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AN ANALYSIS OF ELEMENTARY SCHOOL TEACHERS' KNOWLEDGE AND
USE OF DIFFERENTIATED INSTRUCTION

By

Alix Rodriguez

Dissertation Submitted to the Faculty of

Olivet Nazarene University

School of Graduate and Continuing Studies

in Partial Fulfillment of the Requirements for

the Degree of Doctor of Education

in

Ethical Leadership


May 2012

AN ANALYSIS OF ELEMENTARY SCHOOL TEACHERS' KNOWLEDGE AND
USE OF DIFFERENTIATED INSTRUCTION

by

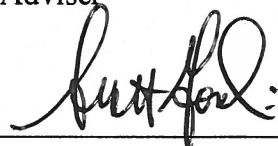
Alix Rodriguez

Dissertation



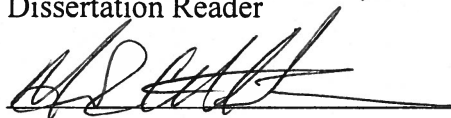
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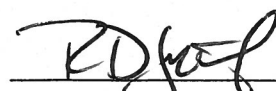
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DEDICATION

I dedicate this dissertation to my son and daughter, Anthony Rafael and Cristina Alejandra. This project is evidence that through hard work, commitment, and determination, you can aspire to accomplish all your dreams. All is possible when you dream, believe, and have faith in all you do.

ABSTRACT

by
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School districts today are being held accountable for providing all students with a quality education in order for students to meet mandated learning standards as well as become productive citizens; thus teachers need to be more responsive to their students' needs. This study investigated teachers' knowledge about differentiated instruction; how often teacher differentiate instruction in specific subject areas; and factors that help or hinder the implementation of differentiated instruction. Study results demonstrated that the majority of the teachers surveyed are familiar with differentiated instruction; however, because of their unfamiliarity of available tools, the immense amount of preparation time involved coupled with lack of resources, many teachers do not differentiate instruction in their classrooms.

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CHAPTER I

INTRODUCTION

Today's educational systems are experiencing greater diversity in the classrooms because "they are comprised of students with many different needs" (Tomlinson, 2005, p. 77). Whatever these different needs might be, the goal for all students is that they achieve high standards. For this reason, according to Lawrence-Brown, "providing them with equal and varied opportunities to reach their potential" is necessary (as cited in Demos & Foshay, 2009, p. 26). There is ample evidence that students in the elementary grades are more successful in school when they are challenged at their readiness level, encouraged to develop their interests, and taught according to their learning profile (Tomlinson, 2000). Differentiated instruction should be adopted in every classroom in order to accomplish these goals. According to Benjamin (2006) differentiating instruction grows out of certain values that are important in the way teachers treat our students, design our curricula, establish rules, and talk about learning. Demos and Forshay found that differentiated instruction that is grounded in cognitive psychology and supported by research on student achievement is an approach that can benefit all students regardless of their ability levels, learning styles, interests, and cultural and linguistic backgrounds. Teachers who differentiate instruction understand that, "all students are unique and have different learning styles and preferences" (Demos & Forshay, p. 26).

Teachers plan instruction by considering lesson delivery, assignments, assessments, and by adjusting the content to meet their students' needs. The literature about differentiating instruction includes, "overall concepts to differentiate instruction, planning, general leadership practices, and good staff development practices" (Richardson, 2007, p. 1). However, there is limited literature identifying teachers' knowledge about differentiation, how often they differentiate in specific subject areas, and factors that help or hinder the implementation of differentiated instruction. Knowing teachers' knowledge of differentiated instruction, how often they practice differentiated instruction, and identifying the factors that help or hinder the process of differentiating instruction are important indices for educational leaders to know and respond to if they expect their teachers to be successful in differentiating instruction. Just as differentiated instruction needs to be considered to support students, differentiated professional development needs to be considered to support teachers.

This study was conducted with 103 participants, who were elementary and middle school teachers employed in charter schools of a not-for-profit organization in the Midwest. The objectives of this research were to identify teachers' knowledge of differentiation, how often teachers differentiate in specific subject areas, and factors that help or hinder the implementation of differentiated instruction. This information was gathered in order to establish a basis for professional development that could help teachers increase their knowledge of differentiated instruction, provide professional development to increase the use of differentiation in all subject areas, and to provide support in what teachers identify as factors that help or barriers that hinder the implementation of differentiated instruction.

Some teachers may have some knowledge of what differentiated instruction is and how to plan it, but some may not. The professional development provided as a result of this research should be tailored to meet teachers' needs in each of the aforementioned areas. The study was completed through a quantitative research study using a one-time survey completed by the teachers.

The results of this study should be of interest to school principals and school superintendents. School principals could use the results to provide professional development opportunities that are tailored to address the needs identified by this research and school superintendents could consider the results in thinking about systemic planning and practice for their districts.

A quantitative study was designed to find out teachers' knowledge of differentiated instruction. A cross-sectional survey design was used to collect the data at one point in time.

Statement of the Problem

Some schools are implementing differentiated instruction as one of their initiatives in response to changing student demographics and the increased demands for accountability. Planning to differentiate instruction requires that teachers think about and plan instruction for the varied needs of different students in the same classroom setting. For many teachers, differentiating instruction is a new approach of providing instruction. Therefore, it is important that teachers receive the support and guidance they need in order to be successful. There is an abundant amount of available literature regarding the rationale and planning process for differentiated instruction. However, little is known about teachers' knowledge of differentiated instruction, the strategies they utilize most in

the different content areas, and the factors that help or hinder the implementation of differentiated instruction. This study aimed to identify the supports teachers need to be successful in differentiating instruction in order for school principals and superintendents to plan professional development sessions that address the identified needs.

Background

In the past, educational systems provided students with a general education that was based on established strategies and practices, including presenting information, recall and recite, drill and practice, and reward and punish. Instruction was teacher-centered. Regardless of the diverse students in the classrooms, “curriculum and instruction could be described as a one-size-fits-all treatment. Some students got it; some did not” (Hilyard, 2004, p. 1).

According to Jehlen (2006), educational systems today confront challenges that include raising the standards, strengthening teacher professional development, refocusing schools around the primary goal of student achievement and holding schools accountable for results. In addition, schools continue to experience increased diversity in the classroom than ever before, including students challenged with many different needs. These students consist of English language learners, “students who are in the process of learning to read and write the English language” (Bantis, 2008, p. 8), gifted students who exhibit intellectual superiority, creativity, and motivation of sufficient magnitude that sets them apart from the vast majority of age-mates, and students who have a learning disability which consist of significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities (Hallahan & Kauffman, 2000).

Schools have always been challenged with diverse student populations and their varying needs, but the difference between then and now is that “only in the past fifty years have there been any concerted efforts to provide teaching that is tailored to the learning needs of each student in a classroom” (Yatvin, 2004, p. 5). In addition, one of the objectives of *No Child Left Behind*, signed in January 2001, is to, “close the achievement gap with accountability, flexibility, and choice, so that no child is left behind” (United States Department of Education, 2001, ¶ 1). Consequently, schools are held accountable for meeting the needs of all their students.

If schools are to be successful in providing all their students a fair, equal, and significant opportunity to obtain a high-quality education, teachers should consider differentiating instruction. Teachers who differentiate instruction plan to meet the needs of all their academically diverse students.

Tomlinson (2003) stated that differentiated instruction is an instructional method that allows teachers to develop a detailed understanding of each student’s readiness, interests, and modes of learning through a range of instructional and management strategies. Teaching with student variance in mind allows teachers to plan varied approaches to what students need to learn, how they will learn it, and how the students can express what they have learned in order to increase the likelihood that each student will learn as much as he or she can as efficiently as possible.

Teachers must be willing to change their belief systems and practices in order to differentiate instruction. In order to facilitate this new growth, staff development must be provided. Staff development can be defined as a deliberate effort to alter professional beliefs and understanding of school personnel toward an articulated goal using an

intentional, purposeful program. In addition, professional development will make available the knowledge and skill-building activities that raise the capacity of teachers and administrators to respond to external demands. Professional development engages teachers to improve their practices and performance (National Staff Development Council, 2000).

Differentiated instruction is based on a combination of educational theories and best practices. Piaget's constructivist theory, Vygotsky's zone of proximal development, and Gardner's theory of multiple intelligences are a few of the theories that support differentiated instruction (Adlam, 2007).

Differentiated instruction is based on the constructivist learning theory. It offers an explanation of the adaptive nature of knowledge and how humans learn. Piaget's (1929/2007) theory emphasized the importance of the learner, rather than the teacher, in the learning primary role. According to this theory, it is the learner who interacts with objects and events and thereby gains an understanding of the features held by such objects or events. The learners, therefore, construct their own conceptualizations and solutions to problems. Learner autonomy and initiative are accepted and encouraged. This theory suggests that humans create and construct knowledge as they try to bring meaning to their experiences. In the differentiated classroom, teachers should be facilitators available to assist students construct their own knowledge through their experiences.

Differentiated instruction also includes the zone of proximal development, which explains IQ and test scores (Vygotsky, 1986). Vygotsky concentrated on the relationship between learning and development and determined that learning must be related to a

student's developmental level. Students in their zone of proximal development can, with another's assistance, resolve a problem that they could not have resolved alone. "The zone of proximal development is the difference between what children can do independently and what they can do with help" (Eady, 2008, p. 17). In the differentiated classroom, teachers need to know what their students can do by themselves in order to support them in their zones of proximal development.

Gardner (1999) stated that human beings possess a basic set of intelligences at varying levels, and that no intelligences should be viewed as bad or good. Gardner's eight multiple intelligences are also included in differentiated instruction. The eight autonomous intelligences consist of: visual/spatial, verbal/linguistic, musical/rhythmic, logical/mathematical, bodily kinesthetic, interpersonal/social, intrapersonal/introspective, and naturalist. Gardner also indicated that having more of certain intelligences is better for school success than to be lacking in those areas. Students who demonstrate linguistic and logical/mathematical intelligences have an advantage in school as students are constantly being assessed in reading, writing, and math. Naturally, then, these intelligences can help students attain higher test scores. In the differentiated classroom, teachers should support and nurture all intelligences by providing educational opportunities that allow students to use all their intelligences.

Teachers who differentiate instruction must consider their students' interests, learning styles, and readiness levels in planning instruction. When teachers consider students' interest, they give students the opportunity to learn skills and concepts through the topics students enjoy studying. Teachers who accommodate various learning styles take into account visual, auditory, and kinesthetic preferences to plan instruction.

Teachers who plan differentiated instruction also consider their students' level of readiness as they provide instruction that is tailored to meet the academic needs of their students (Robison, 2004).

Robison (2004) also stated that teachers must consider four key elements that can make a difference in student learning: content, process, product, and learning environment. Content is described as what the students need to learn and the materials and strategies through which that learning is accomplished. Process includes the activities teachers design to ensure that students use key skills to make sense of essential ideas and information. The product consists of the alternative ways that students can demonstrate mastery of the concepts. The learning environment refers to the classroom and how it is designed to meet the needs of the students.

Research Questions

This study answered the following questions (Adlam, 2007, p. 71-75):

1. How knowledgeable are teachers in strategies they can use to implement differentiated instruction?
2. How often are teachers using differentiated instruction in specific subject areas?
3. What factors help teachers trying to implement differentiated instruction in the classroom?
4. What factors hinder teachers trying to implement differentiated instruction in the classroom?

Description of Terms

The following terms were used in this study:

Academic diversity. The spectrum of learners typically present in the general education classroom, including students with a range of learning problems and learners who are advanced (Tomlinson, 1999).

Constructivist theory. The theory that offers an explanation of the adaptive nature of knowledge and how humans learn. Emphasis is placed on the learner and not on the teacher (Piaget, 1929/2007).

Differentiated instruction. Instructional method that consists of teachers considering the students' interests, learning styles, and readiness levels in planning instruction. Teachers must also consider the content, process, products, and learning environment to differentiate instruction (Richardson, 2007).

English language learners. Students who are in the process of learning to read and write the English language (Bantis, 2008).

Gifted students. Students who exhibit cognitive superiority, creativity, and motivation of sufficient magnitude that sets them apart from the vast majority of age-mates (Hallahan & Kauffman, 2000).

Learning disability. A significant difficulty or difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities in a student of average or above average intelligence. Behavior problems and difficulties with social interaction may co-exist with learning disabilities, but do not by themselves constitute a learning disability (Hallahan & Kauffman, 2000).

Multiple intelligences. Demonstrating one's intellectual abilities in a variety of ways. Gardner (1999) posited that human beings possess a basic set of intelligences. He suggested that teachers be trained to present their lessons in a wide variety of ways incorporating music, cooperative learning, visual arts, role playing, multimedia, field trips, inner reflection, and much more.

No Child Left Behind (NCLB). This law ensures that all children have a fair, equal, and significant opportunity to obtain a high-quality education (United States Department of Education, 2001).

Professional development. A set of knowledge and skill-building activities that raises the capacity of teachers and administrators to respond to external demands and to engage in the improvement of practices and performance (National Staff Development Council, 2000).

Staff development. The deliberate effort to alter professional beliefs and understanding of school personnel toward an articulated goal using an intentional, purposeful program (National Staff Development Council, 2000).

Zone of proximal development. The zone just beyond the student's independent level of achievement, where learning occurs without the support of a knowledgeable individual. Based on this theory, teachers need to determine what the student already knows when planning instruction, and from that knowledge determine what the student needs to learn next (Vygotsky, 1986).

Significance of the Study

The results of this study may help school districts make decisions that will tailor professional development opportunities to address the needs that teachers experience in

differentiating instruction. Because some teachers have knowledge of what differentiated instruction is and how to plan and implement it, and some may not, professional development should be designed to meet the teachers' needs in acquiring the knowledge necessary for differentiated instruction by using a variety of instructional strategies in all subject areas.

Limitations

There are several limitations to this study. First, because all the participants were from the same organization, generalization of the findings cannot be made. Second, the study was completed with teachers at the elementary level, which may not necessarily yield the same findings as research completed with high school teachers. Third, changes in student achievement as the result of differentiated instruction were not measured, thus, no one can definitely say that differentiated instruction is the best strategy for increased student achievement. Last, there was no formal attempt to determine how effective classroom teachers are at differentiating instruction because teacher observations were not included in this study.

Assumptions

It is assumed that the researcher and teachers define differentiated instruction in the same manner. It is also assumed that differentiated instruction has a positive effect on student achievement.

Process to Accomplish

Methodology

This quantitative research study was designed to investigate elementary school teachers' knowledge of differentiated instruction, teachers' use of differentiated

instruction in their classrooms, and to identify the factors that help or hinder the implementation of differentiated instruction. Gay, Mills and Airasian (2009) indicated that quantitative research is the process by which a researcher decides what to study, answers specific questions, collects data from participants, analyzes the data using statistics, and conducts inquiry in an unbiased and objective manner.

Survey research, “involves collecting numerical data to test hypotheses or answer questions about the current status of the subject of study” (Gay et al., 2009). Survey research data are mainly collected through questionnaires, interviews, and observations. Survey research collects data about the characteristics, experiences, knowledge, or opinions of a sample of a population.

There are several advantages in implementing survey research. It is a convenient method of gathering a large amount of data from a targeted population. Survey research is an inexpensive way to gather information. A third advantage is that respondents are given the opportunity to fill out the survey at their own leisure (Gay et al., 2009). There are also disadvantages in implementing a survey research. One disadvantage of survey research is that usually researchers have to develop their own measuring instrument for each survey study because researchers often ask questions that have not been asked before Gay, et al. A second disadvantage of survey research is that participants may fail to return the questionnaire. If the response is low, trustworthy conclusions cannot be drawn.

A cross-sectional design was used to collect information about teachers’ attitudes concerning differentiating instruction. This type of design was used because it was the researcher’s intent to collect data only at one point in time. Gay et al. (2009) indicated

that a cross-sectional survey provides a snapshot of the current behaviors, attitudes, and beliefs in a population, and also that the collection of data can be relatively rapid. In a cross-sectional survey, “the researcher attempts to infer information about a population based on a representative sample drawn from that population” (p. 176).

Procedures

Once permission was obtained from sponsoring university and from principals at individual charter schools, teachers from these schools were invited to participate in the study via the United States Postal Service. The research survey was attached to the invitation for teachers interested in participating in the research. Surveys collected via the United States Postal Service were analyzed and then stored in a locked file cabinet. Gay et al. (2009) stated that collecting data in this way is inexpensive and usually permits data collection from a much larger sample than an interview or personally-administered questionnaire.

Data Collection

After obtaining permission to use an existing questionnaire, which was developed by Adlam (2007), the survey was distributed to elementary and middle school teachers employed in charter schools of a not-for-profit organization in the Midwest area. The original researcher test-piloted the survey with 13 elementary school teachers from her previous place of employment to test its validity and reliability. The data she collected confirmed that the survey was a valid and reliable tool to use, because the results generated identified teachers’ knowledge about differentiation, how often teachers differentiated in specific subject areas; and factors that helped or hindered the

implementation of differentiated instruction (E. Adlam, personal communication, May 12, 2010).

Data collected included demographic information about the teacher, including gender, years of teaching experience, teaching qualifications, current assignment, and subject areas currently taught. In addition, one question was asked about whether or not teachers used differentiated instruction, two questions were asked about differentiated instructional strategies and frequency of use, two questions were asked about the subjects in which teachers differentiated their instruction in and how often, and two questions were asked about factors that helped or hindered the implementation of differentiated instruction. The survey also elicited a response about resources that teachers would be willing to use in order to enhance their own knowledge and understanding about differentiating instruction. Finally, there was an open-ended question included in the survey that allowed the teachers to add additional comments they thought could be beneficial to this study.

Data Analysis

After collecting the surveys, the researcher entered the data into the statistical software SPSS. The next step involved the researcher coding and comparing the data. Descriptive statistics describe data collected from a sample of a population (Gay et al., 2009), and were used to find the frequencies, percentages, and proportions of the results from the survey. According to Gay et al., inferential statistics involves analysis techniques that determine how likely the results obtained from a sample population would be consistent with results gained from surveying the entire population. “Chi-square, in a contingency table, is a measure of the degree of association or linkage between two variables” (Robson, 2002, p. 418). The chi-square test was applied to

determine if there were any relationships present among the data collected. The chi-square test was also applied because it was the most appropriate for comparing frequency counts or percentages. The chi-square test is used to compare frequencies among different categories or groups with nominal data.

Summary

School districts today are being held accountable for providing all students with a quality education in order to prepare students to meet mandated learning standards. Therefore, if school districts are to accomplish these tasks, differentiating instruction should be implemented. It is through this strategy that all students may have the opportunity to be more successful. When teachers differentiate instruction, they consider their students' interests, readiness levels, and learning profiles in the delivery of instruction. By discovering teachers' knowledge of differentiated instruction, use of differentiation strategies in the different subject areas, and factors that help and/or hinder this process, school districts can address the needs that teachers have by planning professional development that can be tailored to overcome those needs.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Diverse student populations and their varying needs have historically challenged school systems, but “only in the past fifty years have there been any concerted efforts to provide teaching that is tailored to the learning needs of each student in a classroom” (Yatvin, 2004, p. 5). If schools are to be successful in providing all of their students a fair, equal, and significant opportunity to obtain a high-quality education, teachers should consider differentiating instruction in order to meet the learning needs of each individual student. Teachers who differentiate instruction consider their students’ academic needs and plan instruction accordingly to meet those needs.

According to Yatvin (2004), differentiated instruction has become a model that educational systems are recommending for implementation to provide teaching that is tailored to the learning needs of each student in the classroom. Differentiated instruction is respectful of students’ needs, interests, readiness, and abilities to meet individual learning differences and is rooted in educational literature tracing back to the work of some of the most respected voices in education. Differentiating instruction requires teachers to take a more active and meaningful approach to planning and teaching lessons for students. Teachers who plan for deep understanding must focus on the objectives to be taught and provide best teaching practices (Hilyard, 2004).

Essentially, this review examines the historical background of differentiated instruction, drawing on various theoretical contributions that influenced the current operational definition and purposes of differentiated instruction in the contemporary classroom. The present review also discusses factors that impact the implementation of differentiated instruction, such as the impact of learning styles and brain functioning. Finally, this chapter concludes with a discussion of factors to consider when assessing and implementing differentiated instructional strategies.

Historical Background

During the 1930s, Dewey and Piaget concluded that students' growth of knowledge is centered on the constructions made by the individual learner (Yatvin, 2004). Bruner (1961) supported Piaget's theory by advocating that student engagement be part of the process of inquiry. According to Yatvin (2004), students learn best when they are actively engaged in their learning and when they perceive their learning as authentic, important, and interesting.

Bloom (1984) defined the differing levels of thinking by describing the graduated levels of complexity of thought needed to problem solve and construct meaning in order to learn. Bloom's taxonomy, which includes higher-level thinking skills of application, analysis, synthesis, and evaluation, "helps guide teacher questioning in classrooms and serves as an important criteria for appropriate selection of educational objectives, strategies, and materials to fit the needs of the learner" (Hilyard, 2004, p. 22). A constructivist classroom allows students to search for meaning in lessons through inquiry and appreciated ambiguity. Brooks and Brooks (1993) stated that a constructivist classroom requires more student-to-student interaction, for lessons using cooperative

learning, for more interdisciplinary curriculum, and for students taking responsibility for their own learning within this classroom environment.

Similar to the model of the constructivist classroom, McCombs and Miller (2009) described the learner-centered model as one that focuses on individual learners and their learning desires. Teachers who implement this model think about what students need to learn, identify the learners' needs and experiences, and use the best available evidence and knowledge about learning and teaching practices to support learning for everyone. In conclusion, the abovementioned researchers asserted that advocating for more student-centered learning opportunities ensured that students would attain an in-depth understanding of the materials they should learn. Teachers who differentiate instruction are responsive to the differing needs of each of their students, giving them an opportunity to learn to their full potential.

Differentiated Instruction: An Operational Definition

Differentiated instruction is a model that enables educators to meet the unique needs of every learner. Teachers who differentiate instruction strategically plan instruction that is tailored to reach the needs of the diverse students in their classrooms in order to achieve targeted standards (Gregory & Chapman, 2007). Teachers who use differentiated strategies and activities implement this model in their classrooms, as well as across grade levels and content areas. Furthermore, teachers who differentiate instruction also consider their students' needs, readiness, preferences, and interests when planning curricula and instructional methodologies. Finally, differentiated instruction requires teachers to consider differentiating the content as well as their assessment tools, performance tasks, and instructional strategies.

Gregory and Chapman (2007) highlighted several important beliefs that underlie the model of differentiated instruction. Some of these beliefs draw on students' individuality in learning, such as (a) all students have areas of strength, and areas that need to be strengthened; (b) each student's brain is unique; (c) it is never too late to learn; and (d) all students can learn, but that they may learn in different ways at different times. Gregory and Chapman also recognized that the students' personal history or experience is utilized in differentiated instruction. That is, when students begin a new topic, they bring their prior knowledge and experience to the learning. Moreover, students' emotions, feelings, and attitudes affect their learning. Differentiated instruction requires teachers to analyze data and make decisions about what is working and what needs to be adjusted (Gregory & Chapman).

Purposes for Differentiated Instruction

According to Tomlinson and Eidson (2003), teachers who understand who they teach and what they teach will be flexible in how they teach. Today's educational systems are encountering diversity in the classroom because "they are comprised of students with many different needs" (Tomlinson, 2005, p. 77), such as language barriers, differences in learning abilities, and the impact of achievement gaps. Thus, it is important to teach each student in a way that ensures individual learning is taking place. Consequently, educators need to think about and respond to the needs of the students who are now being served (Tomlinson, 2003).

An increasingly larger number of English language learners is one of the reasons that teachers need to consider how to respond to the needs of their students. English language learners need to learn a new language (Bantis, 2008); nevertheless, teachers

must ensure that all students in the classroom are learning the same content. Teachers who differentiate instruction for English language learners must practice intentional differentiation of both instruction and assessment. Teachers of English language learners who are differentiating instruction tailor the curriculum to provide their English language learners opportunities to learn content and at the same time develop their listening, speaking, reading and writing proficiency in the second language (Fairbairn & Jones-Vo, 2010).

Addressing the needs of students who have a learning disability in an inclusion, or self-contained classroom, is another reason to differentiate instruction. These students may have difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities (Hallahan & Kaufman, 2000). In addition, it is important to keep in mind that students with learning difficulties may not be able to learn through traditional teaching methods and that many students who have difficulty in learning actually have average to above-average intelligence levels (Winebrenner, 1996). Often, teachers who differentiate instruction identify the best ways for special education students to learn and to present what they have learned by using Gardner's multiple intelligences (Heacox, 2002).

Differentiating instruction is also needed to meet the needs of students who are gifted (Hallahan & Kaufman 2000). Gifted students who are not challenged to learn may be considered lazy, unproductive, or not working up to their potential. However, it is important to recognize that students who are gifted do not want to complete work they are already able to do. Many people believe that gifted students will do fine without any additional support. In addition, people view accommodations for the gifted students as

“exclusive” (Winebrenner, 2001). However, providing differentiated instruction allows gifted students to continue to learn at an expected rate (Tomlinson, 2003). Teachers who differentiate instruction consider curriculum compacting, which may be essential for meeting the needs of gifted students. Curriculum compacting eliminates repetition of mastered content and/or skills, increases the challenge level of the regular curriculum, and provides time for the investigation of a curricular topic that is beyond the scope of the regular curriculum (Heacox, 2002).

A final reason that is causing schools to rethink how they are teaching their students is the achievement gap that exists between minority and Caucasian students. Based on the National Assessments of Educational Progress Report (2010), which annually measures reading and math in the 4th and 8th grade, Caucasian students continue to score higher than students who are African American, Native American, and Hispanic. Furthermore, schools need to meet the objectives of the No Child Left Behind Act (NCLB), signed in January 2001, which include to “close the achievement gap with accountability, flexibility, and choice, so that no child is left behind” (No Child Left Behind, 2001, ¶ 1).

The first objective of NCLB is greater accountability for schools to improve the achievement of all students. Each state must administer an annual test based on the state’s learning standards to measure students’ progress in both reading and math skills. The test data are disaggregated by the categories of poverty level, race, ethnicity, and limited English proficiency to demonstrate how each of these groups make academic gains, known as Annual Yearly Progress (AYP). A district or school not meeting AYP may be subject to state-imposed, mandated efforts to improve or restructure the school. The

second objective of NCLB is to enable more choice for parents and students. When a school has been identified as being on probation or restructuring, the district must provide the parents the opportunity to send their children to another school within the district that is not on probation. The third objective of NCLB is that districts may be given more flexibility in how they choose to use some of the federal funds that are received. The Federal Title programs may be reallocated among all of the funds to better meet the challenges that districts must address. Finally, the fourth objective of NCLB is the requirement for teachers to use proven educational methods that consist of educational programs and practices that are effective as demonstrated by rigorous scientific research (Richardson, 2007).

The Roles of Teaching and Learning in Differentiated Instruction

In addition to diversity in the classroom and NCLB law, understanding the facets of intelligence, the identification of learning styles, and the knowledge of how the brain works are influencing how schools are approaching instruction (Richardson, 2007).

Tomlinson (1999) indicated that intelligence has been thought of as only being demonstrated in one singular way and never changing. However, Sternberg (1985) and Gardner (1993) described similar but unique theories of multiple intelligences asserting that intelligence is fluid, not fixed, advancing the necessity of knowing an individual student's strengths and building upon them in learning situations. Gardner (1999) stated that human beings possess a basic set of intelligences at varying levels, and that no intelligences should be viewed as bad or good. Gardner's eight autonomous intelligences consist of: visual/spatial, verbal/linguistic, musical/rhythmic, logical/mathematical, bodily kinesthetic, interpersonal/social, intrapersonal/introspective, and naturalistic.

Humans gradually develop the skills of the particular intelligences throughout their lives. An injury to the brain can alter the ability to develop a particular intelligence. Each type of “intelligence” has a specific set of skills associated with it, and is able to be encoded into its own system of symbols.

Gardner (1999) also indicated that having more of certain intelligences is better for school success than to be lacking in those areas. Students who demonstrate linguistic and logical/mathematical intelligences have an advantage in school as students are constantly being assessed in reading, writing, and math. Naturally, then, these intelligences can help students attain higher test scores. Heacox (2002) suggested that teachers use the framework for multiple intelligences to increase the variety of teaching and project assignments. In the differentiated classroom, teachers should support and nurture all intelligences by providing educational opportunities that allow students to use all their intelligences. Differentiated teaching practices must take into account students’ individual differences in intelligence (Gardner, 1983, 1989, 1993; Sternberg, 1985).

Sternberg (1985) contributed another new way that teachers can examine how students’ differences in intelligence impacts their teaching practices. Sternberg (1997) stated that, “Even by partially matching instruction, we could improve student achievement” (p. 14). According to Heacox (2002), “Students’ strengths and preferences affect not only the ease of with which they learn but also how they can best represent what they know and understand” (p. 22).

Sternberg and Grigorenko (2004) proposed the theory of successful intelligence, and defined it as “an integrated set of abilities needed to attain success in life; however an individual defines it, within his or her sociocultural context” (p. 274). This statement

suggests that as individuals become aware of their strengths, they also learn ways to compensate for their weaknesses.

Learning Styles

The concept of learning styles preferences proposed by Dunn and Griggs (1995) defined a learning style as “the way in which individuals begin to concentrate on, process, internalize, and retain new and difficult information” (p. 1). This concept is built on several important ideas. A student’s learning style is formed based on a set of personal characteristics that are both biological and developmental. For these reasons, some instructional methods may prove to be effective for some and ineffective for others. The stronger a person’s learning style preference, the more important it is to provide compatible instructional strategies. It is important that students be given the opportunity to use their areas of strength when they are learning a new or difficult material. It is imperative that students’ learning styles are accommodated when students are not being successful academically. Students’ academic achievement increases when instruction is based on their learning styles. Gregory and Chapman (2007) described the learning styles as auditory, visual, tactile, kinesthetic, and tactile/kinesthetic. Teachers who accommodate these different learning styles provide adequate activities that tap into each style throughout the school day. Furthermore, teachers increase the chances of engaging learners in maximizing their brain’s capability.

The Role of Human Brain Functioning in Learning

The growing body of literature on brain functioning influenced many authors to conclude generally that all students have the ability to learn, but that learning is impacted by how information is presented and whether it has meaning to the learner (Jensen, 1998;

Sousa, 1995; Sprenger, 1999). This section highlights research that emphasizes how teachers can plan differentiated instruction to ensure maximum student learning. This section will also include recommended best practices and strategies based on empirical studies.

Sousa (1995) proposed that research on human brain functioning improves educators' understanding of how students learn best and is useful to classroom teachers. Sousa presented a research-based rationale for why and when certain instructional strategies should be used. Findings from his study suggested the use of differentiated instructional strategies to address individual differences to help students succeed academically.

Jensen (1998) referred to the brain as a “meaning-maker” (p. 90), in that the brain first assimilates information and then ascribes meaning to it as it is being processed. He asked the question, “With so many different personalities, cultures, and types of students, how can schools be meaningful to everyone?” (p. 90). For example, when students are able to apply mathematical strategies to their daily life, such as budgeting, the math lesson then becomes internalized because it is personally relevant and has meaning to the student. He stated that the experience of meaning has a biological correlate for each individual. He recommended that teachers generate differentiated instructional strategies to create meaning for each individual student. According to Jensen, students must be academically challenged for learning to take place. However, students must receive challenges that are appropriate for them. Challenges that are difficult or not challenging enough will cause students to give up on the task because they become bored or frustrated with the task provided.

Tomlinson (1997) stated, “Effective learning must begin where the learner is, and promote growth at a level of moderate challenge” (p. 97). Tomlinson (1999) added that curricula must be developed in a way that will enable students to make sense of it. Using overarching categories, concepts, and governing principles may assist in students’ understanding of the curriculum. The curriculum must also be of high interest as well as relevant to students. Teachers need to create multiple opportunities for students to connect new ideas to old ideas. In order to facilitate the linkage of new and old information, teachers are required to identify essential concepts, principles, and skills of the subject(s) they are teaching. Teachers are also expected to develop a clear understanding of each of their individual student’s learning needs. Evidence suggests that interests, emotions, context, and pattern making are important factors to consider when differentiating instruction (Jensen, 1998).

Another body of research on brain functioning has focused on memory and learning, with particular emphasis on the importance of creating brain-compatible classrooms for students (Hilyard, 2004; Sprenger, 1999). Hilyard defined the process of brain-compatible as “building upon what is known about the processes of memory and learning in designing lessons and assessments for students” (p. 28). In summary, student learning is promoted when instructors understand how the brain functions, and consequently develop and implement classrooms that capitalize on the brain’s natural abilities (Parry & Gregory, 1998).

Theoretical Underpinnings of Differentiated Instruction

Piaget and Constructivism

The theory of constructivism is a foundational building block for understanding differentiated instruction. It offers an explanation of the adaptive nature of knowledge and how individuals learn. Elliott, Kratochwill, Cook, and Travers (2000) suggested that there are six tenets of constructivism. The first three tenets describe the cognitive process of what knowledge is and the remaining three describe how learning occurs or how knowledge is constructed.

1. Objective reality implies that subjective understanding of experiences correlate with pre-existing experiences.
2. Knowledge is subjective. Knowledge will not be constructed in the same manner by individuals.
3. Shared knowledge indicates that constructivism appears to function similarly in any given situation.
4. Knowledge is constructed through the process of adaptation of ideas and experience.
5. Knowledge construction is simply influenced by environment and by symbols and materials one uses or has used previously. These symbols and materials become the “essentials” that will affect perception, interpretation, and functionality within the environment.
6. Cognitive constructivism and readiness to learn are precepts of Vygotsky’s Zone of Proximal Development. Vygotsky’s ideas encapsulated the premise

that different students may both be ready to learn about any given concept and may acquire information from the same experience.

Piaget's (1929/2007) theory of Constructivism emphasized the importance of the learner, rather than the teacher, in the primary learning role. According to Piaget's theory, it is the learner who interacts with objects and events, thereby gaining an understanding of the features held by such objects or events. The learner, therefore, constructs his or her own conceptualization and solutions to problems.

Fully in support of Piaget's ideas about constructivism, Dewey stressed that students would put more effort into material they were studying if an interest exists (Ormrod, 2004). In the differentiated classroom, learners' autonomy and initiative are accepted and encouraged. Teachers who implement the differentiated instruction approach in their classrooms understand that they must vary their instructional approaches to modify curriculum and instruction and to design engaging learning activities and assessments in response to their students' range of learning needs (Hilyard, 2004).

Vygotsky and the Zone of Proximal Development (ZPD)

Differentiated instruction also includes application of the theories of Vygotsky, including the zone of proximal development (ZPD), which is used to assist in the explanation of IQ and test scores (Vygotsky, 1986). The fundamental themes in the work of Vygotsky included the unique manner used to identify and use the concepts of development, the social origin of the mind, and the role of speech in cognitive development. Vygotsky concentrated on the relationship between learning and

development and determined that learning must be related to a student's developmental level.

According to Vygotsky (1986), educators and parents should not be content with intelligence test results that identify students' developmental levels at the time of testing. In any standardized test administration process, instructors are not permitted to assist students in any way, resulting in objective and impartial test scores. Vygotsky asserted that standardized IQ test scores do not accurately account for a student's academic functioning or intellectual potential; hence, he introduced the zone of proximal development to explain the difference between what a student is capable of learning and what an IQ test score may reflect. "The zone of proximal development is the difference between what children can do independently and what they can do with help" (Eady, 2008, p. 17). Consequently, standardized IQ test scores do not reflect how a student may perform if they are prompted or assisted during test administration. Students in their zone of proximal development can, with another's assistance, resolve a problem that they could not have resolved alone. Consistent with ZPD, this instructional assistance, also known as scaffolding, referred to the teacher's supportive guidance and interactions that assist the child in learning and mastering new information (Wood, Bruner, & Ross, 1976). Once the child demonstrates successful learning, the teacher steps back, essentially removing the scaffold, to enable the child to demonstrate independent mastery of the task. Vygotsky stated, "what the child is able to do in collaboration today he will be able to do independently tomorrow" (Vygotsky, 1987, p. 211). In the differentiated classroom, teachers need to know what their students can do by themselves in order to

support them in their zones of proximal development. Vygotsky noted that instruction is only effective when it promotes further cognitive development.

Bloom's Taxonomy

Bloom's Taxonomy is evident in differentiated instruction (Gregory & Chapman, 2007). The taxonomy has three major domains: affective, psychomotor, and cognitive. This literature review focused on the cognitive domain and its relationship to differentiated instruction. The six levels of the cognitive domain include: knowledge, comprehension, application, analysis, evaluation, and synthesis (Heacox, 2002). Students who are academically talented may require less time developing a foundation of facts, concepts, and ideas represented in the knowledge and comprehension levels of Bloom's work (Heacox, 2002). Students who are more academically ready need to use the higher order thinking skills of the taxonomy (Heacox, 2002). Curriculum experts use the taxonomy to refine curriculum, and novice teachers utilize it as a guide for developing objectives for lessons (Graves, Juel, & Graves, 2004). Teachers differentiating instruction should use Bloom's Taxonomy as a guide to thinking and planning for differing levels of challenge.

Thorndike, the Law of Readiness, and the Law of Effect

Tomlinson (2003) asserted that readiness is an important aspect of learning because students' proficiency with particular knowledge, understanding, and skill determines their level of frustration or satisfaction in the learning process. Readiness refers to what students know and understand, and what they can do. According to Elliott et al. (2000), Thorndike's law of readiness proposed that all learning is explained by connections formed between stimuli and responses and that these connections occur

through a process of trial and error. Students who are not psychologically or biologically prepared to learn cannot be forced to learn, because, according to Thorndike's law of readiness, they are not ready.

Thorndike's law of effect also has educational implications relating to differentiated instruction. According to this law, good teaching begins with knowing what is to be taught and the desired outcomes (Elliott et al., 2000). This concept of readiness parallels Vygotsky's ZPD (Tomlinson, 2003).

The Elements of Differentiated Instruction

Learning Characteristics

Readiness Levels. It is important for instructors to identify learning characteristics when developing a differentiated instruction curriculum. Identification of student learning characteristics then enables instructors to implement differentiated instruction methods that engage different styles of student learning more effectively. Teachers need to respond to students' interests, learning profiles, and readiness levels by considering differentiation as they plan for curriculum and instruction.

When teachers consider students' interests, students have the opportunity to learn skills and concepts through relevant topics that the students enjoy. Interest refers to what students enjoy learning about, thinking about, and doing. When students' interests are accommodated, they engage in learning, become more productive, and therefore the students' talents are enhanced. The goal of interest differentiation is to support students as they attempt to connect with new information, understanding, and skills by exposing them to connections with things that are appealing, intriguing, relevant, and worthwhile (Tomlinson & Eidson, 2003).

Teachers who accommodate various learning styles take into account visual, auditory, and kinesthetic preferences in order to engage students in the learning process. Learning profile refers to ways in which students will best process what they need to learn (Tomlinson, 2003). Learning style, intelligence preference, gender, and culture all influence learning profiles (Gardner, 1993, 1999; Sternberg, 1997). Tomlinson and Eidson (2003) summarized this concept effectively. “The goal of learning profile differentiation is to assist students to learn in the ways they learn best and to extend the ways in which they can learn effectively” (p. 4).

Teachers who plan differentiated instruction should also consider their students’ level of readiness as they provide instruction that is tailored to meet the academic needs of their students (Robison, 2004). The goal of readiness differentiation is to provide students with a challenge that is a bit difficult and then to provide the students with the assistance needed to succeed with the challenge presented (Tomlinson & Eidson, 2003). Some students may be ready to learn at grade level and others may lack the foundational skills necessary to move on; still others may already know the material (Heacox, 2002).

The following sections identify and define the elements that improve differentiated instruction, drawing primarily on the expertise of Tomlinson and Eidson (2003). In addition to considering student characteristics, these authors stated that teachers must also consider five key elements that can make a difference in student learning: content, process, product, affect, and the learning environment. Content refers to the information that the students need to learn and the materials and strategies through which that learning is accomplished. Process includes the activities that teachers design to ensure that students use key skills to make sense of essential ideas and information.

Product consists of the alternative ways that students can demonstrate mastery of the concepts. Affect refers to how students integrate their thoughts and feelings in the classroom. The classroom's learning environment refers to the setting where learning takes place, and includes the factors that facilitate an effective working relationship between teacher and students. Additionally, the importance of flexibility in the classroom and flexible access to resources is addressed.

Content

The content of the curriculum consists of the “facts, concepts, generalizations or principles, attitudes, and skills related to the subject, as well as materials that represent those elements” (Tomlinson & Allan, 2000, p. 7). Content is also understood as what the student must “know, understand, and be able to do as a result of a segment of study” (Tomlinson & Eidson, 2003, p. 4). National, state and local standards, as well as local curriculum guides and textbooks provide guidance about what teachers should teach. Teachers' knowledge of their subjects and knowledge of their students are important factors to consider when determining methods of content delivery. It is only when teachers understand their content and their students that they can determine what students should know, understand, and be able to do. Teachers who differentiate instruction understand that the overarching goal is for students to be given the opportunity to learn at their individually appropriate level. The differences in meeting that goal are dependent on how the students will obtain the content. Tomlinson and Eidson also suggested that some students might need to work with greater scaffolding from teacher and peers, while others may work independently on more complex formats. They added that, “Because students

vary in readiness, interest, and learning profile, it is important to vary or differentiate content in response to a student's traits" (p. 5).

Process

Tomlinson and Eidson (2003) defined *process* as the beginning of "students making personal sense out of information, ideas, and skills they've accessed" (p. 5).

Process includes the activities that teachers design to ensure that students use key skills to make sense of essential ideas and information. Furthermore, according to Tomlinson and Eidson, it is important to recognize that the activity must be centered on the learning goals. The activity includes giving students time to work with key knowledge, understanding, and skills that will help them understand and think about ideas, and to solve problems. Students should be able to understand how and why things work the way they do and not just give back basic information. An activity is valuable if it captures and maintains a student's interest even if the student initially expressed it as being a difficult task.

Teachers can provide some strategies for differentiating the process of learning. Tomlinson and Eidson (2003) highlighted several ways to differentiate the process of learning based on student readiness. Examples include using tiered activities, providing detailed and specific directions, decelerating or accelerating the pace of student work, and using a variety of criteria for success based on whole-class requirements as well as individual student readiness needs. Teachers can also differentiate the process, based on students' interest, by encouraging students to participate in designing some tasks, and by including students in interest-based work groups and discussion groups. Finally, Tomlinson and Eidson suggested that teachers differentiate the process of learning in

order to accommodate a student's learning profile. This type of differentiation of the process includes providing students with multiple options to demonstrate what they have learned, encouraging students to collaborate by working with others, and by providing activities aimed at discovering students' perspectives on topics and issues.

Product

Tomlinson and Eidson (2003) defined a product as “a means by which students demonstrate what they have come to know, understand, and be able to do,” (p. 5). A product consists of something that is tangible, verbal, or action that provides students with opportunities to demonstrate what they have learned. Heacox (2002) stated, “Products are the end results of learning” (p. 11). Teachers can differentiate products when they plan themes that include multiple ways of learning and when teachers provide students with different projects to choose from. Products can consist of the alternate ways or activities that students can use to demonstrate mastery of a concept. Teachers can engage students in projects that match their learning strengths or in projects that help students to practice their areas of weakness. Teachers who differentiate products support students when they take on a challenge and encourage students to generate their own ideas.

As with content and process, it is important to recognize that product assignments must be centered on the learning objectives. Teachers can provide some strategies for differentiating products that meet a student's readiness level. One strategy is for teachers to use tiered product assignments that allow students at differing readiness levels to work at differing levels appropriate for their readiness. Another strategy is for teachers to develop rubrics for success that take into consideration both grade-level expectations and

a student's learning needs. Teachers can also provide strategies for differentiating products that meet a student's interest. Teachers can encourage students to demonstrate critical skills in relation to topics of special interest and teachers can also allow students to use media to demonstrate their knowledge, understanding, and skill proficiencies. Finally, teachers can differentiate products to meet students' learning profiles by teaching students to use different product formats, in addition to providing visual, auditory, and kinesthetic product options that encourage students to demonstrate what they know.

Affect

Affective differentiated instruction involves teachers attending to the students' feelings as well as the students' understanding and skills. Affective and cognitive competencies are inextricably linked. Teachers promote an affective setting in numerous ways, such as modeling respect, helping students develop awareness of and appreciation for the commonalities and differences among their classmates, helping students develop empathy, establishing a classroom environment that promotes and supports student success, and assisting students to become problem solvers (Tomlinson & Strickland, 2005). Teachers who understand the needs of all humans are able to differentiate proactively and reactively in the case of affect.

Tomlinson and Strickland (2005) stated that students attend school with different abilities and academic needs. To ensure academic success, students' affective and academic needs must be taken into consideration. The expectations and challenges that teachers impose on their students will enable them to develop a sense of self-efficacy and confidence. Additionally, the need to belong is universal human need, and students need to feel that they are important and belong to the classroom group.

According to Tomlinson and Strickland (2005), academic diversity is a general term that describes the variety of student learning needs, which can range from gifted or astute learners to academically challenged learners, or students with learning disorders, impairments, or delays. Students with severe learning disorders and academic challenges need their teachers to include them as an integral part of the whole group just as much as astute learners. Sometimes teachers view impaired or challenged students as separate from the classroom majority based on their learning needs or deficits. When teachers separate students based on their deficits, the teachers are more likely to transmit exclusionary messages, directly and indirectly, about these students to the other students in the group. These messages, in turn, impact these students' experiences of belonging to the classroom group. Essentially, these messages create the affective experience of marginalization for academically challenged students. To ensure that students with severe academic diversity, and all other students in the classroom, master a sense of belonging, the teacher must understand all their students' belongingness needs. More importantly, the teacher must address these needs in an orchestrated way, always keeping in mind the legitimate participation of all students.

Astute learners, on the other hand, also need validation of their belonging and importance to a group as well. Like students with academic deficits, these astute learners are also an integral part of the group and most likely have been identified as achievers. However, when teachers are impatient or feel threatened by astute learners, they are more likely to shut down the astute learners' processes of inquiry and create an affectively hostile learning environment. These students may then feel uncomfortable about asking questions and they, too, will feel uncertain about their status in the group. In this case,

teachers must provide activities or opportunities that encourage students to ask legitimate questions that are valued and celebrated (Tomlinson & Strickland, 2005). In essence, teachers face challenges when creating an inclusive classroom environment that addresses the various ranges of their students' academic diversity.

The Learning Environment in Differentiated Instruction

The structure of the learning environment should enable teachers and students to work together in a setting that is conducive to both the teachers and the students.

Moreover, the classroom's learning environment must be designed to meet the diverse learning needs of the students (Robison, 2004). A flexible environment is a trademark of a differentiated instruction classroom. Teachers must also think about the rules and procedures that will affect the flexible environment. Engineering a flexible classroom is the teacher's responsibility; however, wise teachers include students in the decision-making process to determine how to make the environment a practical place to learn (Tomlinson & Strickland, 2005). When designing a differentiated instruction classroom, teachers should be prepared to consider flexible access to space, time, and materials.

Flexible Access to Space, Materials, and Time in the Classroom

The goal of flexible space in the differentiated instruction classroom is to help both the teachers and the students work in the most efficient way possible. Therefore, teachers and students should ask how they can rearrange furniture to accommodate individual, small-group, and whole-group instruction, where to display student work, and how to handle materials when students have to move from one place to another. In the flexible differentiated instruction classroom, teachers should also ensure that students have the materials necessary to accomplish the learning goals set forth on an individual

basis, in small groups, and as a class. Teachers and students should identify the supplies needed and establish guidelines for retrieving and storing supplies. Additionally, in the flexible differentiated instruction classroom, time is the most valuable commodity. Because academic diversity is inevitable, teachers should teach in small groups to meet the needs of each student while allowing others to work independently. To take advantage of time, teachers and students should determine when it is best to work as a whole class, when it will be helpful to work in small groups, and what can be done if additional support is needed (Tomlinson & Strickland, 2005). Essentially, it is important for teachers to consider the classroom workspace, the availability of necessary materials, and the available time when creating a flexible differentiated classroom environment.

Assessment Strategies for Differentiated Instruction

Teachers planning to differentiate their instructional strategies should assess students with a variety of assessment types and procedures. The students' ability or readiness levels are important for teachers to know when matching the needs of the learner to the strategies utilized (Tomlinson, 2000). When teachers differentiate strategies, they take into account the educational theories that support teaching and learning, to help students succeed academically. Teachers should include a variety of instructional strategies that meet their students' learning profiles, interest and readiness levels.

Researchers have generated specific strategies for teachers to consider when differentiating instruction: (a) Learning Contracts, (b) Tiered Assignments, (c) Independent Study Projects, (d) Curriculum Compacting, (e) Flexible Grouping, (f) Adjusting Questions, (g) Peer Coaching, (h) Learning Profiles and Styles, (i) Student

Interests, (j) Reading Buddy, (k) Buddy Study, and (l) Acceleration or Deceleration (Gregory & Chapman, 2007; Heacox, 2002; Tomlinson & Eidson, 2003).

Learning Contracts are written agreements between the students and the teachers where certain freedoms are put in place for designing and completing work. Tiered Assignments consist of multiple assignments given to different students at the same time that are related to the same concept but differ in complexity. An Independent Study Project is a strategy that provides students with an opportunity to investigate a topic or problem of interest, resulting in a product that shows the students' ability to apply skills and knowledge to the topic or problem (Tomlinson, 2001).

Curriculum Compacting is a strategy that is implemented by pre-testing students before a unit and then eliminating instruction in areas of competence. Flexible Grouping is a strategy where the grouping of students provides opportunities for students to receive instruction or to complete a specific task or assignment; groups change as needed based on students' abilities, interests, and/or readiness. Adjusting Questions is a strategy where teachers vary the sorts of questions posed to learners in discussions and on tests, based on the learners' readiness level. Each student responds to questions that increase mastery of content. Peer coaching is a process in which students who have mastered a concept can become a peer coach to students who need additional support. This strategy is beneficial to the involved students because the coach validates his or her concept mastery while the new learner benefits from peer coaching. Learning Profiles/Styles refers to an early identification strategy where students or parents may complete inventories to help teachers identify their students' preferred learning styles at the start of the school year. These inventories are useful and should be considered to meet the needs of each student.

In addition, teachers consider these inventories to plan instruction in ways that provide differentiated instruction to support individual styles and interests. Assessment of Student Interests is a strategy where teachers often use surveys to identify student interests, and then consider these interests in their curriculum development. When students are finished with assigned work, they are given opportunities to build on the targeted skills while also exploring their interests (Tomlinson, 2001).

The Reading Buddy strategy is beneficial to students who are experiencing reading difficulties. Students that need support are paired with a fluent reader to allow for additional reading practice. The reading buddy system promotes fluency and comprehension. Similarly, the Buddy Study strategy allows students to work together on a project. All students share in the organization and analysis process of the research project. However, each student must independently complete a product to demonstrate mastery (Tomlinson, 2000).

Finally, the Acceleration/Deceleration strategy is another way that teachers differentiate instruction. Students demonstrating higher competency levels work at rate that allows them to move faster through the curriculum. Students who need additional support may require more time and adjusted activities for a deceleration in order to be successful (Heacox, 2002).

Staff Development

Teachers must be willing to change their belief systems and practices in order to differentiate instruction. In order to facilitate this new growth, staff development must be provided. The National Staff Development Council (2000) defined staff development as a deliberate effort to alter professional beliefs and understanding of school personnel

toward an articulated goal using an intentional, purposeful program. In addition, this council asserted that professional development can provide the knowledge and skill-building activities that raise the capacity of teachers and administrators to respond to external demands. Professional development enables teachers to improve their practices and performance (National Staff Development Council). Additionally, Benjamin (2006) concluded that differentiated instruction develops when teachers dialogue about their values in working with students, assessing student learning, establishing classroom rules, and designing curricula.

Relevant Studies

Substantial research exists that supports the use of differentiated instruction in elementary and middle school settings (Adlam, 2007; Hilyard, 2004; Richardson, 2007). Such empirical studies provide valuable information about the level of knowledge that teachers and administrators have, or need to have, regarding how differentiated instruction should be implemented in elementary school classrooms. This section discusses the importance of teachers' knowledge about and understanding of how to use differentiated instruction effectively in order to capitalize on strengths and avoid pitfalls when implementing differentiated instruction in the classroom.

Adlam (2007) investigated teachers' knowledge and use of differentiated instruction. This study focused specifically on how often teachers differentiated instruction in specific subject areas, and factors that helped or hindered implementing differentiated instruction. Adlam's data revealed that the majority of the teachers surveyed were knowledgeable about differentiated instruction. However, the data revealed that teachers were not regularly differentiating instruction in their classrooms

because of their limited knowledge about tools, the time necessary to prepare to differentiate instruction, and the lack of resources available. Some teachers mentioned that student diversity also limited the implementation of differentiated instruction.

Hilyard (2004) assessed 238 elementary school teachers to identify differences in the extent to which teachers perceived that they understood and used differentiated instruction in the classroom. The study aimed to answer these questions: (a) To what extent do teachers understand what differentiated instruction is? (b) To what extent do teachers use differentiated instruction in their classrooms? (c) Do understanding and use of differentiated instruction differ between novice (one to five years of experience) and experienced (six or more years of experience) teachers? Hilyard collected data through self-report questionnaires, interviews, and observations and concluded that no significant differences existed between novice and experienced teachers in their perceptions of their understanding of or use of differentiated instruction. Statistically significant differences existed when the author examined the differentiated instruction strategies used in the classroom. Hilyard determined that the specific areas of difference were in the use of Learning Styles and Inquiry Learning.

Robison (2004) analyzed the factors that influenced teachers' decision-making processes when incorporating specific differentiated instruction strategies to meet their students' needs. The purpose of Robison's study was to uncover a theory of decision-making that could be based on the experiences of the sampled population. Twenty-two elementary school teachers who taught from kindergarten through third grade participated in this study. Participants completed an open-ended survey, participated in an interview, and attended a focus group session. Robison highlighted four findings as a result of this

study. First, teachers did not relate to any research theory as they related their teaching experiences to the concept of differentiated instruction. Second, teachers expressed that they valued the importance of their instructional support teams because the teams assisted with the task of differentiating instruction. Third, the teachers proposed that a program designed to improve students' writing skills be provided as a general staff training for all primary teachers, because it would be a valuable professional development experience. Finally, teachers stated that additional planning time was a key component necessary for differentiating instruction.

While teachers play a primary role in the utilization of differentiated instruction in the classroom, it is also important for school administrators to understand differentiated instruction and to receive trainings designed to improve staff development practices. Richardson (2007) interviewed 20 elementary and middle school building-level leaders from Colorado to determine which knowledge, skills, and strategies that principals were utilizing in implementing differentiated instruction. A one-time qualitative interview was scheduled in which participants responded to several questions from a protocol. Richardson determined that building level leaders needed to enhance their understanding of differentiated instruction further. That is, leaders needed to be trained for leading change, and leaders needed to receive training to learn about effective staff development practices.

Summary

Essentially, these empirical studies generally favored differentiated instruction, but also indicated that school leaders and administrators need additional training to become more knowledgeable about differentiated instruction. Furthermore, teachers must

receive meaningful and ongoing professional development in order to enhance their preparation of differentiated curriculum and strategies for implementation of differentiated instruction in the classroom.

No empirical validation of differentiated instruction, as a package, was found for this review. However, research by Demos and Forshay (2009) suggested that teachers who differentiate instruction understand that “all students are unique and have different learning styles and preferences” (p. 26). Teachers who differentiate instruction plan instruction by considering lesson delivery, assignments, assessments, and by adjusting the content to meet their students’ needs. Demos and Forshay concluded that differentiated instruction can benefit all students regardless of their ability levels, learning styles, interests, or cultural and linguistic backgrounds when the instructional strategies are grounded in cognitive psychology and supported by research on student achievement.

Conclusion

Addressing the needs of today’s academically diverse students can be overwhelming. However, if teachers are realistically considering giving their students the opportunity to learn based on their individual needs, teachers need to differentiate instruction. Teachers who differentiate instruction understand that “skillful instruction is an imperative in order to bring curriculum to life for young learners, and flexible instruction is necessary to make curriculum work for academically diverse student populations.” (Tomlinson & McTighe, 2006, p. vi) It is only when teachers consider robust and flexible instruction that students may have the opportunity to excel in meeting the standards.

Teachers should differentiate instruction to meet the varied needs of their diverse students. Differentiating instruction will assist students in the learning process and help students to reveal what they are learning. Teachers who differentiate instruction consider their students' learning styles, readiness levels, and interests when planning for instruction. Teachers who differentiate instruction also adjust the content, process, and product of learning. Differentiating instruction requires that teachers be supported by their administrators, through the provision of ongoing staff development and training tailored to meet the needs of the teachers.

CHAPTER III

METHODOLOGY

Introduction

The previous chapter explored the historical background of differentiated instruction, drawing on various theoretical contributions that influenced utilization of the current strategies and purposes for differentiated instruction in the contemporary classroom. The previous chapter also reviewed factors that impact the implementation of differentiated instruction. Relevant empirical studies provided valuable information about the level of knowledge that teachers and administrators have, or need to have, regarding how differentiated instruction should be implemented in elementary school classrooms. This chapter will provide a detailed explanation of the methodology used in the current research and describe how the research questions were addressed. This chapter will include detailed descriptions of the research design, methods of data collection, population, sample, and analytical methods, as well as a discussion of the limitations. A thorough description of the research procedure is provided in order for future researchers to replicate this study.

School districts today are being held accountable for providing all students with a quality education in order for students to become productive citizens as well as meet mandated learning standards. If school districts are to accomplish these tasks, differentiated instruction should be implemented. It is through this strategy that all students may have the opportunity to be more successful. When teachers differentiate

instruction, they consider their students' interests, readiness levels, and learning profiles in the delivery of instruction. Adlam (2007) sought to identify classroom teaching strategies in search of ways to improve teaching practices and strategies. Her research investigated elementary school teachers' knowledge of implementing and using differentiated instruction in their classrooms. Adlam's original research pilot tested a survey with 13 elementary school teachers to test its validity and reliability. The data received via this pilot test confirmed that the survey was a valid and reliable tool because the results identified teachers' knowledge about differentiation, the frequency with which teachers differentiated instruction in specific subject areas, and factors that helped or hindered the implementation of differentiated instruction (E. Adlam, personal communication, May 12, 2010). For the purposes of this study, it was important to use a survey that demonstrated validity and reliability through its previous use. Validity refers to the accuracy of a result, or in this study, the accuracy with which survey items assessed the construct of differentiated instruction. Reliability refers to the stability or consistency with which one measures a given construct. Both validity and reliability are important in research to ensure that each research question is properly answered (Robson, 2002).

Research Design

The present research was a replicated quantitative study based on Adlam's work that analyzed teachers' knowledge and use of differentiated instruction in the classroom, and to identify the factors that help or hinder teachers from differentiating instruction. This study, however, also aimed to identify teachers' training needs (e.g., training to prepare teachers to use a variety of strategies to differentiate instruction) in order to provide information for administrators to plan appropriate professional development that

address identified areas of need. The present study utilized a cross-sectional design to collect information about teachers' attitudes concerning differentiating instruction. This type of design was also used because the researcher intended to collect data at only one point in time.

Gay et al. (2009) described quantitative research as the process by which a researcher decides what to study, answers specific questions, collects data from participants, analyzes the data using statistics, and conducts inquiry in an unbiased and objective manner. Quantitative research establishes relationships between measured variables and seeks to explain causes for these relationships. Survey research, in contrast, collects data about the characteristics, experiences, knowledge, or opinions of a sample of a population. Creswell (2005) indicated that a survey is used to describe trends and interests among a sample from a population in order to identify personal opinions, beliefs, and attitudes. Gay (1996) stated that through a survey the researcher attempts to collect data from members of a population in order to determine the current status of that population. Descriptive research obtained through survey methodology is valuable because it represents more than asking questions and reporting answers, it involves careful design and execution of each of the components of the research process. Survey research can be used in many different fields; however, it is most commonly used by schools for data collection about schools.

Gay et al. described several advantages in implementing survey research. First, it is a convenient method of gathering a large amount of data from a targeted population. Second, survey research is an inexpensive way to gather information. A third advantage is that respondents are given the opportunity to fill out the survey at their own leisure

(Gay et al., 2009). Finally, questionnaire methodology allows researchers to collect quantitative data and conduct statistical analyses to describe population trends and obtain objective responses to research questions (Creswell, 2005; Gay, 1996).

Gay et al. (2009) indicated that a cross-sectional survey provides a snapshot of the current behaviors, attitudes, and beliefs in a population, and that the collection of data can be relatively rapid. Researchers use a cross-sectional design to obtain data and estimate the characteristics of a large population of interest based on a smaller sample from that population. For the purposes of this study, cross-sectional survey methodology was used to gather data from a smaller sample of teachers to help make predictions about differentiated instruction practices in the general population of elementary school teachers.

Research Questions

The following research questions were taken from Adlam (2007) and were used in this study:

1. How knowledgeable are teachers in strategies they can use to implement differentiated instruction?
2. How often are teachers using differentiated instruction in specific subject areas?
3. What factors help teachers trying to implement differentiated instruction in the classroom?
4. What factors hinder teachers trying to implement differentiated instruction in the classroom? (pp. 71-75)

Data Collection

The author obtained permission to use an existing survey developed by Adlam (2007). The survey was distributed to elementary charter school teachers employed by a

not-for-profit organization. The survey was a valid and reliable tool used to assess teachers' knowledge about differentiation, assess the frequency of times that teachers used differentiated instruction in specific subject areas, and identify factors that helped or hindered the implementation of differentiated instruction.

Next, permission for data collection was obtained from the Institutional Review Board at ONU, and then consent was obtained for participants to be recruited from principals at the participating individual charter schools. Teachers were invited to participate in the study via the United States Postal Service (USPS). The participant packet included an informed consent invitation for teachers to participate in the research, the research survey, and a postage-paid envelope for data to be securely and anonymously returned to the researcher. Survey responses were collected via the USPS; results were then statistically analyzed and stored in a locked file cabinet. Gay et al. (2009) stated that collecting data in this way is inexpensive and usually permits data collection from a much larger sample than an interview or personally-administered questionnaire.

Population

One-hundred-and-three participant surveys were returned. However, four surveys were omitted from the study due to incomplete responses. The data in this study included survey data from the 99 participants, who were elementary and middle school teachers employed in charter schools of a not-for-profit organization in the Midwest area. Some of the result totals varied due to differing teacher responses to the questions on the survey. For example, some participants reported that they do not differentiate instruction. Demographic information about the teachers was also collected, including gender, years

of teaching experience, teaching qualifications, current assignment, and subject areas currently taught. Table 1 depicts the descriptive characteristics of the participant sample.

Table 1

Demographic Data Summary

Demographic Category	Frequency (<i>n</i>) (<i>n</i> = 99)	Percentage (%)
<i>Gender</i>		
Male	28	28.3
Female	71	71.7
<i>Years of Teaching Experience</i>		
0 to 4	43	43.4
5 to 9	15	15.0
10 to 19	26	28.2
20 +	9	9.9
<i>Teaching Qualifications</i>		
Primary Grade (K-5)	47	47.5
Middle Grade (6-8)	51	51.5
High School (9-12)	1	1.0
<i>Current Grade Assignment</i>		
Primary (Pre-K – 3)	11	11.1
Junior (4 th – 5 th)	3	3.0
Intermediate (6 th – 8 th)	79	79.7
Other (Administrators and counselors)	3	3.0
<i>Subject Areas Taught</i>		
Language Arts	43	43.4
Mathematics	42	42.4
Science	35	35.4
Social Studies	34	34.3
Geography	12	12.1
History	10	10.1
Health	9	9.1
Visual Arts	7	7.1
Physical Education	6	6.1
Music	4	4.0
French	2	2.0
Drama	1	1.0

One question asked about whether or not teachers used differentiated instruction, two questions asked about differentiated instructional strategies and frequency of use, two questions asked about the subjects in which teachers differentiated their instruction and if so, how often, and two questions asked about factors that helped or hindered the implementation of differentiated instruction. The survey also inquired about resources that teachers would be willing to use in order to enhance their own knowledge and understanding about differentiating instruction. Finally, an open-ended question was included in the survey that allowed teachers to add additional comments they thought could be beneficial to this study. In total, participants were asked to respond to 12 items on the survey.

Analytical Methods

Data analyses were conducted using the statistical software SPSS (Version 18). The next step involved the researcher coding and comparing the data. Descriptive and inferential statistics were included in this research. Researchers use descriptive statistics to describe a sample of a population, and to summarize, organize, and simplify data into categories. In addition, descriptive statistics revealed the frequencies, percentages, and proportions of the survey results (Gay et al., 2009). Inferential statistics involve analysis techniques that determine how likely the results obtained from a sample population would be consistent with results gained from surveying the entire population (Gay et al.). Researchers use inferential statistics to obtain samples to make general statements or inferences about a population.

Finally, the Pearson chi-square test was used to determine if there were any relationships present among the data collected based on frequencies rather than variances.

The Pearson chi-square test was applied because it is one of the most appropriate statistical analyses to apply when comparing frequency counts or percentages. The Pearson chi-square test is used to compare frequencies among different categories or groups with nominal data.

Limitations

There were several limitations to this study. First, because all the participants were from the same organization, findings cannot be generalized to a larger population. Second, the study was completed with teachers at the elementary and middle school level, which may not necessarily yield the same findings as research completed with high school teachers. Third, changes in student achievement as the result of differentiated instruction were not measured or compared. Thus, this study did not provide evidence in support of differentiated instruction as the best strategy for increased student achievement. Finally, there was no formal attempt to determine how effective classroom teachers actually are at differentiating instruction because observations of teaching practices were beyond the scope of this study.

Conclusion

This chapter provided a detailed explanation of the research design, and also described the cross-sectional survey methodology used to address the current research questions. The research design, data collection, population, sample and analytical methods, as well as limitations were examined. A thorough description of the methods used in this research was provided in order for future researchers to replicate this study. The next chapter will provide statistical analyses and results for each research question. The next chapter will also include recommendations for future research.

CHAPTER IV

FINDINGS AND CONCLUSIONS

Introduction

The purpose of this study was to identify supports that teachers need to be successful in differentiating instruction in order for school principals and superintendents to plan professional development sessions that address the identified needs. In this three-fold study, teachers' knowledge and use of differentiated instruction in the classroom were analyzed. Second, the supportive factors that teachers need to consider in order to be successful at differentiating instruction in the classroom were identified. Finally, this study also identified teachers' training needs in order to provide information for administrators (principals and superintendents) to plan professional development opportunities that would address the identified needs. Ninety-nine elementary charter school teachers employed by a not-for-profit organization were surveyed to gather data about whether or not they used differentiated instruction in the classroom. More specific research questions to be answered consisted of the following:

1. How knowledgeable are teachers in strategies they can use to implement differentiated instruction?
2. How often are teachers using differentiated instruction in specific subject areas?
3. What factors help teachers trying to implement differentiated instruction in the classroom?

4. What factors hinder teachers trying to implement differentiated instruction in the classroom?

The previous chapter provided a detailed explanation of the methodology used in this replicated study and described how the research questions were addressed. In this chapter, the researcher will present the findings, conclusions, implications, and recommendations of the study. The implications and recommendations will be presented after the results of the data collection are discussed. The survey results were compiled, analyzed, and interpreted using the statistical software program, SPSS, Version 18.0.

Demographic Information

Demographic information about the teachers was obtained from the survey utilized in this study, including gender, years of teaching experience, teaching qualifications, current grade assignment, and subject areas currently taught. Table 1 depicts the descriptive characteristics of the participant sample. Most participants were female; mainly had 0-4 years of teaching experience; were either qualified to teach in the middle-grade or primary grade; were mainly assigned to teach in the intermediate grades; and primarily taught Language Arts and Mathematics. The results were provided in Table 1 in Chapter 3, above.

Findings

Research Question 1: How knowledgeable are teachers in strategies they can use to implement differentiated instruction?

To answer this question, teachers were asked to identify how familiar they were with the following 12 differentiated instruction strategies: (a) learning contracts; (b) tiered assignments; (c) independent projects/investigations; (d) independent study; (e)

curriculum compacting; (f) interest centers/interest groups; (g) learning centers/learning stations; (h) varied instructional materials; (i) provisions for student choice; (j) flexible grouping; (k) varying questions; and (l) pre-assessment data to differentiate learning experiences.

The majority of the respondents reported that they were knowledgeable about most of the strategies that were presented. Of the 12 differentiated instruction strategies, 87% of the teacher respondents were most familiar with flexible grouping ($n = 86$), 86% of the respondents were familiar with independent projects or investigations ($n = 85$), 85% were familiar with varied instructional materials ($n = 84$), and 84% of teachers were familiar with varying questions ($n = 83$). The least familiar strategy was independent study. Sixty-two per cent of the respondents reported that they were knowledgeable about this strategy ($n = 61$). The results are provided in Table 2.

Table 2

Teacher Familiarity with Differentiated Instructional Strategies

<i>DI Strategies</i>	Frequency of Teacher Responses	
	<i>n</i>	Percentage (%)
Flexible Grouping	86	86.9
Independent Projects/Investigations	85	85.9
Varied Instructional Materials	84	84.8
Varying Questions	83	83.8
Pre-Assessment Data	82	82.8
Learning Centers/Learning Stations	81	81.8
Learning Contracts	78	78.8
Interest Centers/Interest Groups	77	77.8
Tiered Assignments	73	73.7
Curriculum Compacting	71	71.7
Provisions for Student Choice	69	69.7
Independent Study	61	61.6

Research Question 2: How often are teachers using differentiated instruction in specific subject areas?

To answer this question, teachers were asked to identify how often they were using differentiated instruction in the following subject areas: (a) Language Arts; (b) Mathematics; (c) Social Studies; (d) Science; (e) History; (f) Geography; (g) Visual Arts; (h) Physical Education (i) Health; (j) Music; (k) French; and (l) Drama. The frequency of differentiated instruction use was found to vary depending on the subject area. Although the majority of the teachers surveyed used differentiated instruction in their classrooms

(approximately 92%, $n = 91$), 8.1% of the teachers ($n = 8$) indicated they did not use differentiated instruction in their classrooms. Additionally, teachers also showed variability in that they used differentiated instruction in only some of the 12 subject areas that were listed.

To address Research Question 2 specifically, teachers were also asked to indicate how often they used differentiated instruction in these 12 subject areas. Responses ranged from: *always* (daily), *frequently* (weekly), *sometimes* (monthly), or *never*. Regarding frequency of use, 46.5% of respondents reported that they *always or frequently* used DI strategies in Language Arts ($n = 46$), and 39.4% of respondents *always or frequently* used DI strategies in Mathematics ($n = 39$). The specific subject areas in which teachers *rarely or never used* differentiated instruction were: Music ($n = 88$ or 88.9% of teachers); Drama ($n = 88$ or 88.8% of teachers); French ($n = 88$ or 88.9% of teachers); Physical Education ($n = 87$ or 87.8% of teachers); and Visual Arts ($n = 84$ or 84.9% of teachers). Depending on the item, either five or six teachers did not provide a response to the items that assessed if teachers were using differentiated instruction in some subject areas. To show the frequency of use of differentiated instruction in the specific subject areas, the data are summarized in Table 3.

Table 3

Frequency of Differentiated Instruction Used Across Subject Areas

Frequency of DI Strategies Used Across Subject Areas (total N = 99)					
<i>Cases</i>	<i>Daily n (%)</i>	<i>Weekly n (%)</i>	<i>Monthly n (%)</i>	<i>Never n (%)</i>	<i>Missing n (%)</i>
<i>Subject Area</i>					
Language Arts	28 (28.3)	18 (18.2)	7 (7.1)	41 (41.4)	5 (5.1)
Mathematics	22 (22.2)	17 (17.2)	8 (8.1)	47 (47.5)	5 (5.1)
Science	13 (13.1)	12 (12.1)	10 (10.1)	59 (59.6)	5 (5.1)
Social Studies	13 (13.1)	13 (13.1)	14 (14.1)	54 (54.5)	5 (5.1)
History	7 (7.1)	8 (8.1)	9 (9.1)	70 (70.7)	5 (5.1)
Geography	4 (4.0)	11 (11.1)	7 (7.1)	72 (72.7)	5 (5.1)
Health	4 (4.0)	3 (3.0)	9 (9.1)	77 (77.8)	6 (6.1)
Physical Education	4 (4.0)	2 (2.0)	3 (3.0)	84 (84.8)	6 (6.1)
French	4 (4.0)	1 (1.0)	3 (3.0)	85 (85.9)	6 (6.1)
Visual Arts	3 (3.0)	6 (6.1)	7 (7.1)	77 (77.8)	6 (6.1)
Drama	3 (3.0)	2 (2.0)	4 (4.0)	84 (84.8)	6 (6.1)
Music	2 (2.0)	3 (3.0)	8 (8.1)	80 (80.8)	6 (6.1)

Research Question 3: What factors help teachers trying to implement differentiated instruction in the classroom?

The eight factors that were examined during this study included: (a) *administration/ school leadership*; (b) *parent expectations*; (c) *range of student diversity in the classroom*; (d) *support of other staff*; (e) *availability of materials*; (f) *knowledge and experience*; (g) *amount of planning time*; and (h) *staff development*.

Knowledge and experience was the top factor identified as the key to facilitating the implementation of differentiated instruction, and was identified by 73% of the teacher

respondents ($n = 72$). The second key factor identified was *availability of materials*, by 68% ($n = 67$), and the third key factor identified was the *amount of planning time*, by 62% ($n = 61$) of the teachers. The least identified factor was *parent expectations*, identified by only 26% of the respondents ($n = 26$). A summary of these results is provided in Table 4.

Table 4

Factors Helping Teachers to Implement Differentiated Instruction

<i>Factors</i>	Frequency of Teacher Responses	
	<i>n</i>	(%)
Knowledge and Experience	72	72.7
Availability of Materials	67	67.7
Amount of Planning Time	61	61.6
Range of Student Diversity	53	53.5
Support of Other Staff	49	49.5
Staff Development	45	45.5
Administration/School Leadership	43	43.4
Parent Expectations	26	26.3

Research Question 4: What factors hinder teachers trying to implement differentiated instruction in the classroom?

In order to answer Research Question 4, respondents evaluated the same eight factors that were used to answer Research Question 3. The most-identified factor that prevented teachers from implementing differentiated instruction was *availability of materials*, identified by 53% of the respondents ($n = 52$). *Amount of planning time* was

the second-most identified factor, identified by 50% of the teachers ($n = 49$). The least-identified factor, identified by 11% of the respondents, was *staff development* ($n = 11$).

This information is summarized in Table 5.

Table 5

Factors Hindering Teachers in Implementing Differentiated Instruction

<i>Factors</i>	Frequency of Teacher Responses	
	<i>n</i>	(%)
Availability of Materials	52	52.5
Amount of Planning Time	49	49.5
Range of Student Diversity	26	26.3
Parent Expectations	20	20.2
Support of Other Staff	18	18.2
Knowledge and Experience	14	14.1
Administration/School Leadership	13	13.1
Staff Development	11	11.1

Additionally, Pearson chi-square tests were then performed on these eight factors to determine if any of them were perceived by teachers to be both a facilitator and a hindrance to the implementation of differentiated instruction. Two of the strongest relationships that were identified included *availability of materials*, with $\chi^2(1, n = 99) = 6.25, p < .05$, and *amount of planning time*, with $\chi^2(1, n = 99) = 5.76, p < .05$. This information is summarized in Table 6. Upon further chi-square analysis, it was revealed that 33.3% of the teachers surveyed regarded availability of materials and amount of planning time as being both a facilitator of as well as a hindrance to the implementation

of differentiated instruction. More specifically, 41.4% of teachers indicated that the *availability of materials* both helped and hindered the implementation of differentiated instruction ($n = 41$). Likewise, approximately 36.4% ($n = 36$) of the teachers indicated that the *amount of planning time* both helped and hindered use of differentiated instruction.

Table 6

Relationships between Factors Facilitating and Hindering Differentiated Instruction

<i>Factors</i>	<i>Chi Square Value</i>
Administration/School Leadership	.04
Staff Development	.41
Range of Student Diversity	.77
Knowledge and Experience	1.39
Amount of Planning Time	5.76*
Availability of Materials	6.25*
Parent Expectations	7.51**
Support of Other Staff	10.08**

* $p < .05$; ** $p < .01$

Several factors did not demonstrate any statistically significant relationships between factors that facilitate or hinder differentiating instruction based upon the chi-square analysis. These factors included administration or school leadership, staff development, range of student diversity, and knowledge and experience.

Additional Findings with Differentiated Instruction

Several additional survey questions that dealt with differentiated instruction, but were not necessarily directly related to this study's four research questions, were subsequently analyzed. First, teachers were asked to indicate how often they used the 12 instructional strategies (examined in Research Question 1) within their classroom. Survey responses ranged from: *always* (daily), *frequently* (weekly), *sometimes* (monthly), or *never*. Teacher respondents reported that the most common differentiated instructional strategies used on a daily or weekly basis, included: varying questions ($n = 72$), varied instructional materials ($n = 72$), and flexible grouping ($n = 69$). The strategies that teachers used least were: learning contracts ($n = 72$), independent projects/investigations ($n = 64$), curriculum compacting ($n = 64$), and independent study ($n = 64$). Depending on the item, either two or three teacher respondents did not provide a response about how often they used each of the differentiated instructional strategies. This information is summarized in Table 7. Many teachers' responses indicated that they were not very familiar with independent study and curriculum compacting, as indicated in Table 2. Consequently, one can conclude that they did not use these particular strategies very often in their classrooms.

Table 7

Teachers' Use of Differentiated Instructional Strategies in the Classroom

<i>DI Strategy</i>	Frequency of Use (<i>n</i> = 99)				
	<i>Daily n (%)</i>	<i>Weekly n (%)</i>	<i>Monthly n (%)</i>	<i>Never n (%)</i>	<i>Missing n (%)</i>
Varying Questions	48 (48.5)	24 (24.2)	12 (12.1)	13 (13.1)	2 (2.0)
Flexible Grouping	34 (34.3)	35 (35.4)	17 (17.2)	11 (11.1)	2 (2.0)
Varied Instr. Materials	33 (33.3)	39 (39.4)	15 (15.2)	10 (10.1)	2 (2.0)
Learning Centers/Stations	22 (22.2)	21 (21.2)	34 (34.3)	20 (20.2)	2 (2.0)
Provisions Student Choice	16 (16.2)	33 (33.3)	27 (27.3)	21 (21.2)	2 (2.0)
Pre-Assessment Data	16 (16.2)	34 (34.3)	34 (34.3)	12 (12.1)	3 (3.0)
Interest Centers/Groups	14 (14.1)	27 (27.3)	36 (36.4)	20 (20.2)	2 (2.0)
Independent Study	13 (13.1)	22 (22.2)	32 (32.3)	30 (30.3)	2 (2.0)
Tiered Assignments	12 (12.1)	32 (32.3)	29 (29.3)	24 (24.2)	2 (2.0)
Independent Projects	7 (7.1)	26 (26.3)	49 (49.5)	15 (15.2)	2 (2.0)
Learning Contracts	6 (6.1)	12 (12.1)	43 (43.4)	36 (36.4)	2 (2.0)
Curriculum Compacting	5 (5.1)	28 (28.3)	33 (33.3)	31 (31.3)	2 (2.0)

To find the relationships between teachers' knowledge of differentiated instructional strategies and the strategies they frequently use, Pearson chi-square tests were used to identify any statistically significant relationships between these two variables. Analysis of all of the 12 strategies revealed statistically significant relationships between knowledge of the strategies and their frequency of use. This information is summarized in Table 8.

Table 8

Significant Relationships between Knowledge of Strategies and Frequency of Use

<i>DI Strategy</i>	<i>Chi-Square Value</i>
Interest Centers/Interest Groups	79.81*
Independent Study	83.70*
Learning Contracts	97.32*
Pre-Assessment Data	97.50*
Learning Centers/Learning Stations	98.90*
Provisions for Student Choice	106.04*
Varied Instructional Materials	121.56*
Curriculum Compacting	123.09*
Independent Projects/Investigations	136.99*
Varying Questions	148.93*
Flexible Grouping	149.06*
Tiered Assignments	151.46*

* $p < .01$

The most common strategies on the list of familiarity, as well as frequency of use, were *flexible grouping* and *varying questions*. When the chi-square tests were performed to determine the relationship between knowledge and use of these strategies, the results revealed very strong relationships between familiarity and usage, with $\chi^2(3, n = 99) = 149.06, p < .01$ and $\chi^2(3, n = 99) = 148.93, p < .01$, respectively. In other words, teachers who were very familiar with flexible grouping and varying questions used them

frequently in their classes. Conversely, the strategy of curriculum compacting, which was not that familiar to teachers, was not used very much by them. Curriculum compacting also demonstrated a very strong relationship between its familiarity and its usage, $\chi^2(3, n = 99) = 123.09, p < .01$.

Another area investigated had to do with evaluating the importance of differentiated instruction along a 3-point Likert scale, ranging from 1 (*not important*) to 3 (*very important*) as it related to the components of lesson planning, lesson delivery, and assessment and evaluation. Approximately 86% ($n = 85$) of the teachers regarded differentiated instruction to be very important in lesson delivery, 80.8% ($n = 80$) of the teachers considered differentiated instruction to be critical in assessment and evaluation, and 71.7% ($n = 71$) of the teachers regarded differentiated instruction as crucial to lesson planning. Figure 1 depicts these percentages concerning the teachers' perceived importance of differentiated instruction for these three components.

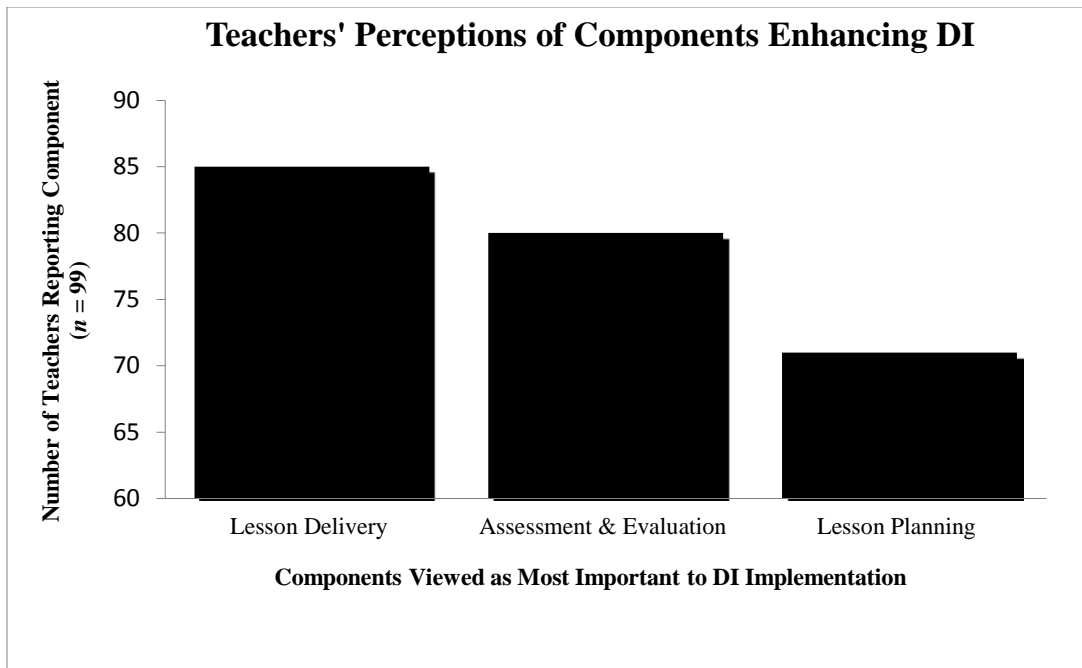


Figure 1. Teachers' Perceived Importance of Differentiated Instruction Component

A third area investigated had to do with identifying particular resources that would help teachers enhance their knowledge and understanding of differentiated instruction. Of the 99 teachers sampled, 75% ($n = 74$) would *participate in* staff as well as professional development activities, 64.6% ($n = 64$) would engage in professional readings, such as journal articles or books about the topic, and 62.6% ($n = 62$) would engage in watching professional or educational videos about the topic. Figure 2 depicts these percentages for use of differentiated instruction with the three types of resources.

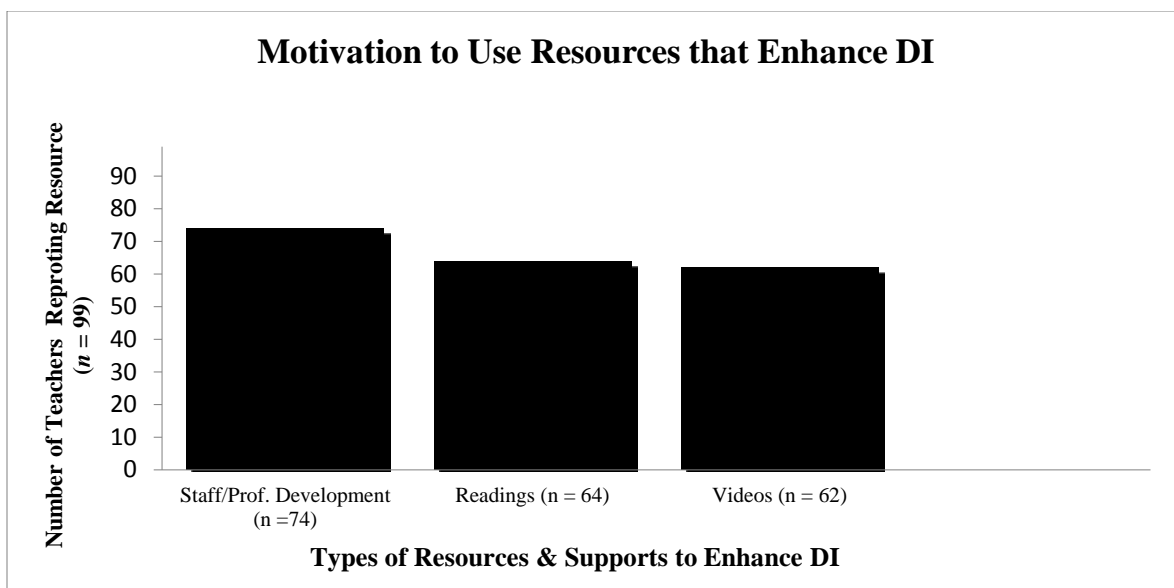


Figure 2. Teachers' Motivation to Use Resources that Enhance Knowledge of DI

Conclusions

Many of the findings in this study confirmed the results of Adlam's (2007) research. Each of the findings were summarized and then related to Adlam's work, because her study also investigated teachers' knowledge and use of differentiated instruction within the classroom.

Knowledge of Differentiated Instruction Strategies

In the current study, the first research question examined teachers' knowledge of differentiated instructional strategies. In general, the teachers reported that they were knowledgeable about many of the strategies that can be used to differentiate instruction. More specifically, the results indicated that teachers were most familiar with the instructional strategies of flexible grouping, independent projects/investigations, varied instructional materials, and varying questions. In contrast, teachers were least familiar with the instructional strategies of independent study, provisions for student choice, and curriculum compacting. The same types of frequencies for many of these strategies were

identified in Adlam's (2007) study. Specifically, both studies found that varied instructional materials, varying questions, and flexible grouping were the most familiar strategies, and curriculum compacting was the least familiar strategy. One difference was that Adlam found the item provisions for student choice to be a very familiar instructional strategy in her study, whereas it was one of the least familiar strategies in the current study.

The purpose of this study was to investigate teachers' knowledge and use of differentiated instruction in order to assist principals and superintendents in providing teachers with valuable information and resources necessary to support their use of differentiated instruction strategies in the classroom. These results indicated that school principals and superintendents would benefit from planning and providing professional development opportunities tailored to help teachers enhance their knowledge of differentiated instructional strategies to implement in their classrooms. More specifically, school administrators, need to develop, plan, and implement training and support in order for their teachers to become increasingly more familiar about the knowledge of differentiated instructional strategies and more effective in their use.

Frequency of Use of Differentiated Instruction Strategies

The second research question examined how often teachers used differentiated instruction in specific subject areas. Consistent with Adlam's (2007) research, the results of the current study also verified that differentiated instruction was used on a frequent basis (i.e., daily or weekly) in subjects such as Language Arts and Mathematics. Furthermore, in both studies, differentiated instruction was least used in exploratory subjects such as drama, visual arts, physical education, music, and French. A stated

purpose of this study was to investigate teachers' knowledge and use of differentiated instruction within specific subject areas in order to assist principals and superintendents in identifying the supports that teachers need. Consistent with Adlam's findings, the results of the present study confirmed that principal and superintendents need to incorporate exploratory teachers (drama, visual arts, physical education, music, and French) into professional development opportunities and plan to support them in becoming familiar with differentiated instruction strategies in their content areas, because differentiated instruction should be implemented across all grade levels and all content areas (Gregory & Chapman, 2007).

Factors that Support the Use of Differentiated Instruction

The third research question examined the factors that helped teachers trying to implement differentiated instruction in their classrooms. A stated purpose of this study was to identify the administrative supports that teachers need to be successful in implementing differentiated instruction. This part of the study analyzed elementary school teachers' knowledge and use of differentiated instruction, by specifically examining the factors that helped or the barriers that hindered the implementation of differentiated instruction strategies. The results of the current study were also consistent with Adlam's (2007) finding: the top factors, knowledge and experience and availability of materials, were identified as statistically significant in facilitating the implementation of differentiated instruction within the classroom.

According to these results, in order to achieve targeted standards (Gregory & Chapman, 2007), teachers who differentiate instruction must be strategic in their planning so that their instruction is tailored to meet the needs of the diverse students in their

classrooms. Consequently, principals and superintendents must be certain to provide teachers with the necessary resources and training experiences in order for teachers to be successful at increasing their knowledge and experience with differentiated instruction strategies. These identified factors are also able to be utilized by principals and superintendents in order to create relevant professional development programming geared toward providing teachers with opportunities to enhance their knowledge and experience, as well as providing access to available materials that can enhance successful implementation of differentiated instructional strategies in the classroom.

Factors that Hinder the Use of Differentiated Instruction

The fourth and final research question examined the factors that hindered teachers trying to implement differentiated instruction in their classrooms. Consistent with Adlam's (2007) findings, the results of the current study identified the key factors that hindered teachers trying to implement differentiated instruction in their classrooms. The key factors were availability of materials and amount of planning time. Given these results, administrators are better able to foresee potential barriers and provide solutions or accommodations to ensure that these barriers do not hinder the implementation of differentiated instruction in elementary schools.

Upon further chi-square analysis of these factors in the current study, the availability of materials was found to both help and hinder the implementation of differentiated instruction. It could be inferred that if materials were readily available, then teachers would use them to differentiate their instruction; however, if the materials were not immediately available, then teachers would not seek out these resources to differentiate their instruction. Analysis of the amount of planning time also showed that

planning time could both help and hinder differentiated instruction. It could also be inferred that if there was sufficient planning time, teachers would differentiate their instruction; however, if time was not available, or was limited, and then teachers would not plan strategies to implement differentiated instruction. These results suggest that principals and superintendents need to ensure that they provide their teachers with the available resources (i.e., materials and planning time), that will help them be successful at differentiating instruction. Furthermore, in order to maximize support to teachers, administrators should incorporate designated differentiated instruction strategic planning times at staff training or team meetings in order to ensure that teachers are receiving planning time built into their expectations and not expecting teachers to complete this task outside of their workday.

Relationship between Familiarity with DI Strategies and Frequency of Use

In the current study, the results from the additional inquiries revealed that teachers who were most familiar with the instructional strategies of flexible grouping, varied instructional materials, and varying questions also employed them on a regular basis, (i.e., daily or weekly). In contrast, teachers who were least familiar with the instructional strategies of independent study and curriculum compacting rarely or never employed them in their classroom. These same strategies were identified in Adlam's (2007) study, which inferred that the more familiar or most used strategies (i.e., flexible grouping and varying questions), were more accessible and easier to implement than the less familiar or rarely used strategies, i.e., independent study and curriculum compacting.

Additional results in the current study showed that all 12 of the instructional strategies demonstrated statistically significant relationships between their familiarity and

frequency of usage. Adlam (2007) also identified the familiarity-usage relationships in nine of the 12 same strategies in her study. Three of her instructional strategies did not show these familiarity-usage relationships: pre-assessment data to differentiate learning experiences, independent study, and learning contracts. However, she did not provide an explanation about why these instructional strategies did not show the expected relationship significance. Like Adlam, one of the strongest relationships identified in the current study involved the strategy of varying questions. This finding suggests that varying questions was a useful technique for teachers to utilize because they were most acquainted with it. These results continue to lend support to the premise that school principals and superintendents need to plan and provide professional development opportunities that will help teachers enhance their knowledge of different instructional strategies. More specifically, school administrators also need to support their teachers so they can competently implement more challenging or unfamiliar differentiated instructional strategies.

Resources Enhancing Teachers' Use of Differentiated Instruction

Finally, the present study examined whether using resources enhanced teachers' understanding of differentiated instruction. The results mirrored Adlam's (2007) findings, and indicated that the majority of teachers in both studies showed a willingness to participate in a variety of professional activities to expand their knowledge of differentiated instruction, from attending workshops, to doing professional readings, to watching educational videos.

In general, both studies revealed similar results. Adlam's (2007) study found that most teachers surveyed were knowledgeable about a variety of differentiated instructional

strategies. However, teachers were not using these strategies as often as they could be. Similar findings were found in the current study. One explanation that Adlam offered was that differentiating instruction takes time to plan and implement, and teachers might not have the time to plan accordingly. Based upon the results obtained in the current study, and to expand on Adlam's explanation, teachers might only use differentiated instruction strategies with which they are familiar and are also comfortable enough to implement them in the classroom. Those strategies that teachers are less knowledgeable about might pose more of a challenge; therefore teachers might be less willing to explore these new techniques if their current instructional strategies are working effectively for them. Thus, it is imperative that school administrators initiate opportunities for exposure to new materials and support their teachers with time to plan and implement diverse differentiated instructional strategies.

A few inconsistent findings were noted between the current study and Adlam's (2007) work, which was performed in Canada. First, provisions for student choice was not a familiar strategy for the teacher respondents who participated in the present study in comparison to those teachers in the previous study, conducted in Canada. This finding suggested the possibility of some cross-cultural differences pertaining to utilizing specific strategies to differentiate instruction. In addition, Adlam did not identify significant relationships between a strategy's familiarity and its usage for three techniques, pre-assessment data to differentiate learning experiences, independent study, and learning contracts. This result might again reflect a cross-cultural distinction in the way educators might be trained in Canada versus the United States. When replicating methodologies involving differentiated instruction, the variable of where the research is being

performed, i.e., the geographic region, should be considered in order to identify both commonalities in differentiated instruction across regions and variations in the findings. Nonetheless, there continues to be a need for school administrators to plan and provide support and resources to teachers trying to differentiate instruction.

Implications

Conclusions drawn from the results for Research Question 1 suggested that the majority of the teachers surveyed were familiar with different strategies that can be used to differentiate instruction. Inferences can be made that teachers who are knowledgeable about different strategies frequently use strategies that are easy and quick to implement and strategies that require low preparation time, (e.g., flexible grouping independent projects, varied instructional materials, and varying questions). Similarly, some of the more complex instructional strategies that require teachers to dedicate time for planning and implementation (i.e., independent study, provisions for student choice, and curriculum compacting) were rarely implemented even by teachers who reported being knowledgeable about various different differentiated instructional strategies. It can be inferred that the extra time needed for teachers to spend planning is a luxury that some teachers do not have. Thus, if schools are to be successful in providing all of their students a fair, equal, and vital opportunity to obtain a high-quality education, principals and superintendents need to support their teachers by providing them with additional time to plan and to implement differentiated instructional strategies that will address the differing needs of each of their students, giving students an increased opportunity to learn to their full potential. For example, teachers who differentiate instruction need to consider curriculum compacting, which may be essential for meeting the needs of gifted students.

Curriculum compacting eliminates repetition of mastered content and/or skills, increases the challenge level of the regular curriculum, and provides time for the investigation of a curricular topic that is beyond the scope of the regular curriculum (Heacox, 2002).

However, it requires teachers to dedicate more time to plan and implement, which is possible only if principals and superintendents provide the additional planning time.

Based on the results of this study, school administrators need to take into consideration how they will address the lack of planning time that teachers need to plan instruction using differentiated instructional strategies that will help to address the needs of all students.

In comparing the variables that relate to familiarity with a strategy and frequency of its use, significant relationships were found in 12 of the 12 strategies. These results suggest that teachers may be familiar with or have limited exposure to specific differentiated instructional strategies, but in spite of this familiarity, they would not necessarily use them in their classrooms. However, it is possible that teachers may not perceive themselves as knowledgeable enough or confident in their ability to implement the strategies in their classrooms. As Adlam (2007) stated, “inherencies from this data suggest that even though teachers are familiar with the specific strategy, it may present difficulties when it comes to implementation” (p. 54). Difficulties related to lack of access to resources and limited time to plan differentiated instruction result in reluctance to use these strategies in the classroom. The findings of this study supported previous research (Robison, 2004; Richardson, 2007) that revealed that teachers must receive meaningful and ongoing professional development in order to enhance their preparation of differentiated curriculum and strategies for implementation of differentiated

instruction in the classroom. Further, the findings of this study supported Hilyard (2004), who stated that differentiating instruction requires teachers to take a more active and meaningful approach to planning and teaching lessons for students, and that teachers who plan for deep understanding must focus on the objectives to be taught and provide best teaching practices. Additionally, the findings of the current study supported several previous researchers, who concluded that teachers who differentiate instruction must take into account their students' academic needs, are responsive to the differing needs of each of their students, giving each an opportunity to learn to his or her full potential, and strategically plan instruction that is tailored to reach the needs of their diverse students (Hilyard, 2004; Yatvin, 2004; McComb & Miller, 2009; Gregory & Chapman, 2007). One way principals and superintendents can support teachers is through meaningful and ongoing professional development tailored to increase teachers' knowledge of differentiated curriculum and how to implement differentiated instructional strategies.

Findings from the results for Research Question 2 suggested that teachers generally differentiated instruction in Language Arts and Mathematics. However, it should be noted that teachers in this study were mostly assigned to teach Language Arts and Mathematics (see Table 1) which would naturally contribute to the results obtained. In spite of this fact, one reason that teachers differentiated instruction in these subject areas could be that more time was allocated, on a daily basis, to teach Language Arts and Mathematics. Another reason, perhaps, could be that teachers who teach the same students every day are able to become familiar with each of their student's needs, and therefore differentiate instruction to respond to each of their student's individual needs. One reason that perhaps explains why differentiating instruction was not used as often in

Science and Social studies could be that less instructional time was allotted for these subjects, as well as in subject areas such as physical education, French, music, and art that perhaps were generally taught less frequently than once a week. Data from the current study indicated that differentiated instruction was least used in music, French, and drama. This finding may possibly have occurred because teachers had too many students on a daily basis and also perhaps because the lack of meaningful knowledge about the students they taught made it extremely difficult to differentiate instruction for every student in each class. However, teachers should differentiate instruction across grade levels and content areas to meet the needs of all their students (Gregory & Chapman, 2007).

Conclusions drawn from the results for Research Question 3 suggested that teachers identified knowledge and experience, availability of materials, and planning time as the factors that helped the most when implementing differentiated instruction in the classroom. The availability of materials both helped and hindered the implementation of differentiated instruction. Likewise, teachers indicated that amount of planning time both helped and hindered differentiated instruction. Based on the data, one can conclude that if there was sufficient planning time, teachers would differentiate their instruction; but if time was not available, or limited, then teachers would not differentiate their instruction.

It can be inferred that the more knowledge and experience teachers had, the more likely these factors contributed to the strategies that teachers used to differentiate instruction. It can also be inferred that teachers differentiated instruction if materials were readily available to use. Finally, it can be inferred that teachers differentiated instruction

if they had more time to plan differentiated instruction, especially planning instruction and implementing strategies that required more time to develop.

Conclusions drawn from the results for Research Question 4 suggested that the factors that hindered implementation of differentiated instruction in the classroom were the same factors that helped when implementing differentiated instruction, including the availability of or lack of materials and planning time. Based on the data, one can conclude that teachers were willing to use materials if they were readily available. However, if these resource materials were not available, then teachers would not use them to differentiate their instruction. For the reasons previously stated, school administrators need to be cognizant of these needs and continuously plan to provide resources and ongoing professional development that will facilitate teachers' implementation of differentiated instruction strategies.

Recommendations

The purpose of this study was to investigate teachers' knowledge and use of differentiated instruction that could be valuable to principals and superintendents interested in providing teachers with the resources necessary to support them. The results of this study indicated that teachers surveyed were knowledgeable about different strategies they can use to differentiate instruction; however, teachers were not using all the strategies about which they were knowledgeable to differentiate instruction. Previous research regarding teachers' knowledge and use that was completed with elementary school teachers yielded the same results (Adlam, 2007; Hilyard, 2004; Richardson, 2007). However, comparisons between elementary school teachers' and high school teachers' knowledge and use of differentiated instruction cannot be made because prior

studies have only been completed at the elementary level. I recommend that future researchers examine high school teachers' knowledge and use of differentiated instruction and then compare their results to the results found with studies conducted with elementary school teachers. The findings could confirm what knowledge, resources, and training or professional development that teachers, at all grade levels, may need in order to differentiate instruction. This information could be valuable to principals and superintendents interested in providing the resources necessary to support teachers, regardless of grade level, with the resources needed to implement differentiated instruction.

The participants in this study also identified the lack of planning time as a factor that hindered their planning and implementation of differentiated instruction. This finding provided implications for future research related to planning time in elementary schools. One plan that administrators could consider when planning teachers' schedules for the year, is ensuring that one daily prep period per week is specifically used towards expanding teachers' knowledge and preparation of differentiated instruction strategies, for example, by logging into an online resource site for the time of their planning period and working on a project or strategy development to present at a team meeting during the school year (A. Siler-Knogl, January 31, 2012, personal communication). Another suggestion is that administrators could provide a Differentiated Instruction video of the month and require that teaching faculty view it during their assigned differentiated instruction weekly prep time in that month. Videos could be checked out of the office and administrative personnel or support staff could keep a log of teachers who have checked out the film, in this way administrators would have a system of checks and balances and

can be accountable for ensuring that their faculty are consistently accessing and exposed to new resources to expand their knowledge and improve their instructional strategies (A. Siler-Knogl, January 31, 2012, personal communication). Future researchers could consider conducting a study to address how elementary school schedules might be redesigned to provide teachers with extended preparation time. Investigating differences between elementary and high school models, including block scheduling at the high school level, could yield some interesting results based on the unique characteristics of block scheduling, including an emphasis on how planning time differs at different levels. Studies on how differences impact scheduling at different levels could have a positive effect on elementary scheduling concerns.

The purpose of this study was to investigate teachers' knowledge and use of differentiated instruction that could be valuable to principals and superintendents interested in providing teachers with necessary resources and support. Differentiating instruction merits further investigation and study because it is a strategy that teachers can use to meet the diverse learning needs of all students effectively. Because this study did not include an observation instrument to evaluate teachers using strategies to differentiate instruction, future studies could be conducted that would utilize an instrument during a classroom observation to identify the strategies teachers are implementing in the classroom. Thus, future research could contribute to increased validity and reliability of future studies. Future researchers could also consider examining the extent to which professional development has been used to support the process of differentiated instruction. Finally, future researchers could also examine the effectiveness of professional development in the implementation of differentiated instruction. Based on

the findings of this study, which were generally consistent with the results of the original researcher (Adlam, 2007), I recommend that teachers be given time to work collaboratively with their colleagues, at the same grade levels and/or subject areas in order to establish differentiated instructional methods that will meet the needs of their students. In addition, the results of this study support the claim that principals and superintendents must provide teachers with a variety of professional development opportunities that relate to, and deal with the implementation of differentiated instruction.

Summary

The purpose of this study was to analyze elementary school teachers' knowledge and use of differentiated instruction as well as to identify the factors that helped or barriers that hindered the implementation of differentiated instruction. Another purpose of this study was to identify the supports that teachers need to be successful in differentiating instruction. Consistent with the original researcher's study (Adlam, 2007), the current results also demonstrated that teachers continue to have a need to be provided with the identified supports, if they are to consistently implement differentiated instruction on a daily basis and in all content areas. The results of this study should help principals and superintendents plan and provide the supports (i.e., planning time, availability of materials, and professional development opportunities) that address the identified needs. Providing teachers with the resources they need to differentiate instruction will enable teachers to become proficient in their implementation of the 12 differentiated instructional strategies examined. As Jones stated,

Differentiating instruction requires teachers to transform their practices from a program based pedagogy to a student-based pedagogy while

focusing on what is taught and by using a curriculum model that will empower teachers to create lessons that will enable students to connect content with their own interests, which in turn increases students' knowledge and learning experiences in the classroom. (As cited by Adlam, 2007, p. 12)

It is through the support that principals and superintendents provide that teachers may have a chance to be successful in implementing differentiated instruction that may ultimately contribute to meeting the needs of each of their individual students.

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Appendix A
Consent Letter for Principals

Dear Principal:

My name is Alixa Rodriguez. I am currently pursuing my doctorate through Olivet Nazarene University in Bourbonnais, IL. As a doctoral student, it is my desire to investigate teachers' knowledge in differentiated instruction.

At this time I am requesting permission to send your teachers information introducing my research topic and to invite the teachers to participate in the research by first completing a consent form agreeing to participate in the research and secondly by completing a survey that will be available to them. The goal of the research study is to obtain information that will assist in answering the following research questions:

1. How knowledgeable are teachers in strategies they can use to implement differentiated instruction?
2. How often are teachers using differentiated instruction in specific subject areas?
3. What factors help teachers trying to implement differentiated instruction in the classroom?
4. What factors hinder teachers trying to implement differentiated instruction in the classroom?

This study aims to identify the supports teachers need to be successful in differentiating instruction in order for school principals and superintendents to plan professional development sessions that will address the identified needs.

I am the sole researcher in this project and will be the only one contacting the teacher or yourself about this study. Teacher participation is voluntary and their identity will be anonymous. Teachers will not be identified in this dissertation by name.

If you have any questions concerning my request, please do not hesitate to contact me at 773-829-3252. Thank you for considering my request.

Sincerely,

Alix Rodriguez
2322 N. Lawndale Avenue
Chicago, IL 60647
alixarodriguez@yahoo.com

Appendix B

Consent to Participate Letter for Teachers

Dear Teacher:

My name is Alixa Rodriguez. I am currently pursuing my doctorate through Olivet Nazarene University in Bourbonnais, IL. As a doctoral student, it is my desire to investigate teachers' knowledge in differentiated instruction.

I am interested in collecting a one-time survey to be completed by elementary teachers who are using differentiated instruction as a strategy to meet the needs of their students. The data collected will be reviewed only by me. The data will be kept confidential in a locked filing cabinet and destroyed after three years. Your participation and willingness to share information about differentiated instruction will add valuable data to the research.

Your participation in this study is voluntary. You are free to choose not to participate or to withdraw from completing the survey.

You are free to ask questions about the study before you participate. I would be happy to share my findings with you after the research is completed. Your name will not be associated with the research in any way and will be known only to me.

There are no known risks or discomforts associated with this study. Please sign your consent form to participate, indicating that you have full knowledge of the purpose of the study.

My contact information as well as my mentor's information is provided below.

Alix Rodriguez
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Signature of Participant

Date

Appendix C

Differentiated Instruction Questionnaire

Differentiated Instruction Questionnaire

The purpose of the following survey is to investigate the knowledge elementary teachers possess in using differentiated instruction their classrooms.

Participation in this research is voluntary. In choosing to complete the following survey you are agreeing to participate in the following study. The survey will take approximately 10-15 minutes to complete. Confidentiality is assured. Return of the survey to the researcher acts as the participant's consent for their responses to be compiled with others. Please understand that use of this data will be limited to this research, as authorized by Olivet Nazarene University. Data (survey results) will not be shared with **ASPIRA**. They will receive a final report once the study is complete.

Your gender: ☐ Male ☐ Female

Currently teaching in the following:

- ☐ General Education Program
- ☐ Bilingual Education Program
- ☐ English as a Second Language Program
- ☐ Special Education Program
- ☐ OTHER (Please specify): _____

How many years of teaching experience do you have as of June, 2010?

_____ years and _____ months

Teaching qualifications:

- ☐ Primary-Grade K-5
- ☐ Middle-Grade 6-8
- ☐ High School-Grade 9-12

Current teaching assignment (grade level):

- | | | | | | | | |
|--------------------------------|----------------------------|------------------------------|----------------------------|------------------------------|----------------------------|------------------------------|----------------------------|
| <input type="checkbox"/> JK/SK | <input type="checkbox"/> 1 | <input type="checkbox"/> 1/2 | <input type="checkbox"/> 2 | <input type="checkbox"/> 2/3 | <input type="checkbox"/> 3 | <input type="checkbox"/> 3/4 | <input type="checkbox"/> 4 |
| <input type="checkbox"/> 4/5 | <input type="checkbox"/> 5 | <input type="checkbox"/> 5/6 | <input type="checkbox"/> 6 | <input type="checkbox"/> 6/7 | <input type="checkbox"/> 7 | <input type="checkbox"/> 7/8 | <input type="checkbox"/> 8 |

Other: _____

Subject areas you currently teach:

- | | | | |
|--|--------------------------------------|---|---|
| <input type="checkbox"/> Language Arts | <input type="checkbox"/> Mathematics | <input type="checkbox"/> Science | <input type="checkbox"/> Visual Arts |
| <input type="checkbox"/> Music | <input type="checkbox"/> French | <input type="checkbox"/> Social Studies | <input type="checkbox"/> History |
| <input type="checkbox"/> Geography | <input type="checkbox"/> Drama | <input type="checkbox"/> Health | <input type="checkbox"/> Physical Education |

1. Do you use differentiated instruction in your classroom? ☐ Yes ☐ No

If answer is no, please continue with question 9.

2. Are you familiar with the following instructional and management strategies?

	YES	NO
Learning Contracts agreements between student and teacher where certain freedoms are put in place for designing and completing work	<input type="checkbox"/>	<input type="checkbox"/>
Tiered Assignments multiple assignments given to different students at the same time that are related to the same concept or topic but differ in complexity.	<input type="checkbox"/>	<input type="checkbox"/>
Independent Projects/Investigations investigation of a topic/problem of interest to a student, resulting in a product that shows the student's ability to apply skills and knowledge to the topic/problem	<input type="checkbox"/>	<input type="checkbox"/>
Independent Study a long-term research investigation	<input type="checkbox"/>	<input type="checkbox"/>
Curriculum Compacting pre-testing students before a unit and then eliminating instruction in areas of competence	<input type="checkbox"/>	<input type="checkbox"/>
Interest Centers/Interest Groups vehicle for providing students with meaningful enrichment when required assignments are complete	<input type="checkbox"/>	<input type="checkbox"/>
Learning Centers/Learning Stations collections of materials where students explore topics or practice a set of skills	<input type="checkbox"/>	<input type="checkbox"/>
Varied Instructional Materials in the same lesson using materials according to student readiness, interest, cultural differences, or other areas of student difference	<input type="checkbox"/>	<input type="checkbox"/>
Provisions for Student Choice about content, process, and/or product	<input type="checkbox"/>	<input type="checkbox"/>
Flexible Grouping grouping of students for instruction or completion of a specific task or assignment; groups change as needed based on students' abilities, interests, and/or readiness	<input type="checkbox"/>	<input type="checkbox"/>
Varying Questions varying the sorts of questions posed to learners in discussions and on tests, based on their readiness, interests, and learning styles	<input type="checkbox"/>	<input type="checkbox"/>
Pre-Assessment Data to Differentiate Learning Experiences based on content, process, and/or product	<input type="checkbox"/>	<input type="checkbox"/>

3. How often do you use these strategies in your classroom?

	ALWAYS (DAILY)	FREQUENTLY (WEEKLY)	SOMETIMES (MONTHLY)	NEVER
Learning Contracts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tiered Assignments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Independent Projects/Investigations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Independent Study	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Curriculum Compacting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interest Centers/Learning Stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Learning Centers/Learning Stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Varied Instructional Materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Provisions for Student Choice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flexible Grouping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Varying Questions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pre-Assessment Data to Differentiate Learning Experiences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. In what subject areas do you differentiate your instruction? (Please check all that apply)

- ☐ Language Arts ☐ Mathematics ☐ Science ☐ Visual Arts
☐ Music ☐ French ☐ Social Studies ☐ History
☐ Geography ☐ Drama ☐ Health ☐ Physical Education
☐ OTHER (Please specify): _____

5. Please indicate how often you differentiate your instruction in the following areas:

	ALWAYS (DAILY)	FREQUENTLY (WEEKLY)	SOMETIMES (MONTHLY)	NEVER
Language Arts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Math	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social Studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
History	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Geography	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Health	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Education	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drama	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Music	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Visual Arts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
French	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Please indicate how important using Differentiated Instruction is in the following:

	VERY IMPORTANT	SOMEWHAT IMPORTANT	NOT IMPORTANT
Lesson Planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lesson Delivery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assessment & Evaluation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. What factors do you think help your ability when implementing Differentiated Instruction in your classroom? (Check all that apply)

- | | |
|---|---|
| <input type="checkbox"/> Administration/School Leadership | <input type="checkbox"/> Parent Expectations |
| <input type="checkbox"/> Range of diversity in classroom | <input type="checkbox"/> Support of other staff |
| <input type="checkbox"/> Availability of materials | <input type="checkbox"/> Knowledge and Experience |
| <input type="checkbox"/> Amount of Planning Time | <input type="checkbox"/> Staff Development |
| <input type="checkbox"/> OTHER (Please specify): _____ | |

8. What factors do you think hinder your ability when implementing Differentiated Instruction in your classroom? (Check all that apply)

- | | |
|---|---|
| <input type="checkbox"/> Administration/School Leadership | <input type="checkbox"/> Parent Expectations |
| <input type="checkbox"/> Range of diversity in classroom | <input type="checkbox"/> Support of other staff |
| <input type="checkbox"/> Availability of materials | <input type="checkbox"/> Knowledge and Experience |
| <input type="checkbox"/> Amount of Planning Time | <input type="checkbox"/> Staff Development |
| <input type="checkbox"/> OTHER (Please specify): _____ | |

9. What resources would you be willing to use in order to enhance your knowledge and understanding about differentiated instruction? (Check all that apply)

- | | | |
|--|--|---------------------------------|
| <input type="checkbox"/> Staff/Professional Development | <input type="checkbox"/> Reading (Books, Journals) | <input type="checkbox"/> Videos |
| <input type="checkbox"/> What other comments do you have that you think are important to this study? | | |

Thank you for taking the time to complete this survey. I sincerely appreciate your time, effort, and honest responses.

Appendix D

Written Permission Letter to use Questionnaire



Mrs. Green Duren – Principal
Mrs. Beth Adlam – Vice Principal
Mrs. Carol Tristano – Secretary



CONCORD PUBLIC SCHOOL

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Windsor, Ontario
N8S 2A1



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Fax (519) 974 - 3825

January 15, 2010

To whom it may concern,

I am writing this letter for Ms. Alixa Rodriguez, a Doctoral Student at Olivet Nazarene University. She has requested permission to utilize the survey created for my research thesis;

E. Adlam. (2007). *Differentiated instruction in the elementary school: Investigating the knowledge elementary teachers possess when implementing differentiated instruction in their classrooms.*

Through use of the survey, my study investigated teachers' knowledge about differentiation; how often teachers differentiate in specific subject areas; and factors that help or hinder the implementation of differentiated instruction.

It is my hope that by using my survey, Ms. Rodriguez will be able to conduct her own research that will help identify strategies that teachers implement most in differentiating instruction and to address how a school district can assist teachers in implementing the strategies they do not implement for one reason or another.

I am **granting permission** to Ms. Rodriguez to utilize this survey for her own research study.

Should you require any further assistance please feel free to email me at the address below.

Sincerely yours,

Mrs. E. Adlam

Mrs. Elizabeth Adlam
Vice Principal, Concord Public School
Greater Essex County District School Board

eizabeth_adlam@gecdsb.on.ca