulating learning experiences.

In differentiated classrooms, teachers focus on content, process, and product, or "what to teach, how best to teach it, and how to assess the students' proficiency with what was taught, while giving attention to students' varying *readiness levels*, *interests*, and *learning profiles*" (Moon, 2005, p. 227). Understanding the link between DI and effective teaching is important because students need knowledge and understanding of content and "the capacity to think critically, analyze, synthesize, and make inferences" (Moon, 2005, p. 227) to be successful in the 21st century.

Professional learning, also known as professional development, staff development, in-service, and training, provides educators with opportunities to acquire or enhance knowledge, skills, attitudes, and beliefs that are necessary to create high levels of learning for all students (National Staff Development Council [NSDC], 2001). One major goal of staff development is to change teacher behavior (Marzano, 2003). Professional development can change teacher behavior when teachers return to their classrooms and practice the knowledge and skills acquired in training. According to Marzano (2003), there is a positive correlation between the length and number of professional learning opportunities in which teachers participate and changes in teachers' behavior.

School systems provide training opportunities designed to educate teachers in the use of DI, but teachers' learning is not always transferred to the classroom. Teachers know that students' learning needs are different, yet teachers' use of differentiation varies. This study of a north Georgia middle school examined Grades 6, 7, and 8 teachers' knowledge and use of DI in relation to staff development opportunities in which teachers participated during the summer of 2008. Teachers' experience levels, education levels, and grade levels were reviewed to determine whether teachers' use of differentiation varied in relation to these factors. Teachers were asked to identify the extent to which they learned DI techniques using methods other than staff development, and teachers' opinions regarding additional differentiated training were reviewed. Few researchers (Blozowich, 2001; Hobson, 2004; Netterville, 2002; K. S. Taylor, 2006) have addressed the topic of teachers' professional learning as it relates to the use of DI, so

there has been a deficit in the literature regarding this issue. Society will benefit from this study as additional information is learned about the relationship between professional learning and middle school teachers' knowledge and use of DI. Participation in this study will make teachers more aware of their instructional practices, and the results of this study will be shared with school leaders and county office staff development coordinators who may utilize the information to promote increased use of differentiation by making revisions to in-service opportunities offered through the school system. The literature review provides further information concerning the literature associated with DI and professional development.

<div align="center">Statement of the Problem</div>

The NCLB requires states to create and use high-stakes standardized tests to measure student performance. These measurements ensure that schools receiving federal funds achieve adequate yearly progress (AYP) or face sanctions, including the loss of funding (USDoE, 2003). Given the diverse needs of learners, teachers know that one-size-fits-all instructional strategies will not help all students succeed academically; thus, DI is necessary to meet students' unique learning needs (Fischer & Rose, 2001; Tomlinson, 1999).

The problem examined in this study was the inconsistent use of DI in the classroom. Research has demonstrated that teachers are aware of the role DI plays in meeting the needs of diverse learners, yet the use of differentiation has varied (Drain, 2008; Gable, Hendrickson, Tonelson, & Van Acker, 2000; Ryan & Ferguson, 2006; Schumm, Moody, & Vaughn, 2000). School systems spend large amounts of money each

year on professional learning to improve instruction (Hornbeck, 2003). In return, teachers are expected to take the information back to their schools and use it effectively to meet the needs of each individual student (Little & Houston, 2003). Despite substantial spending on professional development opportunities to improve instruction, DI has been employed only selectively (Hornbeck, 2003).

This study was conducted to identify teachers' knowledge and use of DI techniques in relation to the in-service opportunities offered by the school system. Data regarding the extent to which teachers learned DI techniques via methods other than in-service opportunities were collected. The respondents were asked about their desire for additional training in differentiation, along with their own education levels, experience levels, and grade levels taught. Data were used to identify areas of need related to teachers' knowledge and use of DI and training opportunities offered through the local school system.

<div align="center">Nature of the Study</div>

This quantitative study used a cross-sectional survey design to examine the relationship between teachers' levels of DI training and teachers' knowledge and use of differentiation. The target population comprised 95 instructors who taught at a north Georgia middle school from August 2008 to May 2009. Single-stage, convenience sampling was used to obtain the data. The self-administered questionnaire was peer reviewed to establish validity and pilot tested to establish reliability. The survey was then distributed during grade-level meetings in the first semester of the 2009-2010 school year. This method of distribution was cost effective and ensured a high response rate.

Additional information concerning the nature of this study including data collection and analysis is discussed in more detail in section 3.

Research Questions

The following questions were investigated:

1. How do middle school teachers' levels of DI training relate to teachers' knowledge of DI?

$H_{01:}$ There is no relationship between middle school teachers' levels of DI training and teachers' knowledge of DI.

H_{a1}: There is a positive relationship between middle school teachers' levels of DI training and teachers' knowledge of DI.

2. How do middle school teachers' levels of familiarity in content DI relate to teachers' content usage of DI in the classroom?

H_{02}: There is no relationship between middle school teachers' levels of familiarity in content DI and teachers' content usage of DI in the classroom.

H_{a2}: There is a positive relationship between middle school teachers' levels of familiarity in content DI and teachers' content usage of DI in the classroom.

3. How do middle school teachers' levels of familiarity in process DI relate to teachers' process usage of DI in the classroom?

H_{03}: There is no relationship between middle school teachers' levels of familiarity in process DI and teachers' process usage of DI in the classroom.

H_{a3}: There is a positive relationship between middle school teachers' levels of familiarity in process DI and teachers' process usage of DI in the classroom.

4. How do middle school teachers' levels of familiarity in product DI relate to teachers' product usage of DI in the classroom?

H_{04}: There is no relationship between middle school teachers' levels of familiarity in product DI and teachers' product usage of DI in the classroom.

H_{a4}: There is a positive relationship between middle school teachers' levels of familiarity in product DI and teachers' product usage of DI in the classroom.

5. How do middle school teachers' levels of familiarity in strategies DI relate to teachers' strategies usage of DI in the classroom?

H_{05}: There is no relationship between middle school teachers' levels of familiarity in strategies DI and teachers' strategies usage of DI in the classroom.

H_{a5}: There is a positive relationship between middle school teachers' levels of familiarity in strategies DI and teachers' strategies usage of DI in the classroom.

6. How do middle school teachers' professional teaching experience levels relate to teachers' use of differentiation?

H_{06}: There is no relationship between middle school teachers' professional teaching experience levels and teachers' use of DI.

H_{a6}: There is a positive relationship between middle school teachers' professional teaching experience and teachers' use of DI.

7. How do middle school teachers' education levels relate to teachers' use of DI?

H_{07}: There is no relationship between middle school teachers' education levels and teachers' use of DI.

H_{a7}: There is a positive relationship between middle school teachers' education levels and teachers' use of DI.

8. How does middle school teachers' use of DI compare to grade levels taught?

H_{08}: There is no difference in the use of DI between grade levels taught (Grades 6, 7, and 8) by middle school teachers.

H_{a8}: There is a difference in the use of DI between grade levels taught (Grades 6, 7, and 8) by middle school teachers.

9. To what extent have middle school teachers learned to differentiate instruction using methods other than in-service opportunities?

10. To what extent do middle school teachers want additional DI in-service opportunities?

These research questions and the methods by which they are answered are addressed in more detail in section 3 of the study.

<div align="center">Purpose of the Study</div>

DI is an accepted approach to meeting the educational needs of diverse students (Edwards, Carr, & Siegel, 2006). Effective DI staff development provides teachers with the knowledge they need to vary instruction in their classrooms (Tomlinson & Allan, 2000). The purpose of this survey study was to examine the relationship between teachers' participation in DI training and teachers' knowledge and use of differentiation. Determining this relationship will help teachers, administrators, and county office personnel develop a better understanding of the professional learning opportunities that could be offered to teachers to meet students' unique learning needs.

Given that DI is based on the idea that students learn in different ways (Chapman & King, 2005; Tomlinson, 1999), effective teachers provide a variety of learning opportunities to help all students achieve academic success (Coil, 2004; Heacox, 2002; Tomlinson, 1999). Therefore, teachers must understand how to differentiate instruction and monitor students' progress as students perform diverse tasks. Knowledge of DI and effective classroom management skills is necessary for the successful implementation of this type of instruction, and staff development may be used to provide this training.

Theoretical Bases

Differentiating instruction involves careful consideration of students' intelligence preferences, critical-thinking skills, and collaborative abilities. All students have intelligence preferences, or "brain-based predispositions" (Tomlinson, 2001, p. 62) for learning, so differentiating instruction is considered an acceptable instructional method to meet students' diverse learning needs. Theorists supporting the idea that all students learn according to their own preferences include Gardner (1993) and Sternberg and Grigorenko (2004). Gardner's (1999) theory of multiple intelligences identifies nine intelligences that demonstrate "students' strengths and preferences . . ., the ease with which they learn . . ., [and] what they know and understand" (Heacox, 2002, p. 22). Gardner's (1998) intelligences include linguistic, musical, bodily-kinesthetic, logical-mathematical, spatial, interpersonal, intrapersonal, naturalist intelligence, and existential intelligence. In the theory of successful intelligence, Sternberg and Grigorenko maintained that teachers capitalize on students' "strengths and compensate for or correct their weaknesses . . . by teaching in a way that balances learning for memory, analytical, creative, and practical

thinking" (p. 274). According to these theorists, DI allows students to learn in ways that match their learning preferences, so students benefit when teachers provide differentiated learning opportunities.

Classroom teachers often use Bloom's taxonomy of educational objectives to design and categorize learning tasks that raise students' levels of thinking (Clark, 2001). Bloom's taxonomy is arranged sequentially from lower level thinking skills to higher level thinking skills. This taxonomy includes six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation. Teachers' plans, when employing DI techniques, include many levels of thinking skills that correspond with students' different learning modes, so students' critical-thinking skills improve as diverse learning needs are met. Developing students' critical-thinking skills is necessary to help students apply knowledge and understanding to new situations. These skills also help students to evaluate information in order to make inferences, draw conclusions, and solve problems. Critical-thinking skills are necessary for lifelong learning (Clark, 2001).

Collaborative learning is also an important part of differentiating instruction. Vygotsky (as cited in Jaramillo, 1996) proposed the zone of proximal development as an explanation for social learning that leads to cognitive development. According to Vygotsky's (as cited in Jaramillo, 1996) theory, peers influence one another as they construct meaning. Vygotsky said, "Children come to learn adult meanings and actions through peer collaboration . . . [therefore] teachers should recognize the potential contributions that students can make when designing curricula and class activities to serve student needs" (as cited in Jaramillo, 1996, p. 138). In DI classrooms, students are

placed in flexible instructional groups "according to their learning needs, strengths, and preferences. Grouping is changed regularly to match student[s'] needs to the task at hand" (Heacox, 2002, p. 86). Students practice collaborative learning skills as they work together in their groups.

Teachers learn instructional methods in a variety of ways. This study, however, focused on teachers' participation in DI learning opportunities provided during the summer by the school system. Although professional learning opportunities are commonly provided by school systems, learning that takes place during these events is not necessarily transferred to or implemented in the classroom (Bandura, 1989). Bandura (1977), author of the self-efficacy theory, addressed this issue by describing the role of self-efficacy in one's belief systems. Bandura (1994) defined self-efficacy as "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (¶ 1). A more common definition is "the belief in one's capabilities to achieve a goal or an outcome" (Kirk, 2009, ¶ 1). Self-efficacy levels indicate how one's capabilities to perform acts at specific levels are based on one's choices of actions and the intensity and persistence that one is willing to endure to complete the task (Bandura, 1977).

Teacher efficacy refers to the level of effort teachers are willing to exert in specific teaching situations and the level of persistence teachers are willing to put forth when confronting obstacles. Tschannen-Moran, Hoy, and Hoy (1998) stated, "Greater efficacy leads to greater effort and persistence, which leads to better performance, which in turn leads to greater efficacy" (p. 234), and the opposite also is true. Teachers'

competence completing tasks can be strengthened by training and positive experiences (Bandura, 1993). In view of this, DI training and successful implementation of this teaching method will potentially lead to greater teacher efficacy and further use of differentiation to meet the learning needs of more students.

Design of the Study

A quantitative correlational survey approach was used to learn how professional development related to teachers' familiarity and use of DI. Relationships among the variables in the study were examined using statistical procedures to analyze numerical data collected from teachers who completed the cross-sectional survey (Creswell, 2009). Quantitative methodology is used when measurements describe the topic of study, when descriptive generalizations can be made about the measurements that were taken, and when probabilities are calculated to determine if "certain generalizations are beyond simple, chance occurrences" (Williams & Monge, 2001, p. 5). Data analysis is described in more detail in section 3.

Definitions of Terms

Academic Knowledge and Skills (AKS): The curriculum for Kindergarten to Grade 12 in the school system involved in this study. The AKS list the essential knowledge and skills students are expected to learn in particular subject areas at each grade level.

Affect: The way "students feel about themselves, their work, and the classroom as a whole" (Tomlinson, 2003, p. 4).

Cognitive abilities: The mental processes that students use to gain knowledge (Clark, 2001).

Content: The curricular topics or concepts that are presented to students and determined by schools or districts to reflect state or national standards (Heacox, 2002).

Interests: "Topics or pursuits that intrigue students" (Tomlinson & Allan, 2000, p. 10).

Learning confidence: Students' beliefs in their abilities to learn new material (Heacox, 2002).

Learning environment: "The way the classroom feels and functions" (Tomlinson & Eidson, 2003, p. 3).

Learning mode: The way that students learn information by auditory, visual, kinesthetic, and tactile means (Van Zile, 2003).

Learning profile: Information concerning students' learning styles, talents, and intelligences; used by teachers to plan differentiated activities (Tomlinson & Allan, 2000).

Process: The way teachers instruct students based on students' preferences and learning styles (Heacox, 2002).

Products: The tangible objects, verbalizations, or actions that students produce which indicate the knowledge students understand and are able to apply (Heacox, 2002).

Professional learning, also known as professional development, staff development, in-service, and training: "The means by which educators acquire or enhance the knowledge, skills, attitudes, and beliefs necessary to create high levels of learning for all students" (NSDC, 2001, p. 2).

Readiness levels: Students' ability levels related to the content being introduced; some students may be ready to learn the material while others either already know the information or need to learn foundational skills first (Heacox, 2002).

Self-efficacy: Beliefs attributed to Bandura and the social cognition theory; "the judgements that students hold about their capabilities to successfully perform academic tasks" (Pajares, Johnson, & Usher, 2007, p. 105).

Scope, Assumptions, Limitations, and Delimitations

The scope of this study was confined to teachers of Grades 6, 7, and 8 who taught at one suburban middle school in north Georgia from August 2008 to May 2009. Based on 95 teachers who were eligible to participate in the study, the expected return rate for the survey was limited to 85%, or 81 teachers. Only 79 teachers actually participated probably due to the length of the survey, teacher absenteeism when the survey was distributed, teachers' lack of time to complete the survey outside of the meeting, or other reasons (Instructional Assessment Resources, 2007; National Center for Education Statistics, n.d.). The use of convenience sampling limited the ability to generalize the results of the study to a larger population. This study was also limited by teachers' recollections of their uses of DI and the amount of differentiated training they received; however, it was assumed that study participants responded to the survey as honestly as possible.

Significance of the Study

The goal of this study was to understand the relationship between teachers' knowledge and use of differentiation and the level of DI training in which these teachers

participated. School systems spend considerable funds providing staff development to educators. In return, teachers are expected to go back to the classroom and implement the knowledge and skills learned in the program (Westwater & Wolfe, 2000). Providing teachers with DI professional learning benefits society because teachers are given the opportunity to learn instructional methods that are effective in teaching diverse populations (Tomlinson et al., 2003). Learning methods that are effective in teaching diverse populations is important because "indications are that without considerably greater expertise in effective teaching of academically diverse populations, our schools will fail many young people whose education is entrusted to us" (Tomlinson & Allan, 2000, p. 79).

This study is significant and will lead to positive social change because it will add to the scholarly research and literature in the areas of DI and professional development. The participating teachers will become aware of their own knowledge levels and use of DI methods possibly resulting in instructional changes. Students will benefit from teachers' use of differentiation by practicing skills, including collaboration, decision making, problem solving, critical thinking; formulating plans; and completing tasks based on those plans. Using these skills leads to more productive citizens who are capable of competing in the global society. Results of the study will be beneficial to district and local school leaders as professional learning coordinators utilize the information to develop future DI in-service opportunities based on teachers' feedback. Furthermore, the greater professional community may wish to conduct additional studies of differentiated learning as a result of data obtained in this study.

Summary

As communities continue to grow and change, schools are becoming more diverse (Knapp, 2005). As Cassady et al. (2004) found, "Children in today's schools . . . [vary] in cultural backgrounds, learning styles, academic readiness, and social maturity" (p. 139), so there is a need for DI to help teachers meet students' unique learning needs. Professional development is used by school systems to provide teachers with opportunities to learn effective teaching strategies, including differentiation, which teachers can implement in their classrooms. Research has suggested, however, that providing professional development does not necessarily mean that teachers will apply their new skills. This study examined the relationship between middle school teachers' knowledge and use of differentiation and the level of DI in-service opportunities teachers reported attending. Teachers' experience levels, education levels, and grade levels were examined to determine how these factors were associated with teachers' use of differentiated learning. The extent that teachers learned DI techniques using methods other than staff development and teachers' desires regarding additional DI training were also discussed.

Section 2 reviews the literature associated with DI and professional development. The section is organized into five broad areas including the efficacy of differentiation in the classroom, student factors influencing teachers' use of differentiation, the process of employing DI as a strategy, barriers to the implementation of DI, and the role of professional development in promoting differentiation. The literature review concludes with a description of this study and a review of the methods used to conduct and analyze

the study. Section 3 explains the methodology. Section 4 describes how the data were presented and the steps taken to analyze the data. Section 5 summarizes the findings of this study and suggests further studies related to the topic.

SECTION 2: LITERATURE REVIEW

Introduction

As one-size-fits-all instructional models do not meet the unique learning needs of all students, flexible curriculums combined with assorted instructional strategies and assessment procedures help children from diverse backgrounds master material and succeed in school (Hawley & Rollie, 2002). DI is an approach to learning that meets a variety of challenges found in heterogeneous classrooms today. DI focuses on individual students' distinct learning needs and provides personalized experiences so children can assimilate the knowledge and skills they are required to learn (Chapman & King, 2005). Tomlinson (2000a) referred to DI as a common-sense approach to teaching diverse learners while focusing on effective instructional practices in mixed ability classrooms. Furthermore, Tomlinson (2005a) referred to differentiation as a philosophy of teaching whereby students maximize their ability to learn as a result of their teacher's ability to respond to each student's unique learning needs.

Teacher preparation is an important part of differentiating instruction. In fact, according to NCLB, "Nothing is more important to a child's success in school than finding well-prepared teachers" (as cited in USDoE, 2004, ¶ 1). Staff development is a form of continuing education that is designed to prepare teachers with knowledge and skills to improve students' learning (NSDC, 1999). This study investigated the relationship between middle school teachers' levels of DI professional learning and their knowledge and use of differentiation.

Organizational Structure

This literature review is a detailed examination of the literature associated with DI and professional learning. The section is organized into five broad areas: the efficacy of differentiation in the classroom, student factors influencing teachers' use of differentiation, the process of employing DI as a strategy, barriers to the implementation of differentiation, and the role of professional development in promoting DI. The review of the literature concludes with a description of this study and a review of the methods used to conduct the study and analyze the data.

Search Strategies

Primary databases used to locate information related to this study included ProQuest, Educational Resources Information Center (ERIC), Academic Search Premier, Education Research Complete, Teacher Reference Center, ProQuest Dissertations and Theses, Dissertations and Theses @ Walden University, Galileo, and the Internet search engines Google and Google Scholar. Initial key word searches included *differentiated instruction, differentiation, differentiated instructional strategies, instructional strategies, student achievement, student diversity, learning styles, multiple intelligences, learning theory, educational theory, Gardner, Bloom, Sternberg, Tomlinson, Bandura, self-efficacy, teacher efficacy, educational reform, professional learning, staff development, professional development, in-service,* and *teacher education*. Reference books, websites, and peer-reviewed journals were also used to gather information concerning the research topic.

Efficacy of DI

A number of studies have supported the efficacy of DI in the classroom. A study of Kindergarten students' reading skills showed that their word recognition and phonological skills improved when teachers interacted more often with individuals and students were more actively engaged in classroom activities (Ponitz, Rimm-Kaufman, Grimm, & Curby, 2009). In another study, Grade 1 students improved their reading fluency when they were more actively involved in reading activities. Students in Grades 4 to 6 also experienced reading growth when teachers asked them higher level questions (B. M. Taylor, Peterson, Pearson, & Rodriguez, 2002).

Another study of classroom practices identified as useful for improving students' reading abilities focused on Grade 4 students' reading comprehension skills. Students were grouped in different ways for this study. Results indicated that students who participated in flexible ability grouping improved reading comprehension skills at a greater rate when compared to students who were taught using total ability grouping, also known as tracking, or whole-class instruction (D'Angelo, 2006).

DI also was part of a plan that led to significant literacy gains in a California high school. In 1999, the average student at this school read at a Grade 5.9 level, whereas 4 years later, the average student at this school read at the Grade 8.2 level. Teachers' use of DI strategies learned in an ongoing staff development program were identified as factors that contributed to the literacy gains (Fisher, Frey, & Williams, 2003).

In a study using the modified guided reading program, small-group DI in literacy was provided to students through individualized instruction, leveled reading materials,

context-embedded language, structured lessons, and frequent assessments. Middle Grade English language learners benefited from this reading program by participating in reading, writing, listening, and speaking activites that engaged students in activities such as oral reading, questioning, and predicting; semantics, syntax, and morphology instruction; detailed vocabulary instruction; and culturally relevant information (Avalos, Plasencia, Chavez, & Rascon, 2008).

In addition to reading and literacy attainment as a specific target for DI, the practice has shown promise in multiple settings. A longitudinal study of Rhode Island schools was conducted to determine effective teaching practices in schools that made significant progress to close achievement gaps between children with individualized education programs and other students. DI was cited as one of the instructional strategies deemed effective in the schools that raised students' language arts and math test scores on the New Standards Reference Exam (Hawkins, 2007).

A Title 1 elementary school in North Carolina implemented DI as part of the Accelerated Schools program. As a result, reading and math scores on state mandated end-of-grade tests increased from an overall 79% proficiency in1998 to 94.8% proficiency 5 years later (Lewis & Batts, 2005). DI, flexible grouping, student interest, and social collaboration were identified as instructional practices that educators used to teach students in multiage elementary school classes. Teachers in this study believed that these strategies were necessary because student diversity in multiage classrooms was greater than single-age classrooms. Teachers also believed that these strategies made learning more meaningful for their students (Hoffman, 2003).

A 3-week study of the effects of curricular adjustments and grouping practices was conducted to determine how these factors affected elementary students' mathematics achievement. Curricular adjustments and grouping practices are common to DI (Tieso, 2005). Tieso (2005) found that a combination of flexible grouping and a differentiated, or revised, curriculum positively affected students' mathematical achievement.

The fact that DI has been demonstrated as an effective method of instruction across a variety of educational settings suggests that this is an instructional approach worthy of further examination and broader adoption. The success of DI lies largely in the ability of the teacher to match learners' needs to learning experiences. The following section discusses factors that influence teachers' planning and implementation of DI.

<div style="text-align:center">Student Factors Influencing Teachers' Use of DI</div>

Effective DI hinges on the degree of match between learner characteristics and the structure of the learning experiences. As such, teachers must be astute in knowing their students. Teachers must know students' readiness for varying learning activities, interests, learning profiles, and affect. Differentiation can be traced back to Confucius, who advised teachers to begin teaching where students are because students' abilities are unique (Tomlinson, 2005b). DI also was used in the one-room schoolhouse to teach students of all levels. Tomlinson (2005b) explained:

> There, the teacher knew students would vary greatly in age, experience, motivation to learn, and proficiency. To effectively instruct the range of students, teachers had to be flexible in their use of time, space, materials, student groupings, and instructional contact with learners. Teachers could not assume students were essentially alike in their learning needs and could not suppose that teaching one topic in one way according to one timetable was a viable practice. (p. 8)

The preceding educators knew the importance of making the learning experience distinct, a practice that continues today.

Currently, students of similar ages with diverse backgrounds and learning needs are found in most classrooms to the same extent. Because student diversity affects school performance, teachers should be aware of student differences in order to personalize instruction (Tomlinson, 1999). Edwards et al. (2006) concluded, "The more teachers learn about their students, the more able they are to design experiences that foster learning" (p. 583). Differentiating based on readiness levels, interests, learning profiles, and affect are ways that teachers can meet students' individual needs.

Readiness

Readiness is students' knowledge, skill, and understanding related to a topic (Tomlinson, 2003). Learners' readiness determines whether students need additional instruction, practice, and exposure to a topic or whether students are ready to move on (Heacox, 2002; Tomlinson & Eidson, 2003). Assessing students' readiness to learn is necessary so that teachers can understand not only what students already know but also the misconceptions that students have concerning a topic. Tasks that are differentiated by students' readiness levels force students to move beyond their comfort zones and then provide "support in bridging the gap between the known and unknown" (Tomlinson, 2001, p. 45). Knowing students' readiness levels helps teachers to plan lessons according to students' needs by matching readiness levels to instruction and increasing opportunities for appropriate challenge and growth to occur (Tomlinson, 2004; Tomlinson & Kalbfleisch, 1998).

A study by O'Connor et al. (2002) supported differentiating by readiness. Reading instruction for poor readers in intermediate grades was differentiated by matching texts to students' reading levels. Results revealed that students with lower reading fluency made stronger gains when teachers supported students by matching texts to students' reading levels. Offering DI by readiness level allows teachers to accelerate and extend the curriculum for gifted and talented students and to provide additional time and learning opportunities for students who are struggling (Heacox, 2002; Stetson, Stetson, & Anderson, 2007; Tomlinson, 1999).

Teachers assess students' readiness using a variety of methods to determine whether students understand important ideas and can perform particular skills at acceptable proficiency levels or whether students need additional instruction. Methods teachers use to assess readiness include pretests, small-group and whole-class discussions, homework assignments, journal entries, exit cards, skill inventories, and interest surveys. Teachers use readiness assessments to plan present and future lessons with the goal of improving students' competency levels (Tomlinson, 1999).

Interests

Student interest and the value students place on learning also differ from student to student. As Tomlinson (2003) found, "Interest refers to those tactics or pursuits that evoke curiosity and passion in a learner" (p. 3). According to Heacox (2002) and Stetson et al. (2007), students who are interested in and value the information they are learning are more committed and motivated to learn than students who are less interested in a topic. Information that is relevant and usable to students is more valuable than

information students perceive they will never need. Therefore, teachers who help students understand how to use information make the learning experience more important to students. A 3-week study of students in Grades 4 to 8 supported differentiating by interest (Tieso, 2001). Using an advanced curriculum, teachers in this study focused on major concepts with specific learning goals, interesting lesson introductions, students' choice of constructivist learning activities, real-world resources, and authentic assessment to teach students. Use of these teaching methods made learning meaningful to the students and resulted in increased motivation, engagement, and enthusiasm for learning.

Nurturing students' interests increases the chance that students will become lifelong learners (Tomlinson, 2001). Teachers determine students' interests through observations, group discussions, and interest inventories. Using students' interests to differentiate instruction helps students make connections between topics students are enthusiastic about learning and the essential knowledge and skills students are expected to learn (Heacox, 2002; Tomlinson & Eidson, 2003; Wehrmann, 2000).

Learning Profiles

Students also vary according to learning profiles, or the individual ways that students learn best (Tomlinson, 2001). According to Tomlinson (2001), students' intelligence preferences, learning styles, gender, and culture affect learning profiles. Gardner's (1998) theory of multiple intelligences addresses students' diverse *cognitive abilities* and intelligence preferences. In this theory, Gardner (1999) explained that all humans possess nine intelligences: verbal/linguistic, logical/mathematical, musical, spatial/visual, bodily/kinesthetic, intrapersonal, interpersonal, naturalistic, and existential.

Students' intelligence strengths and limitations affect their abilities to learn and the methods they use to represent the information they have learned (Heacox, 2002). Educators endorse the multiple intelligences theory because it supports their intuition that students are intelligent in different ways and that students can be taught effectively if teachers take students' preferred ways of thinking into account when planning instruction (Aborn, 2006; Campbell, 1997; Gardner, 1998; Heacox, 2002).

The theory of successful intelligence provides additional support for using students' intelligences to teach curriculum. Instruction that balances learning for memory and analytical, creative, and practical thinking is fundamental to this theory. Sternberg, Torff, and Grigorenko (1998b) conducted a study of students in Grades 3 to 8 by comparing traditional (memory based) instruction; critical-thinking (analytically based) instruction; and triarchic (creative, practical, and analytically based) instruction. Results indicated that students attained higher levels of achievement when taught using the triarchic method of instruction. According to the theory of successful intelligence, children learn better when instructional methods emphasize students' abilities. Using diverse teaching methods allows students to enhance their intellectual strengths and improve their weaknesses (Sternberg & Grigorenko, 2004; Sternberg et al., 1998a).

Learning styles, another essential part of learning profiles, are preferences for when, where, and how students learn information (Heacox, 2002). According to Heacox (2002), learning style differences are based on the following factors: environmental conditions (temperature, light, and sound); social organization (working alone or with peers); emotional climate (level of structure or student motivation); physical

circumstances (level of movement or time of day); and psychological factors (analytical, impulsive, or reflective thinking). Teachers help students to make meaning of their learning by using assorted instructional strategies (Mann, 2006; McCarthy, 1997). Teachers accommodate students' diverse learning styles by providing students choices in learning experiences (Mann, 2006; Tomlinson, 1999). Hoffmann (2003) found that student choice in learning experiences promoted academic growth and motivated students to learn, especially when students' interests were accommodated in activities.

Lovelace (2005) analyzed experimental research based on the Dunn and Dunn learning style model. Studies were conducted between 1980 and 2000. Results of Lovelace's study supported the learning styles model "that matching students' learning-style preferences with complementary instruction improved academic achievement and students' attitudes toward learning" (p. 176). Fine (2003) conducted another study using the Dunn and Dunn learning style model and concluded that students in special education programs earned significantly higher test scores on achievement and attitude tests when taught using their preferred learning styles. In addition, students' classroom behavior and attendance improved. Students attributed these improvements to educators teaching to students' strengths (Fine, 2003).

Gender differences (Gurian & Stevens, 2005) and cultural influences are two other ways that diversity affects students' learning profiles (Heacox, 2002; Wiens, 2005). Tomlinson and Allan (2000) noted:

> Embedded in a person's gender and culture are subtle ways of functioning that can profoundly affect how a person sees and interacts with the world, including the classroom. A mismatch occurs when a person who is socialized to act one way

through his or her gender or culture finds that the classroom is predicated on a different set of assumptions and attitudes. (p. 22)

Allowing students to work together can reduce students' perceptions of cultural differences. A study of 94 students from five multiethnic elementary schools showed that participation in structured cooperative learning experiences increased the popularity of immigrant children in classes and decreased students' perceptions that immigrant children were noncooperative (Oortwijn, Boekaerts, Vedder, & Fortuin, 2008). Recognition of gender and cultural influences when differentiating instruction facilitates learning (Heacox, 2002; Miller, 2000; Tomlinson et al., 2003).

Knowing students' intelligence preferences, learning styles, gender, and cultural influences helps teachers understand how students learn as individuals (Tomlinson & Allan, 2000). Teachers gather information concerning learning profiles through observations, individual and group conversations, family conferences, test results, students' work, preassessments, and surveys (Heacox, 2002). Understanding students' learning profiles is necessary to plan activities that help all students meet academic goals.

Affect

Affect is another student characteristic often considered in DI because affect is the way "students feel about themselves, their work, and the classroom as a whole" (Tomlinson, 2003, p. 4). Students' affective needs include physical and emotional security, a sense of belonging and value, and a desire to feel challenged and successful completing demanding tasks (Tomlinson & Eidson, 2003). Increasing students' learning confidence assures children of their learning abilities. Self-confident students are more

successful in school than those students who lack learning confidence (Heacox, 2002; Margolis & McCabe, 2003). As Tomlinson (2003) noted, "Student affect is the gateway to helping each student become more fully engaged and successful in learning" (p. 4).

Teachers address students' affective requirements proactively through planning and reactively based on current student needs. Educators differentiate affect by helping learners to develop mutual respect and appreciation for student differences; ensuring opportunities for personal growth and equitable participation; and providing the structure that students need to make decisions, solve problems, and feel confident to succeed in school (Tomlinson & Eidson, 2003).

A study of elementary, middle, and high school students' writing self-efficacy beliefs illustrated affect in the classroom. Participants reported their confidence levels in relation to completing specific writing tasks. Girls' self-efficacy beliefs were stronger than boys' in elementary, middle, and high school. For most students, their writing confidence levels dropped as they moved from elementary to middle school, and then remained stable in high school. For elementary and middle school students, writing anxiety was a key factor in their self-efficacy beliefs. Feedback from peers and teachers was instrumental in students' degree of confidence related to writing. Recommendations were made to provide private feedback describing positive aspects of students writing to encourage self-confidence and persistence (Pajares et al., 2007).

In a study of effective teaching strategies used with gifted/learning-disabled students with spatial strengths, an "atmosphere of caring, strength-oriented accommodations, and student centered learning" (Mann, 2006, p. 116) were identified as

strategies that helped students succeed. Teachers at the study site gained students' trust

by differentiating instruction based on students' learning differences and interests.

Students learned advocacy skills and were encouraged to make decisions based on

personal academic needs. Teaching to students' strengths, allowing students to make

choices in their work, and using authentic learning helped these children flourish (Mann,

2006). By using strategies such as the ones identified in the aforementioned study,

teachers can effectively manage the affective climate of their classrooms and provide an

environment in which learning can occur (Tomlinson & Eidson, 2003).

Differentiating process is another method teachers use to increase student

learning. The process of differentiating instruction, however, is complex and requires a

teacher who is willing and able to employ a variety of instructional strategies

simultaneously, all based upon individual student needs. The following section outlines

the process of applying DI and the factors teachers must consider as they implement it in

their own classrooms.

<center>DI as a Teaching Strategy</center>

Educators in DI classrooms use a variety of instructional strategies to meet

students' unique learning needs. According to Tomlinson (1999), teachers adapt

curricular elements based on students' characteristics. Teachers who use an assortment of

instructional strategies to differentiate content, process, and product meet the learning

needs of more students because these teachers address the variability in students'

readiness levels, interests, and learning preferences (Tomlinson, 2000b; Tomlinson &

McTighe, 2006). Further, Tomlinson (2003) concluded,

> To teach most effectively, teachers must take into account *who* they are teaching as well as *what* they are teaching [because] the goal of a differentiated classroom is to plan actively and consistently to help each learner move as far and as fast as possible along a learning continuum. (pp. 1-2)

The practice of differentiating instruction is complex and requires integration of multiple instructional skills on the part of the teacher. This section explores the components of differentiation, beginning with the role of content.

Content

A major component of DI is the teachers' ability to differentiate content. Content is the knowledge, understanding, and skills students are expected to learn during a lesson or unit. Local and state standards determine the content of the curriculum. The school system in this study provides teachers with lists of specific skills for subject areas at each Grade level. Teachers use the AKS to guide instruction and meet students' learning needs.

Organizing instructional content allows students to make personal, meaningful connections between learning and students' lives (Hoffman, 2003). Tomlinson and Eidson (2003) suggested that teachers use the following strategies to differentiate content. When differentiating by readiness levels, make texts with varied reading levels and highlighted information available to students. Provide graphic organizers, vocabulary lists, and audiotaped information. Reteach students who are struggling and offer extended learning opportunities to advanced students. Strategies to differentiate content by interests include using students' questions to guide lessons, providing supplementary materials related to students' interests, and designing centers so students can investigate

topics in which they are interested. Differentiating content by learning profile can be accomplished by using illustrations, examples, and applications related to genders, cultures, and intelligences; presenting information in kinesthetic, auditory, and visual modes; and varying wait time for individuals.

Along with content, process is another element that must be taken into account when exploring DI. Process shifts teacher attention from the content area to the ways in which students acquire and integrate new knowledge. The following section explores the role of process in DI.

Process

Teachers support DI in the classroom by observing students and targeting instruction based on the ways in which students process information. Tomlinson and Allan (2000) described process DI as "how the learner comes to make sense of, understand, and 'own' the key facts, concepts, generalizations, and skills of the subject" (p. 8). Teachers help students to process information by providing activities that have a clear purpose and focus on one significant understanding. Teachers also help students process information by using specifically targeted skills to complete fundamental tasks, linking prior knowledge to new information, and matching students' readiness levels, interests, and learning profiles (Tomlinson, 1999).

Strategies that teachers use to differentiate process by readiness include presenting minilessons, directions, and criteria for success at various levels; providing opportunities to use resource materials at varied reading levels; and adjusting the work pace for students (Tomlinson & Eidson, 2003). Interest-based strategies used to

differentiate process include using work groups and discussion groups that have similar and different views, encouraging students to create interesting tasks, and using the jigsaw strategy to allow students to become experts about specific topics (Tomlinson & Eidson, 2003). Differentiating processes based on learning profiles is achieved by balancing independent, collegial, and competitive work and allowing students choices in the learning tasks that are completed (Tomlinson & Eidson, 2003).

Several studies have suggested the importance of differentiating process. House (2005) used data from the 1999 Third International Mathematics and Science Study to examine the relationship between instructional strategies and science achievement of students from Hong Kong, Japan, and Chinese Taipei. Results indicated that teachers who linked new material to previous experiences or prior learning, used repetition in lessons, assigned homework more often, allowed students to work cooperatively, and employed more active learning strategies such as experiments and practical investigations had students who tended to earn higher science test scores.

A review of studies on the effects of within-class grouping practices indicated that low ability students benefited most academically when placed in heterogeneous groups, while average ability students benefited most academically when placed in homogeneous groups. In addition, teacher training and use of small-group instructional methods maximized student learning (Lou et al., 1996).

Another study was conducted to evaluate the effects of story mapping instruction on the reading comprehension of students with behavioral disorders. Findings indicated an increase in students' reading comprehension skills, improvement in students' abilities

to retell stories, and growth identifying narrative story elements when students received individualized instruction over a 6-week period. The students also stated that they enjoyed participating in the program because it helped them recall what was read (Babyak, Koorland, & Mathes, 2000). As indicated in these studies, providing DI that supports students' learning process helps a greater number of students succeed.

When planning instruction in a differentiated classroom, it is important to design challenging lessons that stimulate students' thinking. Classroom teachers often use Bloom's taxonomy of educational objectives to set specific targets for raising students' levels of thinking. Bloom's taxonomy includes three domains of educational activities: the cognitive domain, which focuses on mental skills and knowledge; the affective domain, which focuses on growth in feelings, emotions, and attitudes; and the psychomotor domain, which focuses on manual or physical skills (Clark, 2001).

The cognitive domain is the most widely used domain in education (Gray & Waggoner, 2002). This time-tested taxonomy helps teachers "design activities that are appropriately rigorous, relevant to essential curriculum, and sufficiently complex" (Heacox, 2002, p. 67) to promote higher order thinking skills. Bloom's taxonomy contains six levels of thinking:

1. Knowledge: Recall data or information.
2. Comprehension: Understand the meaning, translation, interpolation, and interpretation of instructions and problems. State a problem in one's own words.
3. Application: Use a concept in a new situation or unprompted use of an abstraction. Applies what was learned in the classroom to novel situations in the workplace.
4. Analysis: Separates material or concepts into component parts so that its organizational structure may be understood. Distinguishes between facts and inferences.

5. Synthesis: Builds a structure or pattern from diverse elements. Put[s] parts together to form a whole, with emphasis on creating a new meaning or structure.
6. Evaluation: Make[s] judgments about the value of ideas or materials. (Clark, 2001, (Clark, 2001, Cognitive Domain, Figure 1)

Bloom's taxonomy is arranged progressively from lower level thinking skills to higher level thinking skills. As teachers differentiate process, it is necessary to include higher order thinking skills in lessons to promote the development of critical-thinking skills and integration of new knowledge. Developing students' critical-thinking skills is necessary to help children learn how to apply knowledge and understanding to new situations. These skills also help students to evaluate information to make inferences, draw conclusions, and solve problems. Critical-thinking skills are necessary for lifelong learning (Heacox, 2002).

Assessing how students use higher order thinking skills most often takes place by way of student work products. Varying work products is essential to differentiation. The following section provides discussion about the ways in which student products can be adjusted to meet the differing strengths and learning preferences of students.

Product

Differentiating product is another way that teachers can vary instruction to meet students' needs. The term product refers to items a student creates to "demonstrate what he or she has come to know, understand, and be able to do as a result of an extended period of study" (Tomlinson & Allan, 2000, p. 8). Product-related assignments allow students to think creatively and critically as understandings and skills are developed and learning is applied to tasks (Tomlinson & Allan, 2000). When differentiating products,

teachers should determine the essential knowledge, understanding, and skills that students will use to complete tasks. Products should be interesting and challenging, and criteria for success should be specified (Tomlinson & Eidson, 2003). When differentiating instruction, product selections should be influenced by what is known about the students' learning preferences and strengths with regard to how they best demonstrate their newly acquired knowledge.

Tomlinson and Eidson (2003) suggested several ways to differentiate students' products. Strategies to differentiate product by readiness include developing rubrics and benchmarks based on students' learning needs, using critique groups and teacher-led miniworkshops to guide students during product development, and providing multileveled resources students can use for research. Instructional strategies to differentiate product by student interest include guiding students to conduct independent investigations and allowing students to choose the format or media to express their learning. Differentiating product by learning profile can be achieved by making connections between learners' cultures and assignments; providing visual, kinesthetic, auditory, analytical, practical, and creative assignment options; and allowing students to work with partners or alone.

All of these efforts to differentiate product contribute to a broader learning environment. By working together, teachers and students create a classroom culture within which differentiation can be supported and promoted. Creating a supportive learning environment is another essential part of differentiating.

Learning Environment

Learning environment refers to the flexible classroom structures that allow teachers and students to perform so that individuals and group members benefit. In order to differentiate the learning environment, rules and procedures are established to guide students as they move and work in the classroom. Teachers are responsible for ensuring flexible and strategic use of materials, space, and time (Tomlinson & Eidson, 2003). Although it is the teacher's responsibility to create an environment that is conducive to all learners, students also should be involved in making these decisions so the children will have a sense of ownership in the classroom (Heacox, 2002; Tomlinson et al., 2003).

Examples of DI for Content, Process, and Product

Instructional strategies associated with DI abound. Several specific strategies used to differentiate content, process, and product are described next. These strategies can be used with students of all ages and serve as a basis to individualize students' learning opportunities.

Tiering

Tiering is a DI method that allows all students to work on the same basic content simultaneously, yet all students are not completing the same activities. Instead, teachers adjust the instructional level of tasks to match students' readiness levels (Reis et al., 1998; Tomlinson & Eidson, 2003). Tiered assignments may be structured by (a) differing challenge levels based on Bloom's taxonomy, (b) varying the complexity of tasks, (c) matching resources to students' learning needs, (d) changing learning outcomes,

(e) using different processes to reach the same outcome, and (f) creating a variety of final products demonstrating the knowledge students have learned (Heacox, 2005). Tiering allows teachers to provide learning opportunities that meet the various needs of diverse student populations. Tiering also allows students to choose activities that match their learning styles and developmental needs (Heacox, 2002).

Compacting

Compacting is another DI strategy that is especially useful when teaching gifted and talented students because it can help advanced pupils attain higher levels of learning (Heacox, 2002). Pretesting helps determine students' knowledge of skills and content so teachers can make instructional decisions and plan activities for children that have already mastered the required content. These students may then complete "enrichment activities, learning centers, or independent study/contracts" (Lewis & Batts, 2005, p. 29). These activities, centers, and contracts are designed to provide steady challenges and increase advanced students' knowledge beyond the knowledge acquired by other students in the classroom (Kapusnick & Hauslein, 2001; Reis & Renzulli, 1992). Compacting allows students with advanced knowledge to continue learning instead of simply waiting for the other students to catch up (Brimijoin, 2005; Sizer, 1999).

Collaborative Learning

Collaborative learning is another strategy associated with differentiation. Collaborative learning allows students to work together as they explore topics (Educational Broadcasting Corporation, 2004). Teachers ensure collaboration among

group members if desired behaviors are modeled and students are given opportunities to observe and practice cooperative skills (Patsula, 1999).

Vygotsky's (1978) social development theory supports the use of collaborative learning in the classroom. Vygotsky proposed that students learn in the zone of proximal development as teachers assign tasks beyond students' mastery levels. Then teachers support students to meet learning goals. When differentiated tasks require collaborative grouping, students are placed in flexible instructional groups based on learning needs, strengths, and preferences. Teachers change groups as needed based on learning tasks and students' needs (Heacox, 2002; B. M. Taylor, Pearson, Clark, & Walpole, 1999).

Traditional teaching methods were compared to drama-based instruction in a study involving the social interactions of Grade 7 geometry students. Researchers wanted to know how drama-based instruction affected students' attitudes toward mathematics and geometry and students' geometry achievement and retention. Results indicated that drama-based instruction improved geometry achievement and retention and helped students to learn the information easier and understand geometry better because students worked in groups role playing real-world situations. Duatepe-Paksu and Ubuz (2009) explained, "Working in groups provided motivation to learn and enabled them [students] to acquire knowledge by seeing others' behaviors, receiving different ideas, and understanding others' points of view" (p. 283). Differentiating instruction by making the learning experience interesting helped students to learn geometry more easily and retain the information longer.

Other strategies commonly associated with DI include independent study, independent learning centers, and student contracts (Kapusnick & Hauslein, 2001). No matter which instructional strategy is used, teachers practice DI effectively when they remain flexible, utilize a wide variety of resources, plan appropriately, provide choices for students (Coil, 2004), and determine learners' needs in order to provide appropriate learning experiences (Moon, 2005).

Assessment

Assessment is another vital component of differentiating instruction. Assessment is "the process of observing student learning by collaborating with students to collect and interpret data about their academic strengths and weaknesses, interests, and learning preferences, with the goal of making decisions that benefit their instruction" (Moon, 2005, pp. 226-227). According to Moon (2005), assessment should occur in three phases. In the first assessment phase, decisions are made that shape the instructional plan. Pre-assessment data using formal and informal assessments allow teachers to determine instructional methods based on students' needs. Appropriate levels of challenge are determined so students who have mastered material do not spend time repeating previously learned information.

Formative assessment, Phase 2 of Moon's (2005) plan, serves to guide instruction. According to Moon, "Gathering data during an instructional sequence allows teachers to make in-process decisions about students' levels of mastery, misconceptions, insights, and resulting needs . . . [thus allowing instructors] to make adjustments during the instructional sequence" (p. 229) for better understanding and assimilation of new

material. Using a variety of assessments to check students' understanding allows teachers to know if instructional strategies are working (Fisher & Frey, 2007). Examples of formative assessment include class discussions, teacher observations, and students' self-assessments. Decisions concerning reteaching or extending learning goals are made at this time based on the feedback yielded during the formative phase. In addition, teachers also use this data "to form (or reform) student groupings, modify pacing, or change the manner in which materials and content are presented to students" (Moon, 2005, p. 230).

Phase 3 is the summative assessment phase, and it involves evaluating instruction. As such, "decisions concerning the effectiveness of the implemented instruction are made based on students' level of mastery of the identified learning goals and objectives" (Moon, 2005, p. 230). This assessment phase provides information, often as grades, to stakeholders including students, parents, and administrators. Teachers make changes to future instructional approaches based upon this phase of assessment data. Summative assessment occurs after instruction and includes examples such as portfolios, paper-and-pencil tests, and performance assessments.

Classroom assessment changes the way teachers teach. Constant monitoring of students' progress provides teachers with opportunities to individualize instruction and modify teaching practices (Pressley, Raphael, Gallagher, & DiBella, 2004), thus enhancing student learning in differentiated classrooms (Moon, 2005). Using each phase of assessment places a higher level of responsibility on teachers, who must orchestrate these activities. This is one of many ways in which a teacher's responsibility changes in a differentiated classroom environment.

Teachers' Responsibilities

Effective teachers use a variety of instructional methods to guide and support students as essential content is learned. This is the essence of teaching (Tomlinson & McTighe, 2006). In differentiated classrooms, teachers' responsibilities include (a) knowing and teaching the standards using a variety of instructional strategies, activities, materials, and resources; (b) creating a classroom climate that is conducive to learning; (c) knowing the students; (d) assessing before, during, and after learning; (e) adjusting assignments to meet learners' needs; and (f) planning learner-centered opportunities for success either working alone or in flexible groups (Chapman & King, 2005). Teachers also are responsible for motivating and challenging students, communicating high expectations to all students, and providing effective instruction so that students can meet these expectations. Learning in a differentiated classroom is a joint responsibility between students and teachers (Stronge, 2007; Tomlinson & McTighe, 2006).

Differentiating instruction requires that educators find a variety of ways to teach each new concept based on learner characteristics, determining appropriate amounts of time for these activities, and assessing student learning. All of this is typically done within a single classroom with multiple projects taking place simultaneously (Coil, 2004). As a result, there are both real and perceived barriers that impact a teacher's likelihood of adopting a DI strategy.

Barriers to the Implementation of DI

DI is a time-consuming endeavor. As indicated by Evans (2005), DI

[Increases the] scope and complexity of teachers' work – the planning and the actual instruction – and . . . demands extra sophistication, time, and energy . . . [becoming] more challenging as class size grows, as heterogeneity increases, and especially as students move to the upper grades. (¶ 4)

Van Tassel-Baska and Stambaugh (2005) found limited classroom management skills to be the most common reason why many educators do not use DI. In heterogeneous classrooms, it is difficult to manage students who are performing many different tasks at the same time (Halpin-Brunt, 2007). Hawkins (2009) reported that teachers' lack of confidence, efficacy, perseverance, and opportunities to participate in ongoing training are major reasons why differentiation is not used more frequently.

Those educators who are successful using DI use many different management strategies in their classrooms. These skills, however, take time to learn and integrate. Heacox (2002) recommended that teachers interested in DI (a) start small and prepare students, parents, and classrooms for this method of instruction; (b) do as much as possible ahead of time so students do not have to wait for materials or directions; (c) have students help keep track of accomplished work; (d) develop a signal for quiet time; and (e) establish routines for movement, passing out materials, and group work.

Enlisting students to perform many of the routine operations in the classroom allows students to learn classroom operations, become problem solvers and independent thinkers, and feel valued and have ownership in the classroom. In addition, teachers have more time to assist students in the learning process (Tomlinson & McTighe, 2006). Although differentiating instruction is a challenge for teachers, it is considered a viable

form of instruction promoting academic success for students in heterogeneous classrooms (Tomlinson et al., 2003).

Although many studies have supported the use of DI as a means to educate all students, other studies have contradicted that information, and these studies have cast doubt for some teachers about whether differentiating instruction is worth the effort. For example, a study of 29 Grade 3 teachers' reading instruction grouping practices was conducted in classrooms that included learning disabled students. Results of the study indicated that most of the teachers used undifferentiated, whole-class instruction to teach reading because planning and classroom management was easier, the teachers had limited access to materials, and teachers believed that this type of instruction conformed to local school expectations (Schumm et al., 2000).

Data were collected from 44 teachers in a study of teachers' attitudes and differentiated practices for gifted students in Kindergarten to Grade 5 inclusion classes. Although teachers' attitudes towards DI varied from somewhat negative to very positive, 9 of these teachers denied having any gifted students in their classes, 8 teachers reported that they did not differentiate instruction for the gifted students in their classes, and the remaining 27 teachers indicated that they seldom used DI with their gifted students (Drain, 2008).

Another study of DI practices was conducted in 12 Grade 3 and Grade 7 reading classes that included talented readers. Talented readers were identified as students that had advanced reading processing capabilities and language skills, who could read two or more grades above their chronological grade placement. Results indicated that only 3 of

the 12 teachers in the study offered limited differentiated reading instruction in the form of choices of reading material and limited reading strategy instruction (Reis et al., 2004).

In other research, a case study of four students' differentiated learning experiences was conducted over a 3-year period. Initial results showed that teachers provided generalized DI for the students rather than individualized differentiation. According to Olenchak (2001), "Teachers who are not prepared to focus on needs of students at a personal level will not be able to provide effective differentiation of curricula and instruction" (p. 196). After interventions, including a mentor and a personalized DI program were established, students' academic performance improved.

It is possible that the results of these studies were a function not of the technique itself, but from ineffective or uneven implementation of differentiation. Differentiating instruction based on students' readiness levels, interests, learning profiles, and affect helps teachers meet students' individual needs, but to do this requires expertise in knowing the students and the technique itself. The following section explores the role of professional development in promoting the effective use of DI.

Role of Professional Development in Promoting DI

The teacher's role in educating students is more important now than ever because students cannot learn information necessary to meet academic standards if teachers do not have the content knowledge and instructional skills to teach students appropriately (Darling-Hammond, 2000; Marzano, 2003; Mundry, 2005; NSDC, 1999). Professional development provides a link between the knowledge and skills instructors must have to

teach and the information students must learn. Staff development is a method of

educating teachers in order to improve students' learning (NSDC, 1999; Polk, 2006).

Historical Approaches to Professional Learning

In the past, traditional staff development typically consisted of programs such as

faculty meetings with guest speakers or short workshops based on topics chosen by

school or district leaders. As curriculum frameworks were created across the United

States and student expectations increased, school systems began to look more carefully at

professional development costs and the impact of staff development on adult and student

learning. Traditional professional development was scrutinized because the activities

were not always related to school or district goals, often there was no follow-up,

frequently there were no observable effects on students' learning, and repeatedly teachers

did not have the time or skills to master the strategies they observed in staff development

(Kelleher, 2003). Many times teachers attended learning sessions, regardless of their

interest in the topics, to earn professional learning credits required for recertification.

Results of traditional professional development led to changes in teachers'

professional learning opportunities. School districts and states examined current practices

and determined the factors that were necessary to provide higher quality staff

development opportunities to teachers because high-quality staff development promotes

more effective teaching in the classroom (Edwards et al., 2006; Hill, 2007; Stronge,

2007). High-quality professional development (a) lasts several days or weeks; (b) consists

of content specific instruction; (c) analyzes student learning data; (d) is embedded in

teachers' daily work; (e) "support[s] the instructional goals, school improvement efforts,

and curriculum materials in teachers' schools" (Hill, 2007, p. 121); and (f) is aligned with

district and state standards.

Link Between Professional Development and Student Achievement

Teaching educators to offer DI can be accomplished through staff development,

but Bandura (1989) cautioned that

> There is a difference between possessing skills and being able to use them
> effectively and consistently under varied circumstances. Development of self-
> regulatory capabilities requires instilling a resilient sense of efficacy as well as
> imparting knowledge and skills. If people are not fully convinced of their personal
> efficacy[,] they rapidly abandon the skills they have been taught when they fail to
> get quick results or it requires bothersome effort. (p. 733)

Therefore, professional development should teach the knowledge and skills teachers

need, but it should also instill a sense of efficacy. Gibson and Dembo (1984) found that

teachers who had a high sense of instructional efficacy praised students for their

successful accomplishments more often, gave students more help when they needed it,

and dedicated more instructional time to academic learning. Bandura (1977) suggested

that efficacy can be developed through "performance accomplishments, vicarious

experience, verbal persuasion, and physiological states" (p. 191). The greater the

teacher's efficacy, the greater effort and persistence the teacher will use to apply

knowledge and skills that have been learned. This leads to more successful teaching

experiences and greater teacher efficacy (Tschannen-Moran et al., 1998). Raising teacher

efficacy will help educators become more effective in their teaching and also will

promote student achievement.

Although many factors affect student achievement (Ding & Sherman, 2006; Holloway, 2006), limited research has indicated a positive relationship between teachers' participation in staff development and students' academic achievement (Howley & Howley, 2005). For example, in one study, high school teachers participated in a 15-hour seminar course provided by a local university. The course focused on seven specific instructional strategies, including "writing to learn, reading aloud, KWL (What I Know, What I Want to Know, and What I Learned), reciprocal teaching, vocabulary development, concept mapping, and structured note taking" (Fisher, 2001, p. 68). After taking the course, teachers participated in monthly in-service training at their schools, discussions with mentor teachers, peer observations, and administrative observations. Two years after the content literacy instruction was implemented, student achievement increased (Fisher, 2001).

Another study involved extensive staff development in the Direct Instruction Reading Program, with follow-up training, practice sessions, coaching, observations, and immediate feedback. This study was conducted to determine whether teachers implemented the reading program appropriately, teachers' instructional practices changed during the school year, and students' reading achievement improved. Results indicated that the participants did implement the program as instructed, the teachers' use of instructional practices improved over the school year in which the study was conducted, and all of the participating classes showed significant increases in student achievement on the posttest (Forte, 1999).

Additional researchers (Denison, 2006; Gunel, 2006; Hackett, 2005; Rosof, 2006; Vittela, 2006) have indicated a positive relationship between teachers' participation in professional learning and increased student achievement; however, none of the aforementioned studies showed evidence that teachers' participation in formal staff development caused the increase in student achievement. According to Guskey,

> The link between professional development and its impact on students is not direct. It's filtered through educators, ... And with multiple efforts for improvement taking place in schools simultaneously, it's very difficult to isolate the improvements due to professional development. (as cited in Viadero, 2005, p. 19)

Nevertheless, school systems continue to use formal staff development to educate teachers with the goal of improving student achievement.

Professional Development for DI

Despite limited evidence of its effectiveness, educational leaders are using formal staff development to help teachers learn how to differentiate instruction (Tomlinson & Allan, 2000) because many educators see the need to use DI but lack the skills to do so (Tomlinson, 2005b). As a result, the following recommendations have been made to district and local school leaders designing staff development for DI:

1. Base the program on current knowledge of student learning and best practices in effective teaching (Tomlinson, 2005b).

2. Use basic principles and vocabulary related to DI to introduce teachers to this method of teaching, and use future staff development opportunities to build on this understanding (Carolan & Guinn, 2007; Tomlinson & Allan, 2000).

3. Differentiate professional development for teachers as it is for students based on readiness, interests, and learning preferences (Tomlinson, 2005b; Tomlinson & Allan, 2000).

4. Provide examples of DI (Carolan & Guinn, 2007) based on teachers' grade levels, subject areas, and individual needs (Halpin-Brunt, 2007) because "specificity of models and examples helps bring classroom practice to life, helps teachers identify their own questions and needs, and encourages implementation" (Tomlinson & Allan, 2000, p. 80).

5. Design staff development so that teachers can return to the classroom and use the knowledge, skills, and understanding learned in the program (Barnett, 2004; Tomlinson & Allan, 2000).

6. Ensure that administrators and district leaders recognize and support teachers' efforts to offer DI and provide opportunities for ongoing training and feedback (Drain, 2008; Engstrom & Danielson, 2006; Tomlinson & Allan, 2000).

Previous studies have been conducted to determine teachers' knowledge and use of differentiation and teachers' levels of DI staff development. Blozowich (2001) surveyed, observed, and interviewed 10 Grade 6 teachers in a rural middle school in Pennsylvania to determine teachers' frequency of use of DI, teachers' level of professional training, and teachers' use of a common DI strategy. Blozowich found that half of the teachers in the study had moved beyond an "awareness level" of differentiation by satisfactorily implementing DI based on content, process, and product.

The frequency of use of specific differentiated strategies and the frequency that students received the DI varied for these same teachers. Teachers in the study only participated in the DI professional learning opportunities offered through the school system, and no single instructional strategy was common among the participants. Whole class instruction continued for many of the teachers in the study.

Hobson (2004) studied differentiated instructional strategies used by 70 semirural middle school teachers in Virginia to determine the types and frequency of use of DI strategies in order to determine teachers' future staff development needs. Results indicated that teachers' use of DI strategies varied widely. Hobson also found that there was a need for DI classroom management training to help teachers manage differentiated classrooms more effectively.

Netterville (2002) surveyed 16 Texas elementary schools' teachers to examine teachers' attitudes toward DI, teachers' views of whether differentiation enhanced academic achievement, barriers to differentiating instruction, and the relationship between DI and professional development. Findings indicated that the participants knew how to differentiate instruction, and they believed that DI enhanced students' academic achievement. Furthermore, teachers wanted additional professional development opportunities related to DI, teachers wanted to differentiate more frequently and more effectively, and time was the biggest challenge associated with differentiating instruction.

K. S. Taylor (2006) surveyed language arts and mathematics teachers from one middle school and one high school in a southern New Jersey school district to determine teachers' perceptions and use of DI strategies taught during a 2-year workshop series.

Results of the study indicated teachers' reluctance to participate in evaluating the effectiveness of the staff development, which led me to determine that there was resistance to the program. Of the 62 possible participants in the study, only 19 completed the survey, 10 agreed to be interviewed, 7 completed the activity logs, and 8 submitted lesson plans. Only 9 of the teachers who completed the survey admitted using DI in their classrooms. As a result, I examined the staff development program and determined that the training did not meet best practices for professional learning.

DI is student-centered instruction based on best practices in education (Heacox, 2002). Best practices in education can be learned in professional development, but they should be implemented early and refreshed often. Tomlinson and Allan (2000) concluded:

> Development of staff must be part of early planning, needs to be refined as teachers develop greater expertise, and should remain central to any attempts to address academic diversity as long as the students with varying needs continue to show us that one-size-fits-all is a poor fit for many. (p. 77)

Limited research exists to link teachers' knowledge and use of DI to professional development, so additional research should be conducted to develop a better understanding of this relationship.

The Study

This study was unique because I used a cross-sectional survey design to determine how Grade 6, 7, and 8 regular education teachers' knowledge and use of DI related to the teachers' DI training. The study examined demographic factors including teachers' experience levels, education levels, and grade levels to determine how these factors

compared to teachers' levels of use of DI. The extent that teachers learned to differentiate through county-provided professional learning experiences and teachers' desires for additional DI training were also determined. Because previous studies (Blozowich, 2001; Hobson, 2004; Netterville, 2002; K. S. Taylor, 2006) related to this topic have been limited, this study will add to the literature related to professional learning and DI. Completion of the survey helped the teachers reflect on their practices, and school and district leaders may use the results of this study to modify professional learning opportunities available in the school system.

Methodology

A survey was used to collect data in this study. As Fink (2006) explained, "Surveys are information collection methods used to describe, compare, or explain individual and societal knowledge, feelings, values, preferences, and behavior" (p. 1). Frequency counts and percentages for Likert scale and multiple-choice survey responses were calculated, and means and standard deviations were calculated for each Likert scale item. Linear regression was used to analyze relationships in the study, and ANOVA was used to compare differences between teachers' use of DI and the grade levels taught. Additional information concerning the methodology used in this study is discussed in section 3.

SECTION 3: METHODOLOGY

Introduction

The purpose of this study was to determine the relationship between middle school teachers' knowledge and use of DI and professional learning. This section describes the research design, data collection procedures, sample, and research questions used in the study. Research strategies, instrumentation, data analysis, and validation procedures are also discussed. Study participants' rights are summarized at the conclusion of this section.

Research Design

This study used a quantitative correlational survey research methodology to answer 10 research questions. The survey design is the most frequently used research method in education (Fogelman, 2002). As Fink (2006) found, "Surveys are used to collect information from or about people to describe, compare, or explain their knowledge, feelings, values, and behavior" (p. 1). When performing a survey-type study, researchers have the option of using a large number of participants to help support generalization inferences (Cohen & Swerdlik, 2005). Further, engaging a large participant base enables researchers to obtain a wider variety of information on behaviors, perceptions, and emotions that may otherwise not be available when using other types of methodologies. Data collected in surveys can be used to design and evaluate programs and make policy (Fink, 2006).

Correlational research is used to investigate relationships between two or more variables using three key measurement metrics: beta, r, and r-squared. The three metrics

serve as indicators of the strength of the relationship and the direction (positive or negative) that the variables in the study relate. These metrics are described in more detail in the Data Analysis section of this study. A quantitative correlational survey research design was justified for this study because specific data were collected from a large number of participants within a sample that is often used for behavioral research (Fogelman, 2002).

<div align="center">Target Population</div>

Middle school teachers from Grades 6, 7, and 8 working at the study site from August 2008 to May 2009 were eligible to participate in this study. Most grade-level teams included four teachers, and each instructor taught one of four academic subjects: math, science, language arts, or social studies. One three-member Grade 6 team added a fourth teacher in October, and one other Grade 6 team and one Grade 8 team consisted of two teachers each teaching two academic subjects.

Ninety-five teachers met the study's criteria. This sample size was considered acceptable because "in general, larger samples are more likely to collect around the true population mean and be a more accurate estimation of the population mean" (Fink, 2006, p. 53). However, to ensure sample size sufficiency, a formal power analysis was conducted.

Power Analysis

To validate the estimated sample size previously stated, a formal power analysis was conducted to statistically determine a priori sample size where power = .80 and a medium effect size was expected (.15). Accordingly, for Research Questions 1 to 7, the

sample size necessary to likely determine a statistical difference was 55 participants, where alpha = .05. This meant that there was an 80% probability that 55 participants would be sufficient to find a statistical relationship (effect size of .15) between variables, where alpha = .05. For Question 8, the sample size required was 76 participants, where effect size = .40, power = .80 and alpha = .05.

Convenience Sampling

This correlational study surveyed a sample of Grade 6, 7, and 8 teachers from a school district in Georgia. The sample selected for the study consisted of participants who were willing to respond to the paper-and-pencil survey distributed at their schools. This method of sampling is referred to as single-stage, convenience sampling because the survey was distributed directly to known participants (Creswell, 2003). Convenience sampling is regularly used in exploratory research to collect data that are generally representative of the population being studied. In fact, "this method is often used during preliminary research efforts to get a gross estimate of results, without incurring the cost or time required to select a random sample" (StatPac, 2007, p. 1).

Convenience sampling allows researchers to collect data within given time periods and under particular conditions. As a result, the target population may not be sufficiently represented by the study sample, which limits a researcher's ability to generalize results. This means that those selected for the study will only partially represent the population being investigated; therefore, it may be necessary to repeat the study to validate the results (Keppel & Zedeck, 2001). Despite its flaws, convenience sampling is the best method of obtaining a sample population when time and conditions

prevent random sampling (Neuman, 2003). This method helps researchers estimate the truth when obtaining the truth (i.e., via random sampling) is not possible.

Convenience sampling does have an impact on a study's reliability and validity. Reliability relates to the extent to which an experiment, test, or any measuring procedure gives the same results on repeated trials (Bush, 2002). Considering this, study reliability may be minimized because a pure random sample was not obtained. For that reason, results obtained from this study may not necessarily be replicated later using a convenience or random sample from the same target population.

Study validity may be degraded as well. Validity is related to how successful the study is at measuring what needs to be measured (Bush, 2002). Although the results were valid for the sample selected, they may not necessarily have been valid for the entire target population. That is, this study was an attempt to measure relationships between middle school teachers' DI professional learning experiences and their familiarity with and use of DI. Thus, the study may indeed successfully measure what needs to be measured, but this may not be necessarily generalized to the greater population of middle school teachers.

Statistical Components

The following 10 research questions were used to guide this study. Each research question is presented with its associated null and alternative hypotheses. In addition, directly following the research questions are five critical components that describe the variables, how the questions will be statistically analyzed, the target population, and the

sample size. Although these components are briefly presented here, they are described in detail later in this section.

      1. How do middle school teachers' levels of DI training relate to teachers' knowledge of DI?

    $H_{01:}$ There is no relationship between middle school teachers' levels of DI training and teachers' knowledge of DI.

    H_{a1}: There is a positive relationship between middle school teachers' levels of DI training and teachers' knowledge of DI.

      1. Criterion Variable: Knowledge of DI (Composite   Familiarity Scale)

      2. Predictor Variable: Levels of DI training (Q5 - Training)

      3. Statistical Technique: Multiple Linear Regression

      4. Target Population: Teachers

      5. Sample Size: 55 (effect size = .15, Alpha = .05, Power = .80)

      2. How do middle school teachers' levels of familiarity in content DI relate to teachers' content usage of DI in the classroom?

    H_{02}: There is no relationship between middle school teachers' levels of familiarity in content DI and teachers' content usage of DI in the classroom.

    H_{a2}: There is a positive relationship between middle school teachers' levels of familiarity in content DI and teachers' content usage of DI in the classroom.

      1. Criterion Variable: Content Usage Scale

      2. Predictor Variable: Content Familiarity Scale

      3. Statistical Technique: Linear Regression

4. Target Population: Teachers

5. Sample Size: 55 (effect size = .15, Alpha = .05, Power = .80)

3. How do middle school teachers' levels of familiarity in process DI relate to teachers' process usage of DI in the classroom?

H_{03}: There is no relationship between middle school teachers' levels of familiarity in process DI and teachers' process usage of DI in the classroom.

H_{a3}: There is a positive relationship between middle school teachers' levels of familiarity in process DI and teachers' process usage of DI in the classroom.

1. Criterion Variable: Process Usage Scale

2. Predictor Variable: Process Familiarity Scale

3. Statistical Technique: Linear Regression

4. Target Population: Teachers

5. Sample Size: 55 (effect size = .15, Alpha = .05, Power = .80)

4. How do middle school teachers' levels of familiarity in product DI relate to teachers' product usage of DI in the classroom?

H_{04}: There is no relationship between middle school teachers' levels of familiarity in product DI and teachers' product usage of DI in the classroom.

H_{a4}: There is a positive relationship between middle school teachers' levels of familiarity in product DI and teachers' product usage of DI in the classroom.

1. Criterion Variable: Product Usage Scale

2. Predictor Variable: Product Familiarity Scale

3. Statistical Technique: Linear Regression

4. Target Population: Teachers

5. Sample Size: 55 (effect size = .15, Alpha = .05, Power = .80)

5. How do middle school teachers' levels of familiarity in strategies DI relate to teachers' strategies usage of DI in the classroom?

H_{05}: There is no relationship between middle school teachers' levels of familiarity in strategies DI and teachers' strategies usage of DI in the classroom.

H_{a5}: There is a positive relationship between middle school teachers' levels of familiarity in strategies DI and teachers' strategies usage of DI in the classroom.

1. Criterion Variable: Strategies Usage Scale

2. Predictor Variable: Strategies Familiarity Scale

3. Statistical Technique: Linear Regression

4. Target Population: Teachers

5. Sample Size: 55 (effect size = .15, Alpha = .05, Power = .80)

6. How do middle school teachers' professional teaching experience levels relate to teachers' use of DI?

H_{06}: There is no relationship between middle school teachers' professional teaching experience levels and teachers' use of DI.

H_{a6}: There is a positive relationship between middle school teachers' professional teaching experience and teachers' use of DI.

1. Criterion Variable: Composite Usage Scale

2. Predictor Variable: Experience Levels

3. Statistical Technique: Multiple Linear Regression

4. Target Population: Teachers

5. Sample Size: 55 (effect size = .15, Alpha = .05, Power = .80)

7. How do middle school teachers' education levels relate to teachers' use of DI?

H_{07}: There is no relationship between middle school teachers' education levels and teachers' use of DI.

H_{a7}: There is a positive relationship between middle school teachers' education levels and teachers' use of DI.

1. Criterion Variable: Composite Usage Scale

2. Predictor Variable: Education Levels

3. Statistical Technique: Multiple Linear Regression

4. Target Population: Teachers

5. Sample Size: 55 (effect size = .15, Alpha = .05, Power = .80)

8. How does middle school teachers' use of DI compare to grade levels taught?

H_{08}: There is no difference in the use of DI between grade levels taught (Grades 6, 7, and 8) by middle school teachers.

H_{a8}: There is a difference in the use of DI between grade levels taught (Grades 6, 7, and 8) by middle school teachers.

1. Criterion Variable: Composite Usage Scale

2. Predictor Variable: Grade Levels Taught (6th, 7th, 8th)

3. Statistical Technique: 1 x 3 ANOVA with post hoc if necessary

4. Target Population: Teachers

5. Sample Size: 76 (effect size = .40, Alpha = .05, Power = .80)

9. To what extent have middle school teachers learned to differentiate instruction using methods other than in-service opportunities?

a. Statistical Technique: Frequency evaluation

10. To what extent do middle school teachers want additional DI in-service opportunities?

a. Statistical Technique: Frequency evaluation

<div align="center">Criterion and Predictor Variables</div>

Table 1 provides a graphic illustration of the predictor and criterion variables used in the study. For Research Questions 1 to 7, I used linear regression to assess results. For Research Question 8, I used a one-way between-subjects ANOVA to detect differences between groups. For Research Questions 9 and 10, I calculated the frequencies of teachers learning DI using methods other than in-services and teachers wanting additional DI in-service opportunities. Except for Research Questions 1, 9, and 10, the dependent variables were created by developing a composite score by adding respective response scores of that particular construct. The composite score was then either regressed or compared to the predictor or independent variable to determine results.

Table 1

Criterion and Predictor Variables by Research Question

RQs	Criterion variable	Predictor/Independent
RQ1	Knowledge of DI (Composite Familiarity Scale)	Level of DI Training
RQ2	Content Usage Scale	Content Familiarity Scale
RQ3	Process Usage Scale	Process Familiarity Scale
RQ4	Product Usage Scale	Product Familiarity Scale
RQ5	Strategies Usage Scale	Strategies Familiarity Scale
RQ6	Use of DI (Composite Usage Scale)	Experience levels
RQ7	Use of DI (Composite Usage Scale)	Education levels
RQ8	Use of DI (Composite Usage Scale)	Grade levels
RQ9	None	None
RQ10	None	None

Research Strategies

Due to rezoning, participants in this study were divided between the former school and a new school that opened in August 2009. The director of research and evaluation in the division of academic support for the school district was contacted for copies of the Local School Research Request form. A letter of consent to conduct t and the Local School Research Request form were completed and submitted to the local school principals for their approval of the project. Upon the principals' approval, the form was returned to the Director of Research and Evaluation. Copies of the forms were sent to the Institutional Review Board (IRB) as part of the application to conduct research. Once the study was approved by Walden University (IRB approval #10-21-09-0309404), the peer review and pilot test were conducted. Then, grade-level administrators were contacted to schedule a date and time to conduct the survey.

The survey was conducted during grade-level meetings at the new school. A teacher in each grade level at the former school conducted the survey at that school.

Details of the study and participants' rights were shared with potential participants at both schools orally and in a cover letter attached to the front of each survey. I was available via cell phone to answer any questions at the former school during the time when data was collected. Following dissemination of the aforementioned information, attendees had the opportunity to complete and return the survey at that time. Attendance was taken at the meetings, and teachers who were absent received a copy of the cover letter and survey in their mailboxes along with information concerning directions to return the survey.

<div align="center">Instrumentation</div>

The Differentiated Instruction Teacher Survey was used to collect data (see Appendix B). This survey was a modified version of the Teacher/Peer Reflection on Differentiation Survey by Tomlinson and Allan (2000). The Association for Supervision and Curriculum Development gave me permission to adapt and use the survey see Appendix B). The modified survey included two Likert-style scales along with several multiple choice questions. These continuous scale and multiple choice items were used to collect quantitative data. The first four survey items concerned demographic data including teachers' work site, grade levels, experience levels, and education levels. Data from this part of the questionnaire were used to determine the relationship between these factors and teachers' use of DI. Question 5 asked teachers to report the number of hours of DI training they received through the county office during the summer of 2008. Responses to this question were used to determine the correlation between teachers' DI training and teachers' knowledge of DI. Data from Survey Question 6 indicated the

extent that teachers learned how to implement DI using methods other than county provided staff development, and Survey Question 7 indicated teachers' interest in future DI staff development opportunities offered by the school system.

Survey Items 8 to 43 contained two Likert scales intended to measure respondents' familiarity and use of DI by content, process, product, and specific strategies. The 3-point familiarity scale on the left side of Items 8 to 43 included the anchor points 1 (*not familiar*), 2 (*somewhat familiar*), and 3 (*very familiar*). The 4-point scale on the right side of Items 8 to 43 was intended to measure participants' use of DI strategies: 1 (*rarely or never used*), 2 (*use of the strategy once a month*), 3 (*use of the strategy once a week*), and 4 (*use of the strategy two or more times each week*) during the 2008-2009 school year.

<div align="center">Reliability and Validity</div>

I reviewed the literature associated with DI and professional learning and adapted the survey to meet specific research needs. Following approval of the survey by the doctoral study committee and Walden University's IRB, I validated the survey by distributing the questionnaire to a committee of peer educators familiar with differentiated practices and professional learning. This method of validation is content validation and is used often in the behavioral sciences (Haynes, Richard, & Kubany, 1995). This committee consisted of one teacher from each of Grades 6, 7, and 8, and a curriculum and instruction assistant principal. Committee members reviewed the survey and completed the content validation evaluation form (see Appendix A). The committee reached a consensus, and no items were found to be inappropriate or needing revisions.

In addition to the content validation procedure already mentioned, pilot testing a survey helps researchers to determine whether survey instruments are user-friendly and designed well. Poorly designed surveys contribute to bias in studies and reduce the accuracy of the findings (Fink, 2006). The cross-sectional survey in this study was pilot tested to establish a general degree of reliability prior to its use. According to Fink (2006), "A reliable survey results in consistent information. A valid survey produces accurate information" (p. 7). Two teachers representing Grades 6, 7, and 8 from another middle school were asked to complete the survey to determine the survey's reliability. Two independent reviewers examined and interpreted the results of the piloted surveys. Their results were compared to my results, and the survey was deemed reliable.

Procedures

I used the Differentiated Instruction Teacher Survey to collect quantitative data from teachers that worked at the study site from August 2008 to May 2009. The cross-sectional survey was distributed to teachers during grade-level meetings in the first semester of the 2009-2010 school year. This method of data collection was cost effective and ensured a high response rate.

Because the original study site had been rezoned, many of the teachers who were eligible to participate in the study had moved to the new middle school in the area. I attended grade-level meetings at the new school to describe the study and distribute the anonymous questionnaire. Participating teachers had the opportunity to complete and return the survey during the meetings or to leave the meetings and complete and return the survey within the next week. Attendance was taken at meetings to easily identify the

teachers who were not present to participate in the study. Copies of the cover letter and survey were placed in these teachers' mailboxes with a note asking the teachers to complete and return the survey to me within the next week. I reminded these teachers of their opportunity to participate by placing a note in their mailboxes 2 days before the deadline for returning the survey. I also sent an e-mail 1 day before the deadline thanking all teachers for their participation in the survey and reminding them that the survey was due the following day if they wanted to participate in the study.

One teacher in each grade level at the former school distributed and collected the survey during meetings the first semester. Details of the study were shared orally with potential participants. Envelopes and a cover letter explaining details of the study and participants' rights were attached to the surveys distributed to the teachers.

I was available via cell phone to answer any questions at the former school during survey completion. Participating teachers had the opportunity to complete the survey, place it in their envelopes, seal their envelopes, and turn the envelopes in; or participants had the option to take the survey information from the meeting to complete and submit to me via the school courier. Assistants asked the last person turning in the sealed survey to seal the large envelope, and the assistants placed the large envelopes in a locked filing cabinet for me to collect that afternoon.

Attendance was taken to identify teachers that did not have an opportunity to participate in the study. Assistants notified me of the teachers that were absent from the meeting and a copy of the cover letter, survey, and envelope was placed in these teachers' mailboxes with a note asking the teachers to complete the survey and return it to the me

in the sealed envelope through the school courier within the next week. Notes were also placed in these teachers' mailboxes 2 days before the deadline for returning the survey to remind teachers of their opportunity to participate in the study. An email was sent one day before the deadline thanking all of the teachers for their participation in the study and reminding them that the survey was due the following day if they wanted to participate. Data regarding teachers' demographic information, knowledge and use of DI, levels of DI training, extent of learning DI through staff development, and interest in additional differentiated learning in-service opportunities were collected in the teacher survey.

Data Analysis

Descriptive and inferential statistics were used to organize and summarize the data collected in the survey (Gravetter, 2005). Descriptive statistics are the most frequently used statistics, and they serve as the foundation for more advanced statistical methods (Fink, 2006). Anderson and Arsenault (1998) explained, "Quantitative description is based on counts or measurements which are generally reduced to statistical indicators such as frequencies, means, standard deviations, and ranges" (p. 100). Inferential statistics "are used to make inferences and draw conclusions" (Bracey, 2003, p. 4) about populations. Gay (1987) added, "Inferential statistics are concerned with determining how likely it is that results based on a sample or samples are the same results that would have been obtained for the entire population" (p. 378). Descriptive and inferential statistics were used to analyze the data.

In this study, quantitative data were analyzed using SPSS v.17.0 computer program. Computer assisted analysis saves researchers time and hard work, makes

writing and editing easier, provides file systems that store large amounts of data, and makes graphic displays much easier to create. Disadvantages associated with using computer programs include selecting inappropriate programs for studies, taking excessive time and effort to learn difficult programs, and losing data from technical or human mistakes (Hatch, 2002). Considering the large amount of data collected in this study, using the SPSS program made data analysis less complicated and faster for me.

Initially, I analyzed the data by tallying the number of completed surveys and creating a table to display numbers and percentages of respondents and nonrespondents. Frequency counts and percentages were calculated for each of the Likert-type and multiple choice survey items. Frequency counts indicate the number of responses that fit into a category (Fink, 2006). Percentages are the number of "times per 100 [that] a value occurs in the sample" (Bracey, 2003, p. 6). Means and standard deviations were also calculated for each Likert scale item. Means are "a measure of average or typical performance" (Fink, 2006, p. 78). Means are the most frequently used measures of central tendency, "a statistical measure [used] to determine a single score that defines the center of a distribution. One goal of central tendency is to find the single score that is most typical or representative of the entire group" being measured (Gravetter & Wallnau, 2005, p. 53).

Measures of variability are frequently associated with measures of central tendency because variability describes how scores are arranged around the center of a distribution. Standard deviations are measures of variability that show "how much the typical score varies from the mean" (Bracey, 2003, p. 6). In a normal distribution of

scores, 68% of the means will fall within one standard deviation of the population mean and 95% of the means will fall within two standard deviations of the population mean (Fink, 2006; Fogelman, 2002). Calculating the mean for each Likert-type survey item showed the average rating for teachers' familiarity and use of each differentiated strategy. Finding the standard deviation for each mean demonstrated how the scores were distributed around the mean.

Correlational methodology was used to determine the relationship between teachers' levels of professional development and knowledge and use of DI. Least squares regression was used to assess the amount of shared variance and slope of the regression line between the criterion variable and the predictor variable in Research Questions 1 to 7. A simple linear least squares regression analysis was used to measure the linear relationship between the criterion variable and the predictor variable in each question. Multiple regression is similar to the linear regression and was used when the predictor variable was categorical or ordinal (i.e., levels of differentiated training, experience levels, and education levels) given the variable will then need to be dummy coded to be entered into the regression. Dummy coding resulted in the number of predictors being equal to the number of categories minus one. The equation of interest is written in the following manner:

$$y = \beta_0 + \beta_1 x + \epsilon$$

In this equation, y is the criterion variable, x is the predictor variable, and ϵ is the random error component. β_0 and β_1 are, respectively, the y-intercept (the value of y when x is

zero) and the slope of the line that is estimated as a quantitative relationship between the two variables.

Measures of the validity of a linear regression are the R-square value, which measures the goodness-of-fit of the estimated line (or relationship), and the standard error, which is the estimated standard deviation of the error term. A small standard error indicates that there is an established strong relationship of the dependent variable on the independent variable. Also, a large R-square indicates that the line fits the scatter plot of the graph of the criterion versus the predictor variable fairly well. The R-square varies from 0 to 1, where 1 indicates that the estimated line crosses all points on the scatter plot of the graph of the criterion versus the predictor variable.

I was mainly interested in the *slope* of the regression or the regression coefficient β_1. β_1 can be simplified and called "beta." A low standard error and a positive beta indicate a positive relationship between the predictor and criterion variables.

For Research Question 8, I used a 1 x 3 ANOVA to compare DI usage across Grade levels taught. ANOVA is used to compare means across two or more independent groups to determine if they differ significantly. ANOVA uses the following equation:

$$F = \text{Between Mean Squares} \div \text{Within Mean Squares}$$

The ANOVA equation is the sum of squared differences between groups divided by the sum of squared differences within groups. This calculation assesses the variation in scores found between groups and divides that by the variation in scores found within groups. The resulting ratio (designated by F) is a measure of the strength of

independence. *F* is always positive and always greater than 0. *Eta* squared is also a

measure of the strength of independence and is calculated using the following equation:

Eta squared = Sum of squares between groups ÷ Total sum of squares (Meyers, Guarino,

& Gamst, 2005). *Eta* squared is also referred to as an effect size and is characterized by

the following scale developed by Cohen (1988):

.01 = Small

.06 = Medium

.14 = Large

Thus, the two measures of validity, *F* and eta squared, were used to determine whether

mean usage scores were different for Grades 6, 7, and 8. Because the *F* was not

significant in this statistical analysis, no further post hoc tests were conducted.

Participants' Rights

This study was conducted according to Walden University's research protocols.

Learners that act as researchers are faced with ethical concerns; therefore, researchers

must obtain informed consent from all participants (Gall, Gall, & Borg, 2002). Elements

of informed consent include notifying the participants of who will conduct the study,

letting the participants know the time commitment required, explaining the study in

easily understandable language, offering to answer any questions, informing participants

that their involvement is voluntary, informing participants that they can withdraw at any

time, letting participants know the limits of confidentiality (Rudestam & Newton, 2001),

and ensuring that participants will emerge from the research unharmed.

I am a 24-year veteran in the school system, and I know many of the participants in the study; however, I am a teacher, not a supervisor, so I do not have any influence over the teachers who were asked to participate in the study. Permission to conduct this study of professional learning and DI was obtained from Walden University's IRB, the school system, and the local school principals before the study began. I provided oral and written details of the study and information concerning participants' rights to potential participants. Details concerning the purpose of the study and the procedures involved in collecting data were explained. Teachers were told that participation in the study was voluntary, their responses were anonymous, and that they had the right to withdraw at any time without consequence.

The survey took approximately 15 minutes to complete, and because the survey was anonymous, teachers' identities were protected. There were no known risks associated with participation in this study. I was available to answer questions about the study, and a summary of the results of the study will be available on a website that I will design (Creswell, 2003).

SECTION 4: RESULTS

Introduction

Seventy-nine individuals participated in the DI Teacher Survey. Twenty-six

(32.9%) taught Grade 6, 28 (35.4%) taught Grade 7, and 25 (31.6%) taught Grade 8 (see

Table 2). Frequencies and percentages for years of teaching experience are presented in

Table 3, where the majority 27 (34.2%) had 1 to 5 years. Frequencies and percentages for

highest degree earned is presented in Table 4, where 29 (24.4%) had a bachelor's degree,

39 (49.4%) had a master's degree, 10 (12.7%) had a specialist degree, and 1 (1.3%) had a

doctoral degree. Frequencies and percentages for hours of DI staff development earned

during the summer of 2008 are presented in Table 5, where the majority 34 (43.0%) of

participants had zero hours.

Table 2

Frequencies and Percentages for Grade Taught Last Year

Grade	Frequency	Percent
6th	26	32.9
7th	28	35.4
8th	25	31.6

Table 3

Frequencies and Percentages for Years of Teaching Experience

Years	Frequency	Percent
1 to 5	27	34.2
6 to 10	22	27.8
11 to 15	11	13.9
16 to 20	11	13.9
21 to 25	4	5.1
26 or More	4	5.1

Table 4

Frequencies and Percentages for Highest Degree Earned

Degree	Frequency	Percent
Bachelor's	29	36.7
Master's	39	49.4
Specialist	10	12.7
Doctorate	1	1.3

Table 5

Frequencies and Percentages for Hours of DI Staff Development

Hours	Frequency	Percent
0	34	43.0
1 to 3	21	26.6
4 to 6	8	10.1
7 to 10	6	7.6
11 or more	10	12.7

Research Questions

Research Question 1

To examine Hypothesis 1, a multiple regression was conducted to determine whether there was a positive relationship between middle school teachers' levels of DI training (zero hours vs. other, 1 to 3 hours vs. other, 4 to 6 hours vs. other, and 11 or more hours vs. other) and teachers' knowledge of DI. The results of the regression were not significant, $F(4, 74) = 0.63$, $p = .642$, and teachers' levels of DI training only accounted for 3.3% of the variance in teachers' knowledge of DI. Levels of DI training did not have a positive relationship with teachers' knowledge of DI. The results of the regression are summarized in Table 6.

Table 6

Regression With Levels of DI Training Influencing Knowledge of DI

Levels of DI training	*B*	*SE*	β	*t*	Sig.
(Constant)	100.00	4.61		21.70	.001
Zero	-6.71	5.00	-0.30	-1.34	.184
1 to 3	-6.86	5.23	-0.27	-1.31	.193
4 to 6	-4.75	6.10	-0.13	-0.78	.438
11 or more	-3.30	5.83	-0.10	-0.57	.573

Research Question 2

To examine Hypothesis 2, a linear regression was conducted to determine if there was a positive relationship between middle school teachers' levels of familiarity in content DI and teachers' content usage of DI in the classroom. The results of the regression were significant, $F(1, 77) = 7.73$, $p < .01$. Teachers' content familiarity accounted for 9.1% of the variance in teachers' content usage. These results show that levels of familiarity in content DI did have a positive relationship with teachers' content usage of differentiation. Content usage of DI will increase by 0.54 units for every one unit increase in levels of familiarity in content DI. The results of the regression are summarized in Table 7.

Table 7

Regression With Levels of Familiarity in Content DI Influencing Content Usage of DI

Independent Variable	*B*	*SE*	β	*t*	Sig.
(Constant)	6.77	3.13		2.16	.034
Familiarity in content	0.54	0.19	0.30	2.78	.007

The Differentiated Instruction Teacher Survey was used to collect data from study participants. Responses to survey questions 8 to 13 were used to determine teachers'

familiarity and use of content DI. Frequencies, percentages, means, and standard

deviations for familiarity of content DI are presented in Table 8. All (100%) of the

teachers were somewhat familiar (Level 2) to very familiar (Level 3) with question 11,

giving students word lists and study guides ($M = 2.91$) and Question 13, extending

learning opportunities for all students who mastered the required AKS quickly

($M = 2.72$). Participants were the least familiar with Question 9, allowing students to use

audiotapes as needed ($M = 2.38$) and Question 8, providing students with a variety of

reading materials at different reading levels ($M = 2.53$). Results of participants'

familiarity with content DI are summarized in Table 8.

Table 8

Frequencies, Percentages, Means, and Standard Deviations for Familiarity With Content DI

	Level 1		Level 2		Level 3			
	n	%	*n*	%	*n*	%	*M*	*SD*
Q8	2.0	2.5	33	41.8	44	55.7	2.53	0.55
Q9	10	12.7	29	36.7	40	50.6	2.38	.70
Q10	1	1.3	15	19.0	63	79.7	2.78	.44
Q11	0	0.0	7	8.9	72	91.1	2.91	.29
Q12	3	3.8	17	21.5	59	74.7	2.71	.53
Q13	0	0.0	22	27.8	57	72.2	2.72	.45

The frequencies, percentages, means, and standard deviations for teachers' use of

content DI are presented in Table 9. The majority of the participants (93.7%) gave

students word lists and study guides (Question 11) once a week (Level 3) to two or more

times each week (Level 4), and this content strategy was used most often by participants

in the study ($M = 3.49$). Question 9, allowing students to use text audiotapes as needed

($M = 1.46$), and Question 8, providing all students with a variety of leveled reading

materials ($M = 2.20$), were the two content strategies that were used least often. See Table

9 for a summary of participants' use of content DI survey items.

Table 9

Frequencies, Percentages, Means, and Standard Deviations for Usage of Content DI

	1		2		3		4			
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*M*	*SD*
Q8	23	29.1	28	35.4	17	21.5	11	13.9	2.20	1.02
Q9	57	72.2	13	16.5	4	5.1	5	6.3	1.46	0.86
Q10	11	13.9	16	20.3	23	29.1	29	36.7	2.89	1.06
Q11	0	0.0	5	6.3	30	38.0	44	55.7	3.49	0.62
Q12	10	12.7	24	30.4	24	30.4	21	26.6	2.71	1.00
Q13	6	7.6	31	39.2	26	32.9	16	20.3	2.66	0.89

Research Question 3

To examine hypothesis 3, a linear regression was conducted to establish if there

was a positive relationship between middle school teachers' levels of familiarity in

process DI and teachers' process usage of DI in the classroom. The results of the

regression were significant, $F(1, 77) = 41.02$, $p < .001$. Teachers' familiarity in process

DI accounted for 34.8% of the variance in teachers' usage of DI. Levels of familiarity in

process DI did have a positive relationship with teachers' process usage of DI. Analysis

of the data suggested that as levels of familiarity in process DI increased by one unit,

process usage of DI increased by 0.93 units. The results of the regression are summarized

in Table 10.

Table 10

Regression With Levels of Familiarity in Process DI Influencing Process Usage of DI

Independent variable	B	SE	β	*t*	Sig.
(Constant)	8.02	6.37		1.26	.212
Familiarity in process	0.93	0.15	0.59	6.41	.001

Survey Questions 14 to 29 were used to determine teachers' familiarity with and use of process DI. The frequencies, percentages, means, and standard deviations for familiarity of process DI are shown in Table 11. All of the participants (100%) were somewhat familiar (Level 2) to very familiar (Level 3) with Question 14, using AKS related essential questions to guide instruction ($M = 2.96$); Question 17, requiring students to apply and extend concepts that are learned ($M = 2.96$); Question 16, linking prior knowledge to new information ($M = 2.95$); and Question 25, helping struggling students learn by reteaching information ($M = 2.94$). Participants were the least familiar with Question 19, using Gardner's multiple intelligences to plan a variety of student activities ($M = 2.20$) and Question 26, using the jigsaw strategy to allow students to become experts in topics of interest ($M = 2.33$). The results of teachers' familiarity with process DI are summarized in Table 11.

Table 11

Frequencies, Percentages, Means, and Standard Deviations for Familiarity With Process DI

| | Level 1 | | Level 2 | | Level 3 | | | |
	n	%	*n*	%	*n*	%	*M*	*SD*
Q14	0	0.0	3	3.8	76	96.2	2.96	0.19
Q15	0	0.0	14	17.7	65	82.3	2.82	0.38
Q16	0	0.0	4	5.1	75	94.9	2.95	0.22
Q17	0	0.0	3	3.8	76	96.2	2.96	0.19
Q18	1	1.3	13	16.5	65	82.3	2.81	0.43
Q19	22	27.8	19	24.1	38	48.1	2.20	0.85
Q20	1	1.3	17	21.5	61	77.2	2.76	0.46
Q21	2	2.5	23	29.1	54	68.4	2.66	0.53
Q22	5	6.3	23	29.1	51	64.6	2.58	0.61
Q23	3	3.8	6	7.6	70	88.6	2.84	0.45
Q24	1	1.3	13	16.5	65	82.3	2.81	0.43
Q25	0	0.0	5	6.3	74	93.7	2.94	0.25
Q26	19	24.1	15	19.0	45	57.0	2.33	0.84
Q27	6	7.6	18	22.8	55	69.6	2.62	0.63
Q28	4	5.1	31	39.2	44	55.7	2.50	0.60
Q29	1	1.3	11	13.9	66	83.5	2.85	0.43

Table 12 summarizes the frequencies, percentages, means, and standard deviations for teachers' usage of process differentiated survey items. Question 14 was the process differentiated strategy that was used most often by a majority of the teachers (93.7%). This survey question examining the use of AKS-related essential questions to guide instruction was used at least two or more times each week by most teachers ($M = 3.92$). The process DI strategies used least by a majority of the participants included Question 26, using the jigsaw strategy to allow students to become experts in topics of interest ($M = 2.04$), and Question 19, using Gardner's multiple intelligences to plan a variety of student activities ($M = 2.21$). The results for teachers' use of process differentiation are summarized in Table 12.

Table 12

Frequencies, Percentages, Means, and Standard Deviations for Usage of Process DI

	Level 1		Level 2		Level 3		Level 4			
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*M*	*SD*
Q14	0	0.0	1	1.3	4	5.1	74	93.7	3.92	0.31
Q15	9	11.4	17	21.5	29	36.7	24	30.4	2.86	0.98
Q16	0	0.0	2	2.5	18	22.8	59	74.7	3.72	0.50
Q17	0	0.0	7	8.9	24	30.4	48	60.8	3.51	0.66
Q18	3	3.8	14	17.7	30	38.0	32	40.5	3.15	0.85
Q19	23	29.1	27	34.2	18	22.8	11	13.9	2.21	1.02
Q20	1	1.3	15	19.0	30	38.0	33	41.8	3.20	0.79
Q21	8	10.1	23	29.1	30	38.0	18	22.8	2.73	0.93
Q22	13	16.5	30	38.0	23	29.1	13	16.5	2.46	0.96
Q23	2	2.5	6	7.6	22	27.8	49	62.0	3.49	0.75
Q24	1	1.3	14	17.7	23	29.1	41	51.9	3.31	0.81
Q25	1	1.3	10	12.7	23	29.1	45	57.0	3.42	0.76
Q26	27	34.2	28	35.4	18	22.8	6	7.6	2.04	0.94
Q27	11	13.9	25	31.6	34	43.0	9	11.4	2.52	0.88
Q28	6	7.6	30	38.0	22	27.8	21	26.6	2.73	0.93
Q29	2	2.5	8	10.1	34	43.0	35	44.3	3.29	0.75

Research Question 4

To examine Hypothesis 4, a linear regression was conducted to learn if there was a positive relationship between middle school teachers' levels of familiarity in product DI and teachers' product usage of DI in the classroom. The results of the regression were significant, $F(1, 77) = 27.66$, $p < .001$. Teachers' product familiarity comprised 26.4% of the variance in teachers' use of differentiation. Levels of familiarity in product DI did have a positive relationship with teachers' product usage of DI. As levels of familiarity in product differentiation increased by one unit, product usage of DI increased by 0.84 units. The results of the regression are summarized in Table 13.

Table 13

Regression With Levels of Familiarity in Product DI Influencing Product Usage of DI

Independent variable	*B*	*SE*	β	*t*	Sig.
(Constant)	2.31	3.32		0.70	.488
Familiarity in product	0.84	0.16	0.51	5.26	.001

Survey Questions 30 to 37 were used to examine teachers' familiarity and use of product DI. Table 14 summarizes the frequencies, percentages, means, and standard deviations for participants' familiarity in product DI. All of the teachers (100%) were somewhat familiar (Level 2) to very familiar (Level 3) with Question 30, providing opportunities for students' products to be based upon the solving of real and relevant problems ($M = 2.72$), and Question 33, supporting students as they used varied resources to complete tasks ($M = 2.72$). Only one participant was not familiar (Level 1) with Question 37, providing leveled rubrics so students knew the criteria for success ($M = 2.72$). Participants were the least familiar with Question 35, using critique groups and teacher-led miniworkshops to guide students during product development ($M = 2.20$). Table 14 summarizes participants' familiarity with product DI.

Table 14

Frequencies, Percentages, Means, and Standard Deviations for Familiarity With Product DI

	Level 1		Level 2		Level 3		*M*	*SD*
	n	%	*n*	%	*n*	%		
Q30	0	0.0	22	27.8	57	72.2	2.72	0.45
Q31	5	6.3	21	26.6	53	67.1	2.61	0.61
Q32	4	5.1	25	31.6	50	63.3	2.58	0.59
Q33	0	0.0	22	27.8	57	72.2	2.72	0.45
Q34	6	7.6	25	31.6	48	60.8	2.53	0.64
Q35	10	12.7	43	54.4	26	32.9	2.20	0.65
Q36	5	6.3	27	34.2	47	59.5	2.53	0.62
Q37	1	1.3	20	25.3	58	73.4	2.72	0.48

Table 15 presents the frequencies, percentages, means, and standard deviations for teachers' usage of product DI. Techniques used the most often by the majority of the teachers include Question 37, the use of leveled rubrics so all students knew the criteria for success ($M = 2.90$); Question 33, support for all students as they used a variety of materials to complete tasks ($M = 2.83$); and Question 30, opportunities for all students to produce products that are based upon the solving of real and relevant problems ($M = 2.82$). The technique used the least often by participants was Question 35, the use of critique groups and teacher-led miniworkshops to guide students during product development ($M = 1.87$). Table 15 summarizes participants' use of product DI.

Table 15

Frequencies, Percentages, Means, and Standard Deviations for Usage of Product DI

| | Level 1 | | Level 2 | | Level 3 | | Level 4 | | | |
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*M*	*SD*
O30	4	5.1	25	31.6	31	39.2	19	24.1	2.82	0.86
Q31	14	17.7	43	54.4	14	17.7	8	10.1	2.20	0.85
Q32	21	26.6	30	38.0	19	24.1	9	11.4	2.20	0.96
Q33	6	7.6	24	30.4	26	32.9	23	29.1	2.83	0.94
Q34	13	16.5	26	32.9	31	39.2	9	11.4	2.46	0.90
Q35	27	34.2	40	50.6	7	8.9	5	6.3	1.87	0.82
Q36	22	27.8	26	32.9	20	25.3	11	13.9	2.25	1.02
Q37	6	7.6	22	27.8	25	31.6	26	32.9	2.90	0.96

Research Question 5

To examine Hypothesis 5, a linear regression was conducted to determine whether there was a positive relationship between middle school teachers' levels of familiarity in strategies DI and teachers' strategies usage of DI in the classroom. The results of the regression were significant, $F(1, 77) = 18.35$, $p < .001$, and teachers' familiarity with strategies DI explained 19.2% of the variance in teachers' usage of strategies differentiation. Analysis of the data indicate that levels of familiarity in strategies DI did have a positive relationship with teachers' strategies usage of DI. For every one unit increase in levels of familiarity in DI strategies, DI strategies usage increased by 0.54 units. The results of the regression are summarized in Table 16.

Table 16

Regression With Levels of Familiarity in Strategies DI Influencing Strategies Usage of DI

Independent variable	*B*	*SE*	β	*t*	Sig.
(Constant)	4.65	1.81		2.56	.012
Familiarity in strategies	0.54	0.13	0.44	4.28	.001

Survey Questions 38 to 43 examined teachers' familiarity and use of strategies DI. The majority of the teachers were somewhat familiar (Level 2) to very familiar (Level 3) with all of these techniques. Teachers were the most familiar with Question 42, using independent study ($M = 2.68$). Teachers were the least familiar with Question 43, using choice boards ($M = 1.85$). Frequencies, percentages, means, and standard deviations for strategies DI are summarized in Table 17.

Table 17

Frequencies, Percentages, Means, and Standard Deviations for Familiarity With Strategies DI

	Level 1		Level 2		Level 3			
	n	%	*n*	%	*n*	%	*M*	*SD*
Q38	7	8.9	34	43.0	38	48.1	2.39	0.65
Q39	14	17.7	31	39.2	34	43.0	2.25	0.74
Q40	11	13.9	28	35.4	40	50.6	2.37	0.72
Q41	7	8.9	19	24.1	53	67.1	2.58	0.65
Q42	6	7.6	13	16.5	60	75.9	2.68	0.61
Q43	33	41.8	25	31.6	21	26.6	1.85	0.82

The frequencies, percentages, means, and standard deviations for use of strategies DI are presented in Table 18. The majority of teachers used Question 42, independent study, once a week (Level 3) to two or more time each week (Level 4; $M = 2.58$). The remaining strategies were used once a month (Level 2) or rarely or never (Level 1). Choice boards were the least used strategy ($M = 1.44$). Results summarizing participants' use of strategies DI are presented in Table 18.

Table 18

Frequencies, Percentages, Means, and Standard Deviations for Usage of Strategies DI

	Level 1		Level 2		Level 3		Level 4			
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*M*	*SD*
Q38	23	29.1	26	32.9	21	26.6	9	11.4	2.20	0.99
Q39	24	30.4	23	29.1	24	30.4	8	10.1	2.20	0.99
Q40	38	48.1	25	31.6	10	12.7	6	7.6	1.80	0.94
Q41	28	35.4	31	39.2	10	12.7	10	12.7	2.03	0.10
Q42	19	24.1	11	13.9	33	41.8	16	20.3	2.58	1.07
Q43	55	69.6	15	19.0	7	8.9	2	2.5	1.44	0.76

Research Question 6

To examine Hypothesis 6, a multiple regression was conducted to learn whether there was a positive relationship between middle school teachers' professional teaching experience (1 to 5 years vs. Other, 6 to 10 years vs. Other, 11 to 15 years vs. Other, 16 to 20 years vs. Other, and 21 to 25 years vs. other) and teachers' use of DI. The results of the regression were not significant, $F(5, 73) = 0.95$, $p = .454$, and 6.1% of the differences in teachers' use of DI can be accounted for by teachers' experience levels. Levels of professional teaching experience did not have a positive relationship with teachers' use of DI. The results of the regression are summarized in Table 19.

Table 19

Regression With Levels of Professional Teaching Experience Influencing Use of DI

Years of experience	*B*	*SE*	β	*t*	Sig.
(Constant)	102.75	8.59		11.97	.000
1 to 5	-7.34	9.20	-0.20	-0.80	.427
6 to 10	-7.02	9.33	-0.19	-0.75	.454
11 to 15	-3.02	10.03	-0.06	-0.30	.764
16 to 20	-6.48	10.03	-0.13	-0.65	.520
21 to 25	-23.00	12.14	-0.30	-1.90	.062

Research Question 7

To examine Hypothesis 7, a multiple regression was performed to determine if there was a positive relationship between middle school teachers' education levels (bachelors vs. other, masters vs. other, and specialist vs. other) and teachers' use of DI. The results of the regression were significant, $F(3, 75) = 2.77$, $p < .05$, and 10.0% of the variance in the use of DI can be accounted for by teachers' education levels. Teachers' education levels did have a relationship with teachers' use of DI overall; however, none of the individual independent variables was significant. The results of the regression are summarized in Table 20.

Table 20

Regression With Levels of Education Influencing Use of DI

Education	B	SE	β	t	Sig.
(Constant)	94.00	16.59		5.67	.001
Bachelor's	-1.83	16.87	-0.05	-0.11	.914
Master's	1.03	16.80	0.03	0.06	.951
Specialist	15.50	17.40	0.30	0.89	.376

Research Question 8

To examine Hypothesis 8, an ANOVA was conducted to assess whether there was a difference in the use of DI by grade levels taught (Grades 6, 7, and 8) for middle school teachers. The results of the ANOVA were not significant, $F(2, 76) = 1.47$, $p = .237$, suggesting no difference in the use of DI by grade levels taught. Means and standard deviations on the use of DI by grade level taught are presented in Table 21.

Table 21

Means and Standard Deviations on the Use of DI by Grade Level Taught

Grade taught	*M*	*SD*
6	93.15	17.86
7	93.96	15.96
8	100.60	17.33

Research Question 9

To examine Research Question 9, descriptive statistics, including frequency and percentages, were calculated to explore the extent that middle school teachers learned to implement DI using methods other than in-service opportunities. The results (see Table 22) showed that 4 (5.1%) answered Not At All, 4 (5.1%) answered 2, 16 (20.3%) answered 3, 18 (22.8%) answered 4, 17 (21.5%) answered 5, 14 (17.7%) answered 6, and 6 (7.6%) answered Very Much.

Table 22

Frequencies and Percentages for the Extent That Middle School Teachers Have Learned to Implement DI Using Methods Other Than In-Service Opportunities

Response	Frequency	Percentage
Not at all	4	5.1
2	4	5.1
3	16	20.3
4	18	22.8
5	17	21.5
6	14	17.7
Very much	6	7.6

Research Question 10

To examine Research Question 10, descriptive statistics, including frequency and percentage, were conducted to explore the extent that middle school teachers want

additional DI in-service opportunities. The results (see Table 23) showed that 11 (13.9%)

answered Not Interested, 4 (5.1%) answered 2, 12 (15.2%) answered 3, 11 (13.9%)

answered 4, 19 (24.1%) answered 5, 13 (16.5%) answered 6, and 9 (11.4%) answered

Very Interested.

Table 23

Frequencies and Percentages for the Extent That Middle School Teachers Want Additional DI In-Service Opportunities

Response	Frequency	Percentage
Not interested	11	13.9
2	4	5.1
3	12	15.2
4	11	13.9
5	19	24.1
6	13	16.5
Very interested	9	11.4

Summary

Seventy-nine educators participated in the Differentiated Instruction Teacher

Survey. Of these teachers, 26 taught Grade 6, 28 taught Grade 7, and 25 taught Grade 8.

The majority of the teachers (34.2%) had 1 to 5 years teaching experience, and 29

teachers had earned a bachelor's degree, 39 had earned a master's degree, 10 had earned

a specialist's degree, and 1 had earned a doctoral degree. Forty-three percent participated

in zero hours of DI staff development during the summer of 2008. Analysis of the data

indicated that teachers' familiarity with content, process, product, and strategies DI had a

positive relationship with teachers' use of content, process, product, and strategies DI. DI

professional learning did not have a positive relationship with teachers' knowledge of DI.

Participants' years of teaching experience did not have a positive relationship with teachers' use of DI, but teachers' education levels did, overall, relate to teachers' use of DI. There was no difference in the use of DI by grade level. Most teachers 55 (69.6%) rated themselves from somewhat to very much interested(Levels 4 to 7) in using methods other than in-service opportunities to learn how to differentiate instruction, but 52 (65.9%) were moderately interested to very interested (Levels 4 to 7) in taking future DI classes if these classes are offered by the school system.

SECTION 5: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The NCLB was created to close achievement gaps for students across the nation. This act requires schools to measure student achievement using standardized tests, and school systems risk sanctions and loss of federal funds if schools in the system fail to meet AYP guidelines. Furthermore, this legislation emphasizes the importance of having well-prepared teachers in the classroom, and it recommends that research-based instructional strategies be used to meet students' diverse learning needs as well as increase student achievement (USDoE, 2003, 2004). As a result, school systems provide teachers with professional learning opportunities intended to improve instruction and raise student achievement (NSDC, 1999, 2001; Polk, 2006). DI is a research-based instructional method that is often used to help students achieve academic success in heterogeneous classrooms (Heacox, 2002; Tomlinson, 1999); however, use of DI varies (Drain, 2008; Gable et al., 2000; Hornbeck, 2003; Ryan & Ferguson, 2006; Schumm et al., 2000).

This study was designed to investigate teachers' knowledge and use of DI in relation to staff development opportunities provided by a local school system. Ninety-five teachers who taught at one suburban middle school in Georgia during the 2008-2009 school year were asked to participate in this quantitative study. A cross-sectional survey design was used to collect data from 79 teachers who completed the Differentiated InstructionTeacher Survey. The self-administered, anonymous survey was distributed to participants during faculty meetings, and participation was voluntary.

Of the 79 teachers participating in the study, 26 taught Grade 6, 28 taught Grade 7, and 25 taught Grade 8. The majority (34.2%) had 1 to 5 years teaching experience. Twenty-nine teachers had earned a bachelor's degree, 39 a master's degree, 10 a specialist's degree, and one a doctoral degree.

Research Questions

Research Question 1 investigated the relationship between teachers' levels of DI training taken during the summer of 2008 and teachers' knowledge of differentiation. Forty-five teachers in the study participated in in-services that summer. Analysis of the data suggested that the level of training these teachers received did not positively relate to teachers' knowledge of DI.

Research Questions 2, 3, 4, and 5 explored the relationship between teachers' levels of familiarity and use of content, process, product, and strategies DI. Results indicated a positive relationship between teachers' levels of familiarity and teachers' use of each category (content, process, product, and strategies). In addition, the data suggested that as teachers' familiarity in a category increased, usage of that category of DI also increased.

Research Questions 6, 7, and 8 scrutinized teachers' use of DI in relation to other teacher factors. Question 6 examined the relationship between middle school teachers' professional teaching experience levels and teachers' use of DI. Results indicated that teachers' professional teaching experience levels did not have a positive relationship with teachers' use of DI. Research question 7 examined the relationship between middle school teachers' education levels and teachers' use of DI. These results suggested that

teachers' education levels did have a relationship with use of DI overall; however, none of the independent variables was significant. Research Question 8 investigated middle school teachers' use of DI compared to grade level taught. According to the results, there was no difference in the use of differentiation by teachers in each grade level.

Research Questions 9 and 10 examined teachers' learning about DI and their desires for future in-service opportunities. Question 9 determined the extent that teachers used methods other than staff development to learn DI methods. The majority of the teachers (69.6%) indicated that they learned how to differentiate somewhat (Level 4) to very much (Level 7) using methods other than staff development. Research Question 10 asked to what extent middle school teachers wanted additional DI opportunities to be provided by the school system. Results indicated that 65.9% of the respondents were somewhat interested (Level 4) to very interested (Level 7) in future in-service opportunities.

<div align="center">Interpretation of the Findings</div>

Study findings are divided into three categories for discussion: Teachers' Familiarity With and Use of DI, Teacher Factors and the Use of DI, and Professional Learning and DI.

Teachers' Familiarity With and Use of DI

Teachers implement DI based on students' specific needs to make learning more personal for students (Chapman & King, 2005). Educators consider differences in human intelligence when differentiating instruction because children think, learn, and create in ways that are unique to them. Children construct meaning from prior experiences by

grouping new information around ideas that they already understand, and they are challenged by leveled learning tasks linked to their learning zones. These principles serve as the foundation for differentiating (Tomlinson, 1999).

Techniques used to implement DI vary, so it is important for teachers to be familiar with assorted strategies. Teachers' familiarity with assorted instructional strategies increases opportunities to differentiate content, process, and product while meeting students' readiness levels, interests, and learning preferences (Tomlinson, 2001; Tomlinson & McTighe, 2006). Techniques included in this study were selected because they are commonly associated with DI and best teaching practices (Heacox 2002; Tomlinson & Allan, 2000).

Similar to previous research (Blozowich, 2001; Hobson, 2004), results of this study indicated that participants' familiarity with and use of DI varied. Most of the teachers in this study were familiar with and frequently used many of the techniques associated with content, process, and product differentiation. Although the majority of the teachers were familiar with strategies DI, they used these techniques less frequently. Overall, in each of these categories of DI, as teachers' familiarity increased, usage also increased. The following section discusses teachers' familiarity and use of content, process, product, and strategies DI in more detail.

Content DI (Research Question 2)

Although the state department of education and the local school system mandate curriculum, classroom teachers choose how to differentiate content to support students' learning. The majority of the teachers in this study were somewhat familiar (Level 2) to

very familiar (Level 3) with all of the content differentiated survey items. Teachers'

familiarity in content DI accounted for 9.1% of the variance in teachers' content usage.

Strategies used most often (Level 3–once a week to Level 4–two or more times each

week) included giving students word lists and study guides; using various support

mechanisms; relating topics to genders, cultures, and intelligences by varying illustrations

and examples; and extending learning opportunities for students who mastered the

required AKS quickly.

Although the findings indicate that the majority of the teachers were familiar with

and used many of the content DI strategies in the survey, audiotexts and leveled reading

materials were not frequently used (Level 2–used about once a month or Level 1–rarely

or never) at the study site, and these rates could be improved. Previous researchers

(Avalos et al., 2008; O'Connor et al., 2002) have advocated the use of these DI strategies

for improving students' reading skills. In addition, use of leveled reading materials and

audiotexts support students' learning styles (Heacox, 2002), which can lead to increased

achievement and motivation to learn (Lovelace, 2005).

The current results corroborated earlier research on content DI and further

suggested that resources at the study site need to be inventoried to determine whether

audiotexts and leveled readers are available for use. If these materials are not available,

the school system can address this issue by taking additional steps to purchase these

items. If these resources are available, placement in a central location will provide all

teachers with access to the materials. Additional suggestions to augment usage are to

remind teachers that these resources are available for use, and if necessary, provide

teachers with additional training in using audiotexts and leveled reading materials to support students' learning.

Process DI (Research Question 3)

Teachers differentiate process by varying instructional techniques to assist students as they learn and understand the concepts being taught (Tomlinson & Allan, 2000). The data in this study indicated that the majority of teachers were somewhat familiar (Level 2) to very familiar (Level 3) with process DI. Teachers' familiarity with process differentiation accounted for 34.8% of the variance in teachers' process usage. Although use of DI process strategies varied, most teachers used essential questions, prior knowledge, Bloom's taxonomy, different *learning modes*, varied wait time, adjusted work pace, opportunities to apply information, reteaching, and formative evaluation two or more times each week. Preassessment; student grouping based on readiness, interests, and learning profiles; and student choice were used by most teachers about once a week.

Although teachers were familiar with and used many of the DI process strategies frequently, they were less familiar with Gardner's multiple intelligences and the jigsaw strategy, and these techniques were used less often (Level 2-once a month or Level 1-rarely or never) by most of the faculty members. As previously discussed, Gardner's multiple intelligences theory (1998) and the theory of successful intelligence (Sternberg & Grigorenko, 2004) support the use of DI by allowing students to learn in ways that match their learning preferences. Designing activities to match learning preferences gives students opportunities to choose how they will learn, thereby engaging learners and making learning meaningful to students (Dotger & Causton-Theoharis, 2010; Gardner,

1993; Tomlinson & Eidson, 2003). According to Tomlinson (1999), differences in human intelligences, which enable students to think, learn, and create, is one of the three principles that form the foundation for DI, so it is surprising that teachers in the study did not use multiple intelligences and the jigsaw strategy more often to vary classroom instruction.

In support of the previous research, the current findings made it clear that most teachers were familiar with and used many of the process differentiated strategies on a regular basis to vary instruction; however, improvements can still be made. It is recommended that future high-quality training opportunities be made available. These training opportunities will ensure that teachers continue to build their repertoire of process differentiated strategies to ensure variety in lessons and to meet students' diverse learning needs.

Product DI (Research Question 4)

Teachers create differentiated products so students can demonstrate learning that has occurred. Differentiated products give students opportunities to think creatively and critically as they develop skills and apply learning to tasks (Tomlinson & Allan, 2000). In addition to differentiating by content and process, the majority of the teachers were somewhat familiar (Level 2) to very familiar (Level 3) with product DI. Moreover, 26.4% of the variance in product usage can be explained by teachers' familiarity with product DI. Most teachers gave students opportunities to solve real and relevant problems, support using varied resources, and rubrics specifying criteria for success at least once a week (Level 3) to two or more times each week (Level 4).

Findings indicated that two product DI strategies were used less frequently by a majority of the participants. Allowing students to choose products from a wide list of alternatives was used infrequently (Level 2, about once a month, or Level 1, rarely or never) by 72.1% of the teachers, and allowing students to choose formats or media to express their learning was used (Level 2, about once a month, or Level 1, rarely or never) by 60.7% of the teachers. Research (Mann, 2006; Tomlinson, 1999) indicated that student choice is an important part of differentiating instruction because this is a way that teachers accommodate students' learning preferences. Additionally, allowing students to make choices in their learning experiences motivates students to learn, especially if they are interested in the topic (Hoffman, 2003).

For these reasons, and based on the current results, middle school teachers need to provide more frequent opportunities for students to make choices about the products they produce to reflect the information they have learned. Whereas most teachers grouped students for instruction (in process DI) about once a week based on students' readiness, interests, and learning profiles, product differentiated results indicated that assigning products based on individual or group readiness, interests, and learning needs was only used infrequently. Of the participants, 64.6% used this strategy once a month (Level 2) or rarely or never (Level 1). When product is differentiated, students create products to show their understanding of topics they have learned (Tomlinson & Allan, 2000). Linking leveled learning tasks to students' learning zones provides appropriate levels of complexity and challenge so students can learn continually in different learning situations (Tomlinson, 1999).

Based on the current findings and in support of the previous research, it is recommended that administrators provide teachers with additional instructional support and collaborative planning time to create topic related products based on students' readiness, interests, and learning preferences. According to Evans (2005), planning for and implementing DI takes a tremendous amount of teachers' time. Collaborative planning time encourages teachers to share the responsibility for creating lessons and reduce teachers' workload. Additionally, collaboration can facilitate understanding as lessons and strategies are shared (Heacox, 2002; Schmoker, 2006).

One other interesting finding about product DI is teachers' limited use of critique groups and teacher-led miniworkshops to guide students during product development. These strategies were used once a month or less (Level 2, about once a month, or Level 1, rarely or never) by 84.8% of the teachers in the study. According to Vygotsky (as cited in Jaramillo, 1996), as adults and children collaborate, they construct meaning. Using critique groups and teacher-led miniworkshops allows teachers and students to collaborate and increase understanding of a topic; therefore, the current findings emphasized the need for increased usage of these strategies. Teachers that express an interest in using these strategies may benefit from observing peers or working with an instructional coach. Observing strategies in action and working with instructional coaches will facilitate understanding and encourage future attempts to use certain instructional techniques (Katzenmeyer & Moller, 2001; Stronge, 2007).

All of the content, process, and product differentiated strategies discussed thus far, including the infrequently used techniques, are an integral part of differentiating

instruction. Strategies DI, another important part of differentiation, is discussed next. Although these strategies were reportedly used infrequently by respondents in this study, they are still considered a viable form of differentiating instruction.

Strategies DI (Research Question 5)

As in content, process, and product differentiation, the majority of the teachers were somewhat familiar (Level 2) to very familiar (Level 3) with strategies DI. Teachers were most familiar with using independent study and least familiar with using choice boards. Teachers' familiarity in strategies DI accounted for 19.2% of the variance in teachers' usage. As familiar as teachers were with strategies DI, only independent study was used by the majority of the teachers once a week (Level 3) to two or more times each week (Level 4). The majority of the teachers indicated that they used tiering, compacting, student learning contracts, learning stations, and choice boards once a month (Level 2) or rarely or never (Level 1).

As previously noted, these strategies combined techniques used in content, process, and product DI. To use these strategies, teachers put forth considerable time and effort to plan and implement these activities (Evans, 2005), matching students' needs to the learning experiences (Moon, 2005), and then managing students as they perform multiple tasks simultaneously (Coil, 2004). This is difficult for some teachers (Halpin-Brunt, 2007), but techniques such as these are implemented because they are especially useful for meeting the learning needs of advanced and gifted students (Heacox, 2002).

It is clear that there is a need to increase teachers' familiarity of particular differentiated strategies and to encourage usage of such strategies in daily teaching

routines. Teachers wishing to use these strategies would benefit from administrative support in the form of collaborative planning time, opportunities to observe peers who are successful using these strategies, personal guidance from instructional coaches, and possibly additional high-quality training in the use of these strategies.

As discussed in the literature review, it is the teacher's responsibility to make learning personal for students by differentiating instruction based on students' readiness, interests, learning profiles, and affect (Heacox, 2002; Tomlinson & McTighe, 2006). The findings from these four questions indicated that the teachers were familiar with DI and they used many of the techniques associated with content, process, and product DI on a regular basis; however, teachers also reported limited use of particular strategies in each category of DI (content, process, product, and strategies), and especially strategies differentiation. Most teachers were aware of the importance of planning instruction to meet students' learning needs, and many were willing to implement DI for the benefit of their students. Most importantly, the results of the current investigation indicated that as teachers' knowledge of DI increased, teachers' use of differentiation also increased.

Effective teachers use a wide variety of instructional strategies in the classroom to assist students in the learning process (Tomlinson & McTighe, 2006). Knowing this, three teacher factors were also examined to learn more about their effect on teachers' use of DI in the study. These results are discussed next.

<div align="center">Teacher Factors and the Use of DI</div>

The teacher's role in the classroom cannot be underestimated because instruction has the largest influence on student achievement (Schmoker, 2006). In the current study, I

examined teachers' professional teaching experience levels, education levels, and grade

levels taught to determine if there was a relationship between these factors and teachers'

use of DI. Results related to these factors are discussed next.

Professional Teaching Experience Levels (Research Question 6)

Teachers' professional teaching experience levels were examined to determine the

relationship between this factor and teachers' use of DI. Teachers' experience levels

ranged from 1 to 26 or more years. Results of the study indicated that levels of

professional teaching experience did not positively influence teachers' use of DI.

Teachers' experience levels accounted for 6.1% of the variance in teachers' use of

differentiation.

DI is a method of teaching that can be used effectively in every subject, at all

levels of education, and by educators with varying years of teaching experience (Heacox,

2002; Tomlinson, 1999; Tomlinson et al., 2003). Teachers are encouraged to use DI to

meet students' individual learning needs. Administrative support is essential to promote

the use of this instructional method.

Education Levels (Research Question 7)

Teachers' education levels were also surveyed to determine if there was a

relationship between these levels and teachers' use of differentiation. Teachers' degrees

earned included bachelors, masters, specialists, and doctorate, with the largest group

(49.4%) holding a master's. Results indicated that teachers' education levels did

influence teachers' use of DI overall, but none of the levels were significant. Education

levels accounted for 10.0% of the differences in teachers' use of differentiation.

According to Stronge (2007), "Effective teachers invest in their own education" (p. 29). These findings indicated that regardless of teachers' education levels, teachers recognized students' unique learning needs and were striving to meet them. Sharing these results at the college level will reinforce the need for continuous improvements to teacher education programs.

Grade Levels Taught (Research Question 8)

This study took place in a middle school setting consisting of Grades 6, 7, and 8. Teachers' use of differentiation was compared to the grade levels they taught. Results indicated that there was no significant difference in the use of DI by Grade levels, and the means for each Grade level were similar. These findings are not surprising because techniques used to differentiate can be applied across grade levels. Ongoing administrative support will encourage teachers across grade levels to use DI.

Although professional teaching experience levels and grade levels taught did not influence teachers' use of DI, overall, teachers' education levels did have a positive relationship with teachers' use of differentiation. Despite these results concerning specific teacher factors, participants in the study responded that they did use many differentiated strategies regularly. The next section interprets findings concerning teachers' professional learning and DI.

Professional Learning and DI

School systems use professional learning as a form of continuing education to teach educators the content knowledge and skills they need to improve students' learning (NSDC, 1999). The ultimate goal of staff development is to help teachers modify their

teaching practices to effectively educate students as needed (Duffy & Kear, 2007). In this study, teachers were surveyed to determine the extent that they participated in DI staff development the summer prior to the 2008-2009 school year. Results of teachers' participation in these training sessions and teachers' feedback regarding professional learning opportunities are described next.

Levels of DI Training (Research Question 1)

Fifty-seven percent of the teachers in this study participated in DI professional learning during the summer. Of these teachers, the largest group (26.6%) had 1 to 3 hours of training. Analysis of the data indicated that there was not a positive relationship between teachers' levels of training and their knowledge of DI.

These findings indicated that many teachers did not participate in summer training opportunities, and of those who did, the training did not positively influence their knowledge of DI. According to previous research, high-quality professional learning opportunities help teachers to be more effective in the classroom (Edwards et al., 2006; Hill, 2007; Stronge, 2007). Stronge (2007) concurred:

> High quality professional development activities are necessary tools for improving teacher effectiveness. These activities must be collegial, challenging, and socially oriented, because learning itself entails these characteristics. Additionally, professional development training must be tailored to the individual teachers within a particular school to support both the individual and organizational needs as they exist within a particular context. In essence, teacher effectiveness is not an end product; rather, it is an ongoing, deliberate process. (p. 103)

It is unclear why these results do not corroborate the previous research findings, so additional research on this topic could be conducted. It is agreed by most in education

that the more effective teachers are in the classroom, the greater the level of teacher

efficacy, or feelings that teachers have about themselves and their abilities to teach

students successfully (Bandura, 1989). The fact that many of these teachers used DI

indicated their desire to do what was best for their students.

Differentiation Learned by Methods Other Than In-Service (Research Question 9)

Many of the teachers were familiar with differentiating instruction, but 69.6%

responded that they learned how to differentiate somewhat to very much (Level 4-Level

7) using methods other than staff development. These findings indicated that teachers'

desires to meet students' needs led them to informally seek out and apply differentiated

techniques in the best interest of their students. Staff development is important, but it is

equally important that teachers recognize the need to DI and that teachers choose to apply

those skills to advance student learning. It is recommended that informal learning of

teaching techniques continue. Teachers are encouraged to voice their opinions regarding

options to choose future training sessions in which they are involved. Additional research

to determine the methods teachers are using to familiarize themselves with differentiating

instruction would be informative and could be conducted.

Future DI Training (Research Question 10)

Unlike Blozowich (2001), who found a lack of interest in future differentiated in-

service opportunities, the majority of the study participants (65.9%) stated that they were

somewhat interested to very interested (Level 4-Level 7) in future professional learning

opportunities if these training sessions were offered through the school system. The

current results corroborate Netterville (2002), who also found that teachers would like

additional DI training. These findings indicated that teachers in the study recognized the benefits of professional learning to enhance their teaching skills, and they were willing to continue learning for the benefit of their students.

Results of this study supported previous literature and indicated a need for future, DI professional learning opportunities to be provided at the local school and county level. High-quality staff development is content specific, based on student data, aligned with district and state standards, and supportive of school improvement goals to further students' education (Hill, 2007). Teachers are allowed to choose the training opportunities in which they participate, and the professional learning opportunities are differentiated based on teachers' readiness, interests, and learning preferences (Tomlinson, 2005b; Tomlinson & Allan, 2000). Specific examples of differentiated lessons are provided (Carolan & Guinn, 2007) based on grade level, subject area, and individual needs (Halpin-Brunt, 2007) to guide teachers' creation of lessons and to encourage the use of DI (Tomlinson & Allan, 2000). After training, teachers return to the classroom with the ability to use the knowledge and skills they learned during the training sessions (Barnett, 2004; Tomlinson & Allan, 2000). Additionally, administrators and county personnel recognize and support teachers as they differentiate instruction and provide additional opportunities for training and feedback to occur (Drain, 2008; Engstrom & Danielson, 2006; Tomlinson & Allan, 2000).

<div align="center">Implications for Social Change</div>

Positive social change may occur as a result of this study. This information adds to the scholarly research and literature concerning professional learning and teachers'

knowledge and use of DI. As a result, future research may be conducted based on the recommendations made in this study. In addition, teachers that completed the survey are more aware of their own knowledge and use of differentiation. This awareness could lead to increased participation in DI training and increased usage of DI strategies, especially those techniques teachers seldom used. As teachers use DI in the classroom, students benefit by practicing skills including collaboration, decision making, problem solving, and critical thinking; formulating plans; and completion of tasks based on those plans. Application of these skills leads to more productive citizens that are capable of competing in the global society. Local school leaders and professional learning coordinators at the county office can benefit by using this information from teachers to improve existing staff development and to plan and implement future DI training opportunities based on teachers' readiness, interests, and learning preferences.

<div align="center">Recommendations for Action</div>

This study examined the relationship between professional learning and teachers' familiarity and use of DI. Recommendations for action are made based on these results. Teachers, college educators, local administrators, and county staff development personnel are the audiences who would be interested in these recommendations.

A majority of the teachers were familiar with many of the DI techniques included in the survey, and they used these teaching methods regularly; however, some of the instructional strategies were used infrequently. Because administrators and county staff development coordinators support educators currently using DI techniques, teachers are encouraged to increase the use of instructional strategies that were being used

infrequently. This might be also be accomplished by providing materials that are needed to differentiate effectively and placing these materials within easy access to all teachers. In addition, teachers benefit from observing colleagues, so peer observations will provide aid from teachers who are successful using the infrequently used strategies. Personal guidance from instructional coaches or mentors will encourage further implementation of certain techniques. Coaches or mentors are often used in schools to guide a teacher to mastery of a skill or strategy in order to improve teaching (Jackson, 2009; Kise, 2006).

Administrators are the instructional leaders in schools. As such, they are responsible for providing opportunities for members of the professional learning community to work together to improve learning in the school. Professional learning communities are designed "to continuously improve instruction and student performance . . ., [and oftentimes] they succeed where typical staff development and workshops fail" (Schmoker, 2006, p. 106). In professional learning communities, teachers "share more, they help one another more, and they are more supportive of one another. Likewise, when teachers trust administrators, they feel less threatened and [are] more likely to take risks in creating learning opportunities" (Mathews & Crow, as cited in Spanneut, 2010, p. 101). Common planning time can be used to create student learning opportunities as teachers design and share differentiated lessons. Teacher sharing multiplies the effort that educators put forth to generate differentiated activities (Tomlinson & Allan, 2000). Teacher collaboration to share ideas, experiences, and techniques will reduce teachers' workloads and help teachers understand and implement strategies that they struggle to use in their classrooms. DI websites and teacher created lesson plans could be added to

and stored on the local school share drive or in the county maintained lesson plan database so all teachers would have access to the plans.

Local school administrators and county staff development coordinators are obligated to modify teacher training to ensure that future professional learning opportunities meet high-quality staff development standards previously outlined. College educators may also be interested in providing additional DI learning opportunities for their students. In fact, the Blue Ribbon Panel on Clinical Preparation and Partnerships for Improved Student Learning has recommended changes to teacher education programs, "making clinical practice the centerpiece of the curriculum . . . [along with] opportunities for teaching experience with academic content and professional courses" (National Council for Accreditation of Teacher Education, 2010, ¶ 7). New training opportunities would ensure that more teachers received the training needed to fulfill the learning needs of all students. Finally, teachers should continue to provide opportunities for students to make choices concerning how they learn material and the products they produce to show the learning that has occurred. This requires more planning on the teacher's part, but it motivates students to learn and apply concepts that they have learned.

School system personnel will be contacted when the results are released. County officials and administrators will be informed via email that a website has been created to share results. The email will contain a link to a summary of the results of the study, and administrators will be asked to share the information with their faculty members. The study will also be published according to Walden University's requirements for the benefit of the learning community.

Recommendations for Further Study

This study answered several questions about professional learning and teachers'
knowledge and use of DI, but it also raised questions that may be answered by further
research. The following recommendations are suggestions for future research concerning
these topics.

- Teachers in this study used many of the DI techniques quite often; however,
  some of the strategies were used less frequently. A descriptive study could be
  conducted to determine why particular differentiated strategies are used more
  often than others. This information would be beneficial to training
  coordinators responsible for planning future professional learning
  opportunities.

- Many of the teachers in this study learned to differentiate instruction using
  methods other than staff development. A descriptive study could be conducted
  to determine the informal methods that teachers use to learn differentiated
  techniques. This information would be beneficial to other teachers, local
  school administrators, county personnel responsible for providing teachers
  with meaningful professional learning experiences, and others (authors,
  publishers, etc.) who create and provide materials teachers use to learn
  differentiation skills.

- Staff development is intended to improve teachers' knowledge and skills and,
  ultimately, students' academic performance. If the county modifies staff
  development opportunities offered to teachers, a pretest-posttest follow-up

experiment could be conducted to determine how high-quality professional

learning opportunities affect student achievement as well as teachers'

knowledge and use of differentiation.

Conclusion

This study examined the relationship between teachers' participation in DI in-

service opportunities and teachers' knowledge and use of differentiation. Results of the

study indicated that the majority of the teachers were familiar with DI and used many of

the differentiated techniques often. Professional teaching experience levels and grade

levels taught did not affect teachers' use of DI, but overall, teachers' education levels did

influence teachers' use of differentiation. Several teachers participated in DI staff

development prior to the beginning of the school year, but teachers' levels of DI training

did not positively relate to teachers' knowledge of differentiation. In fact, most of the

teachers reported that they learned how to differentiate using methods other than staff

development. Regardless of this, many teachers reported that they would be willing to

participate in future DI staff development opportunities if this training is provided by the

school system.

Differentiating instruction is an ideal method of teaching designed to help all

learners reach their potential as effectively and efficiently as possible. Even so, teachers'

use of differentiation varies. According to Tomlinson and Strickland (as cited in Huebner,

2010, p. 80), "There is no one-size-fits-all model for differentiated instruction; it looks

different depending on the prior knowledge, interests, and abilities students bring to a

learning situation." It is the teachers' responsibility to provide unique learning

experiences for all students. While no two days are alike in teaching, Tomlinson (1999)

asserted that

> If we are not careful, all the days can take on a deadening sameness. We must remember that we have every opportunity to transform ourselves and our practice, just as we have every opportunity to stagnate, remaining much the same teachers [as] we were when we began. (p. 119)

Fortunately, many teachers are willing to invest their time and energy in training

opportunities to improve their teaching skills and benefit their students. As a result,

changes are recommended for the professional learning opportunities available at the

local school and the county level. Feedback from teachers in this study should be used to

establish detailed plans for future DI training programs because one-size-fits-all learning

opportunities make as little sense for teachers as they do for students. "If we expect

teachers and school leaders to improve professional practices and decision making, then

we must first give them different knowledge and skills than they have received in the

past" (Reeves, 2010, p. 15). Reeves (2010) noted that effective professional development

"is intensive and sustained, it is directly relevant to the needs of teachers and students,

and it provides opportunities for application, practice, reflection, and reinforcement"

(p. 23). Professional learning coordinators need to keep these characteristics in mind as

they evaluate the staff development that they have in place now and as they plan new

professional learning opportunities in the future.

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APPENDIX A: CONTENT VALIDATION EVALUATION FORM

Thanks for agreeing to evaluate the content of the DI Teacher Survey. Please read the research questions below, and respond to each item on the following pages.

Research Questions

In this study, the researcher will investigate the following questions:

1. How do middle school teachers' levels of DI training relate to teachers' knowledge of DI?

2. How do middle school teachers' levels of familiarity in content DI relate to teachers' content usage of DI in the classroom?

3. How do middle school teachers' levels of familiarity in process DI relate to teachers' process usage of DI in the classroom?

4. How do middle school teachers' levels of familiarity in product DI relate to teachers' product usage of DI in the classroom?

5. How do middle school teachers' levels of familiarity in DI strategies relate to teachers' usage of DI strategies in the classroom?

6. How do middle school teachers' professional teaching experience levels relate to teachers' use of DI?

7. How do middle school teachers' education levels relate to teachers' use of DI?

8. How does middle school teachers' use of DI compare to grade levels taught?

9. To what extent have middle school teachers learned to differentiate instruction using methods other than in-service opportunities?

10. To what extent do middle school teachers want additional DI in-service opportunities?

Please rate the following questions based on their applicability to the research questions asked in the study.

1. Did you teach at XXX School from August 2008 to May 2009?

   a. _____ Yes   b. _____ No

Please rate this question on its applicability to the research questions being asked.

Not Applicable   Very Applicable

            1   2   3   4   5   6   7

2. Which grade level students did you teach last year?

   a. _____ 6th   b. _____ 7th   c. _____ 8th

Please rate this question on its applicability to the Research Questions being asked.

Not Applicable   Very Applicable

            1   2   3   4   5   6   7

3. How many years of teaching experience did you have at the end of the last school year?

   a. _____ 1-5 years   b. _____ 6-10 years   c. _____ 11-15 years
   d. _____ 16-20 years e. _____ 21-25 years   f. _____ 26+ years

Please rate this question on its applicability to the research questions being asked.

Not Applicable   Very Applicable

            1   2   3   4   5   6   7

4. What is the highest degree level you earned by May 2009?

   a. _____ Bachelors   b. _____ Masters   c. _____ Specialist
   d. _____ Doctorate

Please rate this question on its applicability to the research questions being asked.

Not Applicable   Very Applicable

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

5. How many hours of DI staff development provided by the county office did you attend during the summer of 2008? (Include hours that DI was discussed in any county level classes you took during this period.)

a. _____ 0 hours   b. _____ 1-3 hours   c. _____ 4-6 hours
d. _____ 7-10 hours   e. _____ 11 or more hours

Please rate this question on its applicability to the research questions being asked.

Not Applicable   Very Applicable

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

6. To what extent have you learned how to differentiate instruction using methods other than staff development opportunities offered by the school system?

Not at all   Very Much
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Please rate this question on its applicability to the research questions being asked.

Not Applicable   Very Applicable

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

7. Are you interested in participating in future DI staff development opportunities if these classes are offered by the school system?

Not Interested   Very Interested
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Please rate this question on its applicability to the research questions being asked.

Not Applicable   Very Applicable

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Please read each item used in the DI Teacher Survey to determine if the items adequately represent a sample of the knowledge and behaviors commonly associated with DI. Use the following four-point scale to indicate the appropriateness of each item. If you would like to make comments or suggest revisions regarding items, please use the space provided.

1 - Inappropriate
2 – Needs major revisions
3 – Needs minor revisions
4 – Appropriate

DI by Content	Scale				Comments
8. I provided all students with a variety of reading materials at different reading levels.	1	2	3	4	
9. I allowed students to use text audiotapes as needed.	1	2	3	4	
10. I used various support mechanisms (such as reading buddies, leveled graphic organizers, and highlighted information).	1	2	3	4	
11. I gave all students word lists and study guides.	1	2	3	4	
12. I related topics of study to different genders, cultures, and intelligences by varying illustrations and examples.	1	2	3	4	
13. I extended learning opportunities for all students who mastered the required AKS quickly.	1	2	3	4	

DI by Process	Scale	Comments
14. I used essential questions related to the AKS to guide instruction.	1 2 3 4	
15. I preassessed students to determine their level of understanding regarding topics.	1 2 3 4	
16. I linked prior knowledge to new information.	1 2 3 4	
17. I required students to do something with their knowledge (apply/extend concepts).	1 2 3 4	
18. I used Bloom's Taxonomy to provide higher-level tasks so all learners were appropriately challenged.	1 2 3 4	
19. I used Gardner's multiple intelligences to plan a variety of student activities.	1 2 3 4	
20. I presented information using kinesthetic, auditory, and visual modes.	1 2 3 4	
21. I varied instructional groups based on readiness, interests, or learning profiles.	1 2 3 4	
22. I encouraged all students to create or help create learning tasks.	1 2 3 4	

DI by Process (Continued)	Scale	Comment
23. I varied wait time for individuals.	1 2 3 4	
24. I adjusted the work pace for individuals.	1 2 3 4	
25. I helped all struggling students by reteaching information.	1 2 3 4	
26. I used the Jigsaw strategy to allow students to become experts in topics of interest.	1 2 3 4	
27. I allowed students to make choices regarding the way they learned information.	1 2 3 4	
28. I balanced independent, collegial, and competitive work.	1 2 3 4	
29. I used formative evaluation to assess student progress and modify instruction.	1 2 3 4	

DI by Product	Scale	Comments
30. I provided opportunities for all students' products to be based upon the solving of real and relevant problems.	1 2 3 4	
31. I allowed all students to choose from a wide list of product alternatives to show what they learned.	1 2 3 4	
32. I assigned different products based on individual or group readiness, interests, or learning needs.	1 2 3 4	
33. I supported all students as they used varied resources to complete tasks.	1 2 3 4	
34. I provided product assignments that balanced structure and choice.	1 2 3 4	
35. I used critique groups and teacher-led mini-workshops to guide students during product development.	1 2 3 4	
36. I allowed all students to choose formats or media to express their learning.	1 2 3 4	
37. I provided rubrics at various levels so all students knew the criteria for success.	1 2 3 4	

DI Strategies	Scale	Comments
38. I provided tiered activities.	1 2 3 4	
39. I compacted assignments.	1 2 3 4	
40. I used student learning contracts.	1 2 3 4	
41. I used learning stations.	1 2 3 4	
42. I used independent study.	1 2 3 4	
43. I used choice boards.	1 2 3 4	

Do these survey items adequately represent a sample of the knowledge and behaviors commonly associated with DI?

_____ Yes   _____ No

Should any additional items be added to or deleted from the survey? If so, please indicate this information below.

Thank you for your time.

Differentiated Instruction Teacher Survey

Please answer the following questions by marking the appropriate response.

1. Did you teach at Lanier Middle School from August 2008 to May 2009?

   a. _____ Yes   b. _____ No

2. Which grade level students did you teach last year?

   a. _____ 6th   b. _____ 7th   c. _____ 8th

3. How many years of teaching experience did you have at the end of the last school year?

   a. _____ 1-5 years   b. _____ 6-10 years   c. _____ 11-15 years   d. _____ 16-20 years   e. _____ 21-25 years   f. _____ 26+ years

4. What is the highest degree level you earned by May 2009?

   a. _____ Bachelors   b. _____ Masters   c. _____ Specialist   d. _____ Doctorate

5. How many hours of differentiated instruction staff development provided by the county office did you attend during the summer of 2008? (Include hours that differentiation was discussed in any county level classes you took during this period.)

   a. _____ 0 hours   b. _____ 1-3 hours   c. _____ 4-6 hours   d. _____ 7-10 hours   e. _____ 11 or more hours

6. To what extent have you learned how to differentiate instruction using methods other than staff development opportunities offered by the school system?

   Not at all   Very Much
       1   2   3   4   5   6   7

7. Are you interested in participating in future differentiated instruction staff development opportunities if these classes are offered by the school system?

   Not Interested   Very Interested
       1   2   3   4   5   6   7

Please use the scales below to respond to the following items. Please base your responses on your teaching experiences during the last school year from August 2008 to May 2009.

Familiarity Scale: (Left Side)
1 – I am not familiar with this strategy. I have never heard of this.
2 – I am somewhat familiar with this strategy. I have heard of this strategy, but I cannot explain it to another person.
3 – I am very familiar with this strategy. I can explain this strategy to another person.

Usage Scale: (Right Side)
1 – I rarely or never used this strategy.
2 – I used this strategy about once a month.
3 – I used this strategy about once a week.
4 – I used this strategy two or more times each week.

Familiarity Scale				Differentiation by Content	Usage Scale			
1	2	3	8.	I provided all students with a variety of reading materials at different reading levels.	1	2	3	4
1	2	3	9.	I allowed students to use text audiotapes as needed.	1	2	3	4
1	2	3	10.	I used various support mechanisms (such as reading buddies, leveled graphic organizers, and highlighted information.)	1	2	3	4
1	2	3	11.	I gave all students word lists and study guides.	1	2	3	4
1	2	3	12.	I related topics of study to different genders, cultures, and intelligences by varying illustrations and examples.	1	2	3	4
1	2	3	13.	I extended learning opportunities for all students who mastered the required AKS quickly.	1	2	3	4
Familiarity Scale				Differentiation by Process	Usage Scale			
1	2	3	14.	I used essential questions related to the AKS to guide instruction.	1	2	3	4
1	2	3	15.	I preassessed students to determine their level of understanding regarding topics.	1	2	3	4
1	2	3	16.	I linked prior knowledge to new information.	1	2	3	4
1	2	3	17.	I required students to do something with their knowledge (apply/extend concepts).	1	2	3	4
1	2	3	18.	I used Bloom's Taxonomy to provide higher-level tasks so all learners were appropriately challenged.	1	2	3	4

Familiarity Scale				Differentiation by Process (Continued)	Usage Scale			
1	2	3	19.	I used Gardner's multiple intelligences to plan a variety of student activities.	1	2	3	4
1	2	3	20.	I presented information using kinesthetic, auditory, and visual modes.	1	2	3	4
1	2	3	21.	I varied instructional groups based on readiness, interests, or learning profiles.	1	2	3	4
1	2	3	22.	I encouraged all students to create or help create learning tasks.	1	2	3	4
1	2	3	23.	I varied wait time for individuals.	1	2	3	4
1	2	3	24.	I adjusted the work pace for individuals.	1	2	3	4
1	2	3	25.	I helped all struggling students by reteaching information.	1	2	3	4
1	2	3	26.	I used the Jigsaw strategy to allow students to become experts in topics of interest.	1	2	3	4
1	2	3	27.	I allowed students to make choices regarding the way they learned information.	1	2	3	4
1	2	3	28.	I balanced independent, collegial, and competitive work.	1	2	3	4
1	2	3	29.	I used formative evaluation to assess student progress and modify instruction.	1	2	3	4

Familiarity Scale				Differentiation by Product	Usage Scale			
1.	2	3	30.	I provided opportunities for all students' products to be based upon the solving of real and relevant problems.	1	2	3	4
1	2	3	31.	I allowed all students to choose from a wide list of product alternatives to show what they learned.	1	2	3	4
1	2	3	32.	I assigned different products based on individual or group readiness, interests, or learning needs.	1	2	3	4
1	2	3	33.	I supported all students as they used varied resources to complete tasks.	1	2	3	4
1	2	3	34.	I provided product assignments that balanced structure and choice.	1	2	3	4
1	2	3	35.	I used critique groups and teacher-led mini-workshops to guide students during product development.	1	2	3	4
1	2	3	36.	I allowed all students to choose formats or media to express their learning.	1	2	3	4
1	2	3	37.	I provided rubrics at various levels so all students knew the criteria for success.	1	2	3	4

Familiarity Scale				Differentiated Instructional Strategies	Usage Scale			
1	2	3	38.	I provided tiered activities.	1	2	3	4
1	2	3	39.	I compacted assignments.	1	2	3	4
1	2	3	40.	I used student learning contracts.	1	2	3	4
1	2	3	41.	I used learning stations.	1	2	3	4
1	2	3	42.	I used independent study.	1	2	3	4
1	2	3	43.	I used choice boards.	1	2	3	4

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Thanks for completing this survey. I sincerely appreciate the time you took to answer these questions.

CURRICULUM VITAE

Andrea McMillan

Education

1979-1983   DeKalb Community College

1983-1991   Georgia State University, BA, Journalism; MEd, Middle Childhood

Education

2003-2004   Lincoln Memorial University, Specialist degree in Educational

Administration and Supervision

2005-2011   Walden University 2005-2011, Doctor of Education in Teacher

Leadership

Teaching Experience

1986-1987   Grade 7 Teacher.

1987-2011   Grade 6 Teacher.