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TEACHERS’ PERCEPTIONS TOWARD ENHANCING LEARNING THROUGH MULTIPLE INTELLIGENCES THEORY IN ELEMENTARY SCHOOL: A MIXED METHODS STUDY

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ABSTRACT

The purpose of this study was to investigate the effects of multiple intelligences theory on elementary students’ academic achievement and to investigate teacher perceptions of multiple intelligences theory. The multiple intelligences school that was chosen for this study was Edwin Rhodes Elementary School. The study examined Edwin Rhodes Elementary School performance via the California Academic Performance Index. Edwin Rhodes School scores were compared with similar traditional school scores and with gifted and talented scores. The study found that the multiple intelligences school performance was between traditional and gifted and talented school performances. The study also explored teachers’ perceptions at Edwin Rhodes School toward multiple intelligences theory using a cross-sectional survey. The results of the study showed that teachers were familiar with the theory of multiple intelligences, but they did not have formal education about it, either in a teacher education program or through professional development.
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CHAPTER 1

Introduction

In 1983, a new theory in psychology was introduced (Gardner, 1993). This theory opened a new horizon not only in psychology but also in education. Gardner (2006) stated that humans have strengths in some areas and weaknesses in other areas. The strengths, as well as weaknesses, should be recognized and developed and some should be improved. Belief in a multiple intelligences theory led to the belief that everybody is intelligent. The theory introduced eight main intelligences: musical, linguistic, logical-mathematical, spatial, interpersonal, intrapersonal, bodily-kinesthetic, and naturalist. According to Gardner (2006), it is possible to include additional intelligences to the eight intelligences in the future. Gardner (2006) stated that intelligences such as the mechanical intelligence and existential intelligence can be added. Gardner’s theory shifted from psychology to education to better understand ways students learn (Hoerr, 2002). Understanding how students learn according to their strengths will be positively reflected on their achievement and success in school (Hoerr, 2002). Multiple intelligences theory became part of many educational systems and has been implemented in classrooms. Results have shown that multiple intelligences theory has developed students’ achievement and increased their learning motivation (Hoerr, 2002).
Statement of the Problem

Since multiple intelligences theory was implemented in schools, studies have been conducted to test the effects of applying multiple intelligences theory in the classrooms (Hoerr, 2002). This theory has been implemented for 14 years in schools (Hoerr, 2002). According to the data available in 2002, 41 schools that adopted multiple intelligences theory reported that 78% of the students had increased their achievement on standardized tests (Hoerr, 2002).

These studies were very broad and not limited to one specific group. The studies included the effect on traditional students, gifted students, and students with disabilities. The studies also included several subjects such as math, reading, and spelling. The studies examined not only outcomes but also the effect of multiple intelligences theory on students’ attitudes as well as teacher attitudes. However, studies on teachers’ perception of multiple intelligences theory were limited.

Most of the studies that were done in the field did not compare the outcomes of two different groups, such as traditional students with gifted students, or traditional students with students with disabilities. Introducing multiple intelligences theory may not be something new; however, providing a study that compares two different groups of identified students will provide new results in the field of multiple intelligences theory.

Purpose of the Study

Terminology is a barrier in education. Labeling students based on their test scores, such as *high-ability students, gifted, traditional* and so on, is a hidden message that educators are sending to students. Students within each labeled area learn that this label is the scale for their abilities. With that understanding, students’ success is what is expected of them and not what they can truly achieve.
The purpose of this study was to explore a school adopting multiple intelligences theory to determine how traditional students can profit from multiple intelligences instruction and if their achievement can be aligned closer to the achievement of gifted students. In other words, the study explored if the core of the multiple intelligences theory is true: all students are gifted; they need to know their strengths to be able to reach the highest level of achievement. The study also described the teachers’ perceptions toward using multiple intelligences theory in classroom.

**Research Questions**

1. How frequently do teachers at Edwin Rhodes Elementary school implement Gardner’s multiple intelligences theory?
2. What are the teachers’ perceptions at Edwin Rhodes Elementary school toward the multiple intelligences theory?
3. How does multiple intelligences theory increase the level of achievement of traditional students at Edwin Rhodes Elementary school when their achievement is compared to a similar traditional school?
4. How does multiple intelligences theory increase the level of achievement of traditional students at Edwin Rhodes Elementary school when their achievement is compared to students at a gifted and talented school?

**Definitions**

For the purpose of the study the following terms were applied:

*Academic Performance Index (API) reports* were defined by the California education department as the academic accountability system used for the levels K-12. API scores are between 200 at the lowest and 1,000 at the highest. API measures school performance according to the student achievement in statewide testing. API assessment is the result of the standardized
testing and reporting program (STAR), which measures students’ abilities in English art, math, history, and science (California Department of Education, 2009).

There are two different API reports, Growth and Base reports. The Growth report measures the improvement of a school by comparing the API results from year to year. Growth reports include changes in achievement. The API Base report is calculated from results of state wide testing. Indicators for Base and Growth reports are the same and tests used in comparison are tests of the same weight (California Department of Education, 2009).

In 2009, the State Board of Education approved some changes to the API reports starting in 2008-2009 (California Department of Education, 2009). The changes are the following:

- Grades 3 & 7: California Achievement Test, 6th edition survey was excluded from 2008 Base API report because funding was removed from 2008-2009 budget bill.
- Grades 3 through 5: California Modified Assessment is based on customized achievement standards. In 2008, the State Board of Education approved performance levels for California Modified Assessment for grades 3 through 5 (California Department of Education, 2009).
- In 2009 California Modified Assessment included grades 6 through 8.

Gifted students are students capable of performing at advanced levels of achievement in areas related to creativity, leadership, logic, and more (U.S. Department of Education, 1993). Gifted students in most studies are identified according to their IQ score (Renzulli, n.d.). Other studies identified gifted students according to the students’ ability to be creative or based on teacher nomination (Renzulli, n.d).

Traditional students are students who are not identified as gifted students, and students who are not identified as students with disabilities. Traditional students are students with an
average IQ score. Traditional students are enrolled in traditional schools. Traditional school is identified as “an established environment designed to provide a comprehensive education to the general public to which assignment of students is made more on the basis of geographical location than on unique educational need” (Aron, 2003, p. 7).

Limitations of the Study

During the planning phase there were 29 participants who were teachers at Edwin Rhodes Elementary School. During the data collection phase, the number dropped to 22. The data collected covered academic years 2004-2008. The views expressed teachers’ perceptions toward multiple intelligences theory and practices to the theory.

Delimitation of the Study

I limited the API scores collected for the research site to scores available from the established research year to 2008. At the time data were collected and analyzed, the API score for 2010-2011 was not available. For validity purposes, I chose four academic years (2004-2008) instead of two for data collection and analysis.

Assumptions

The following assumptions guided this study.

- The control sites of the study were not implementing multiple intelligences theory in their teaching instruction or in their educational goals and philosophy.
- Teachers at Edwin Rhodes School had knowledge and experience with multiple intelligences theory.
- Participants in the survey would provide honest and trustworthy responses to the study survey.
- API scores are an effective measure of achievement.
Significance of the Study

The study assisted in providing evidence that Gardner’s (2006) theory about human performance can be used to support student development and improve learning. The study introduced a new perspective of a current theory used widely in education, i.e., multiple intelligences theory. Additionally, the comparison in the study provided a deeper analysis for both groups: traditional students and gifted students. This analysis helped in determining future needs. Furthermore, all students can be classified as gifted if they are educated in a way that addresses their strengths and improves their weaknesses. This study sought to broaden the knowledge of multiple intelligences theory practice in classrooms and provide information to educators about teachers’ experiences who had adopted multiple intelligences theory.
CHAPTER 2

Literature Review

Gardner (1993) introduced a new theory in psychology. This theory gave the term *intelligences* a new approach. The theory addressed the need to organize and classify humans’ intellectual element based on cognitive, cultural, and scientific abilities (Gardner, 1993). The core of Gardner’s theory was based on the belief that every person is intelligent in more than one aspect. The term *intelligence* is not limited to the ability to solve a complicated math problem, but also the ability to communicate, listen to music, and more. Gardner’s theory is based on the belief that humans have strengths in some areas and weakness in others; the areas of strength are the *intelligences*. Since the theory was introduced, many educators have transferred this theory to the classroom, in all levels and for all students, both traditional and gifted. The literature review provides many studies and reports the results of applying Gardner’s theory not only in the United States but worldwide. The literature review shows research on multiple intelligences theory is applied in only one direction, either in traditional classes or gifted classes but never comparing the two different groups. This literature review is divided into several parts. The first part presents the theoretical foundation of multiple intelligence theory. The second part defines multiple intelligences; the third part critiques multiple intelligences. The fourth part clarifies multiple intelligences in practice. The final segment of the literature review presents the need for change and the need for additional studies on multiple intelligences theory.
Theoretical Foundation

Identifying and measuring intelligence is a debatable topic that is still one of the most important issues to be discussed. Some theorists believe that intelligence can be measured whereas others believe that intelligence is not measurable because giftedness is limitless. These debates have introduced several concepts to the term intelligence. The considerable history of studies on intelligence enriched the theory of multiple intelligence. Several movements in the field of human psychology led in different directions in analyzing human intelligence. The following reviews briefly highlight some of the major movements in understanding intelligence.

Jean Piaget. Piaget’s theory of intelligence produced a shift in how intelligence was measured. Piaget worked with Simon, the co-founder of Binet-Simon test (Plucker, 2007a). Through his work, Piaget realized that standardized tests were not leading to the real meaning of intelligence. He noticed that children who were taking the Binet-Simon test were making the same mistakes over and over. This observation led him to the belief that there is something wrong with the test rather than the children’s abilities (Piaget, 1950). Moreover, Piaget was curious about how the human brain developed knowledge. He noted that intelligence was a type of adoption through cognitive structure (Piaget, 1950). This format has a unique system of accepting knowledge and organizing it. Because this system is different from one individual to another, Piaget called it schema. Piaget’s theory of intelligence inspired many scholars to think outside the realm of standardized testing.

Louis Leon Thurstone. Thurstone’s research in the field of psychology can be determined as the first piece in the theory of multiple intelligences. Thurstone (1938) introduced the Primary Mental Abilities theory. Thurstone developed 57 tests from tests results collected from 240 college students (Thurstone, 1938). Thurstone analyzed the results of the tests and
developed his theory of primary mental abilities (Thurstone, 1938). In his theory, Thurstone stated that to be able to identify intelligence one must analyze seven mental abilities, which include verbal comprehensive, word fluency, number, space, associate memory, perceptual speed, and reasoning skills (as cited in Plucker, 2007b). Introducing seven components as part of intelligence led to the theory of multiple intelligences.

**Edward L. Thorndike.** Thorndike (1911/2000) was known for his studies on animal behavior. These studies led Thorndike to develop the law of effect (Thorndike, 1911/2000). The law of effect was based on the idea that there are several responses to the same situation depending on the individual (Thorndike, 1911/2000). During the 1920s, Thorndike developed a new intelligence test that was the foundation for the modern intelligence test (Plucker, 2007c). The test was designed to measure different things—completion, arithmetic, vocabulary, and directions, and called the CAVD test (Plucker, 2007c). Thorndike (1912) believed that the ability to perform a task is something with which a person is born. On the other hand, intelligence is something a person can gain through experience and training and can change with maturity (Thorndike, 1912).

Thorndike’s studies developed a new concept of intelligence. The new idea was that there are different intelligences. Thorndike stated that there are four elements of intelligence. These elements include: altitude, which is the ability to solve complicated problems and complex tasks; width, which includes the ability to accomplish multiple tasks; and area, whereby both altitude and width function together. The fourth element refers to the speed a person takes to complete the given task (as cited in Plucker, 2007c). Thorndike’s study of intelligence was the key to the idea of multi-intelligences and opened new horizons in the field of intelligence.
**Lewis Terman.** In 1916, Terman translated the Binet scale (as cited in Plucker, 2007d). Terman’s translation was the most successful version which he renamed the Stanford-Binet test (Plucker, 2007d). Terman’s research focused solely on the Stanford-Binet test. Terman believed the Binet IQ test was not functioning properly because it was developed according to the French experience and need (Plucker, 2007d). Terman added new items and set up new age standards to the Binet IQ test to make the test workable in an American environment (as cited in Hilgard, 1904). However, the new American version of the IQ test was limited to children only and not intended for adults (Plucker, 2007d).

**Alfred Binet.** Alfred Binet is considered the father of the intelligence test known as the Intelligence Quotient (IQ) test. The idea of IQ testing began in 1904 when a French professional group interested in child psychology wanted to find a tool to identify children with different needs (Hilgard, 1904). Binet, along with his colleague Simon, developed a scale to measure a child’s ability to answer sets of questions. These questions were divided into different levels, from the easiest to most difficult; however, this scale was not leading to understanding anything other than whether the child was able to answer the questions or not (as cited in Hilgard, 1904). For that, Binet started working on new scale that would lead to the level of intelligence (Plucker, 2007e). In 1908, Binet was able to present the new test, which was revised in 1911 (as cited in Hilgard, 1904). The scale Binet created was a major change in the field of psychology that introduced a new type of testing and is considered one of the first intelligence testing scales.

**Howard Gardner and multiple intelligence.** Gardner is the father of the multiple intelligences theory. Gardner was influenced by different theorists, such as Piaget, and was inspired by Thurstone’s notion about intelligence. The theory started in 1983 (Gardner, 1993). Gardner believed that human mind performance cannot be measured by one single tool, such as
the Alfred Binet scale. The core idea of multiple intelligences was to help people recognize their strengths and weaknesses in order to draw out their strength and improve their weakness (Gardner, 2006). Common intelligence tests are designed to measure limited areas, mainly math and linguistic. Gardner stated that there are eight main intelligences, and there is also the possibility to add more (Gardner, 2006). The intelligences according to Gardener are musical, linguistic, logical-mathematical, spatial, interpersonal, intrapersonal, bodily-kinesthetic, and naturalist. The eight intelligences are individually described.

**Musical intelligence.** Musical intelligence is related to the ability to recognize different sounds and rhythms and the ability to use a musical instrument without receiving the proper training (Gardner, 2006). It is also related to the individual’s ability to remember music experiences. Students who have strength in musical intelligence can better learn when there is rhythm and music (e.g., learning the alphabet via song). Musical intelligence may not resemble mathematical intelligence but by definition musical intelligence is just like mathematical intelligence (Gardner, 2006).

**Linguistic intelligence.** Linguistic intelligence is related to spoken and written language. It is the ability to use words effectively in writing, reading, and speech. People with linguistic intelligence strength are capable of writing poetry and novels (Gardner, 2006). Gardner believed that people with high linguistic intelligence are also capable of recognizing the meaning and sounds of the words, rules of language, and using the language effectively (as cited in Jones, 2006). In addition, linguistic intelligence is also the ability to use verbal memory. People who are classified under linguistic intelligence have the ability to recall information about words (Gardner, 2006).
Logical-mathematical intelligence. Logical-mathematical intelligence is related to the ability of reasoning, analyzing, and dealing with numbers (Gardner, 2006). The logical-mathematical intelligence is not limited to the calculation and mathematical problems but also includes the ability to analyze logically. This intelligence includes the ability to find relationships between numbers and patterns (Jones, 2006).

Spatial intelligence. Spatial intelligence is related to the ability to recognize the world and space and present information visually. In other words, it is the ability to use visual memory to judge and create previous visual experiences (Gardner, 2006). People who are strong in spatial intelligence are able to solve puzzles and give directions easily.

Interpersonal intelligence. Interpersonal intelligence is related to a person’s ability to communicate with others, including the ability to build relationships with other people and interact effectively with them. People with strong interpersonal intelligence prefer working within a team and learning collaboratively (Gardner, 2006).

Intrapersonal intelligence. Intrapersonal intelligence is related to the ability to understand and communicate within a person’s self. It involves the ability to express personal goals, needs, and emotions and recognize what needs. People who are strong in intrapersonal intelligence learn best individually and prefer working alone (Gardner, 2006).

Bodily-kinesthetic intelligence. Bodily-kinesthetic intelligence is related to physical ability. People with strong bodily-kinesthetic intelligence can control their movements and their body and excel in physical activities such as dancing (Jones, 2006). Bodily-kinesthetic people learn best when activity is involved; they prefer learning by doing and touching.

Naturalist intelligence. Naturalist intelligence was added later to the previous intelligences and is related to nature. People who are strong in this intelligence are connected to
nature, know the weather, like animals and plants, and learn best when they are in a nature setting, not in a classroom. People with naturalist intelligence prefer learning what is related to nature more than other subjects (Gardner, 2006).

**Critiques of Multiple Intelligence**

Multiple intelligence theory faced critique as it became a popular theory. Klein (1997) highlighted several points as critiques to Gardner’s theory. Klein stated that multiple intelligence theory is very broad and cannot be used in curriculum design. Moreover, he criticized the definition of some of the intelligences such as the bodily-kinesthetic intelligence. Klein claimed that multiple intelligence theory would define this intelligence as the ability to use the body for high performance. This definition, according to Klein, was not clear. He argued that according to multiple intelligence theory, the answer to a question such as why a person is a good dancer is because that person has a bodily-kinesthetic intelligence, and to ask what bodily-kinesthetic intelligence is, it is the ability to perform a good dance. In other words, multiple intelligence theory definition of bodily-kinesthetic intelligence is like defining dancing as the ability to dance (Klein, 1997).

The overlapping between intelligences was another critique of multiple intelligence theory (Klein, 1997). For instance, a person who is identified as a person with linguistic intelligence includes not only this particular intelligence but also the interpersonal intelligence as well (Klein, 1997). Another critique of multiple intelligence was the lack of evidence of the connection between multiple intelligence theory and students with learning disabilities. Multiple intelligence theory refers to students with learning disabilities as proof of the theory (Klein, 1997). Klein stated that he did not find any learning disability that can be addressed by multiple intelligence theory.
Another major criticism was that multiple intelligence is more like a cognitive style of learning than a theory. Morgan (1992) suggested that the multiple intelligence structure is very close to the cognitive learning styles. Morgan criticized Gardner for labeling abilities as intelligences. Morgan explained the Guilford description of intelligence. Guilford created a model that included three domains: five operations, six products and four content areas. Morgan stated that these domains could elaborate to 120 cells. Some cells present abilities that are measured by standardized tests (Morgan, 1992). Based on Guilford’s description, Morgan suggested that Gardner could adopt Guilford and develop 120 intelligences instead of seven. Morgan criticized multiple intelligence theory for containing theoretical and structural errors.

**Measuring Multiple Intelligence**

The multiple intelligence theory has been used as a learning and teaching model in many schools. It is important to note that Gardner made it clear that multiple intelligences are not programs that can be used or implemented in a classroom. It is a psychological thought that can help in developing a person’s performance and mind (Gardner, 2006). Educators believed that if teachers applied Gardner’s theory, they would be able to explore students’ strengths and deal with their weaknesses and be able to teach the students effectively (Jones, 2006). Many studies were conducted in classrooms and showed a positive effect on students when a multiple intelligence model is adopted in classroom. A discussion of these studies follows.

**Multiple intelligence in the elementary classroom.** A study was done in 2002 that included four different grades (Bednar, Coughlin, Evans, & Sievers, 2002). This study was conducted on kindergarten, third, fourth, and fifth grade students to examine how adopting a multiple intelligence model in math affected students’ achievement and attitudes. Lessons were designed and taught through the eight intelligences Gardner developed. The math lessons
included cooperative learning, games, journaling, graphic organizers, and other activities that were created to meet each of the eight intelligences (Bednar et al., 2002). During the study, students reflected upon their daily learning experience with journals. In addition, students worked as a team to create human graphs and dramatize word problems, and teachers used educational games to enhance students’ learning experience. Activities in the study utilized each of the eight intelligences (Bednar et al., 2002). Students participated in several activities, such as playing a round board game, solving word problems by drawing pictures or creating lists, identifying space and figures through outside activities, geo-boarding, sharing creative stories, drawing a symmetric butterfly, and more activities.

The results of this study in general showed that using multiple intelligence theory to teach math increased students’ achievement and developed positive attitudes toward learning math. Furthermore, the third grade student motivation increased during active participation and decreased during passive participation. Fourth grade students’ post-test results improved from pretest results. For some students, motivation remained the same, but for other students, motivation increased. Fifth grade student results improved significantly. As for the motivation segment, students who were categorized as passive on a motivation scale were moved up to the emerge level. Those students who were in the emerge level moved to the active level. For kindergarten students, their learning achievement did not increase, perhaps because of their young age (Bednar et al., 2002).

The study in general concluded that students and teachers had positive results, i.e., in attitude toward learning, enjoying the content, and feeling comfortable about the knowledge they gained (Bednar et al., 2002). The result of this study showed that younger students may not be
influenced by the multiple intelligence model because the theory is based on knowing one’s strength and weakness areas, which kindergarten students may not yet recognize.

A different study was conducted on three fifth grade classes in Illinois (Reidel, Tomaszewski, & Weaver, 2003). In this study, there were approximately 30 students per class, 10 and 11 years of age. The study measured the achievement of students and motivation in a reading class when they utilized multiple intelligence theory. The study used pretest and posttest results that examined students’ reading level focusing on three areas of reading. These areas were phonics, vocabulary, and reading comprehension (Reidel et al., 2003). The pretest consisted of 10 questions in phonics, 25 questions in vocabulary, and four short stories with 24 comprehension questions. The researchers of the study utilized multiple intelligence theory by creating a multiple intelligence bulletin board and reading center. The reading center contained files of activities for each intelligence. In addition, the reading center contained models of each of the eight intelligences and had all the materials needed for the activities. Students chose their activities. The reading curriculum was changed every two weeks to cover new skills and strategies; activities were changed as well to fit the new learning goals. A weekly checklist was completed to follow students’ attitudes. The study concluded that students’ motivation toward comprehensive reading increased. The researchers suggested that to obtain these positive results, the multiple intelligence model should be applied for a longer period of time (Reidel et al., 2003).

Another study was conducted in the Republic of Turkey on elementary seventh grade chemistry students (Ucak, Bag & Usak, 2006). (The grade structure in Turkey is different than the United States. Seventh grade is considered primary.) There were two groups of 27 students. The control group applied traditional teaching and learning methods, and the experimental group
applied a multiple intelligence method. The study focused on students’ attitudes toward chemistry and students’ scores in science. The study concluded that students in the experimental group had a more positive attitude toward the content they had learned. When pretest and posttest results were compared between groups, there was a significant difference in student achievement and attitude when they utilized multiple intelligence theory.

The previous studies showed that adopting multiple intelligence theory in elementary school had significant positive effects on students’ achievement and attitudes toward what they learn. These results stated that applying multiple intelligence theory in elementary school, not only in the United States but in different parts of the world, increased students’ achievement and desire to learn.

**Multiple intelligence in middle and high school classrooms.** A study was completed in Kuwait with middle school students, both male and female, to test the effects of adopting multiple intelligence instruction on reading achievement (Al-Balhan, 2006). The study compared the achievement of two groups: the experimental group contained students who were utilizing multiple intelligence instruction, and the control group contained students in traditional classes. The study concluded that students’ achievement in the experimental group was significantly higher than the control group. The study also concluded that female students achieved higher scores than male students within the experimental group (Al-Balhan, 2006).

Another study was conducted in the Republic of Turkey in a high school biology class (Koksal & Yel, 2007). Two groups of students were randomly selected. The study lasted nine weeks. Students in the experimental group learned through multiple intelligence instruction while the control group students were in a traditional setting. The results showed that there were significant differences in the experimental group student achievement when they were in class
based on multiple intelligence instruction compared to traditional instruction students’ achievement. However, the study found no significant differences between the attitudes of multiple intelligence students and traditional students (Koksal & Yel, 2007). It was expected that students would like the multiple intelligence learning style and atmosphere which would change their attitude.

Another study was conducted on eighth grade students in one of the public middle schools in the Republic of Turkey with students aged 13 and 14 (Kaya, Dogan, Gokcek, Kilic, & Kilic, 2007). The intent of the study was to measure the effects of adopting multiple intelligence instruction on students’ achievement and attitudes toward science. The study compared two groups of students; each group consisted of 30 students. The first group, experimental, had to learn science using the multiple intelligence frame, and the other group was taught in a traditional setting and the same content was learned but in the traditional approach. Students’ achievement was measured through a comparison of the results of the pretest and posttest and a comparison of the achievement between the two groups. Student attitude was measured via a questionnaire. The results of the study concluded that there was a significant difference in students’ attitude toward science. In the achievement area, students’ achievement in the experimental group increased when compared with the pretest and posttest results of the control group (Kaya et al., 2007).

A study was done to find effective teaching approaches with different learning styles and effective teaching approaches based on the multiple intelligence theory (Snyder, 1999). The study categorized Gardner’s theory as a learning style. In addition, the study was conducted to find out the relationship between achievement and different learning styles. Students in this study were asked to define their learning preference, such as learning with a group, in a quiet or
noisy atmosphere, learning by doing, or in a formal or informal setting. The students’ answers were the key to identifying their learning styles, i.e., whether they were auditory, visual, or kinesthetic learners. Their answers also determined their areas of strength and weakness based on Gardener’s multiple intelligence theory. The study did not include the naturalistic intelligence. The study concluded that students’ achievement had a significant positive relationship with learning style. Knowing a student’s learning style will increase the student’s achievement. The study found that with gender differences, female students achieved significantly better than male students. Boys in the study were found to be more of kinesthetic learners than girls (Snyder, 1999).

Since multiple intelligence theory was introduced, many studies have been conducted. Most of these studies focused on the achievement increase and improved attitudes in students. A large study that contained 41 schools from the United States and Canada found that 78% of the students had significantly improved their standardized test scores when they utilized multiple intelligence instruction for at least three years. In addition, 80% of schools reported improvement for students with learning differences/disabilities, 78% associating this improvement with multiple intelligence (Kornhaber, Fierros, & Veenena, 2004). This study, known as SUMIT project, showed that multiple intelligence can increase students’ intelligence level. In other words, adopting Gardner’s theory in school from the first grade will help students use their maximum strengths and improve their weakness areas and then all students can be categorized as talented students.

**Multiple Intelligence and Gifted and Talented Programs**

Gardner criticized the way gifted students are identified (Fasko, 2001). In most cases, gifted students are identified through their IQ test score. If their score is 130 or higher, they are
considered gifted. If the score is 129, they are not (Fasko, 2001). The IQ test focuses only on the mathematical and linguistic intelligences. That is the reason Gardner believed that the score is not very reliable and many students have talent but are not gifted in math or linguistics (Gardner, 2006). Students may have strengths in other areas, such as musical or interpersonal, that the IQ test does not recognize. Yet, these two types are just as valuable as mathematical and linguistic intelligences.

In the United States, several programs were designed for gifted students using multiple intelligence instruction. However, the results of applying Gardner’s method were not reported (Fasko, 2001). There are no data available that show that adopting multiple intelligence theory in gifted programs yields any significant differences from applying traditional methods. Even though many programs were designed based on multiple intelligence, such as DISCOVER and START programs, no analysis compared the gifted students to traditional students in similar programs (Fasko, 2001).

**Schools of Success**

Gardener’s theory of multiple intelligence is used broadly in schools as a teaching model (Campbell & Campbell, 1999). The theory helps teachers learn more about how students learn by understanding how the human brain works (Campbell & Campbell, 1999). The students’ positive achievement motivates educators to adopt Gardner’s theory in the educational system. Multiple intelligence theory schools are schools of success; these schools educate more than teach, students gain knowledge, develop their skills, and are able to transfer what they have learned. A discussion of these results follows.

**San Jose Elementary School.** San Jose Elementary School in Florida is an example of a multiple intelligence theme-based school (Seider & Geiger, 2009). Teachers at San Jose school
plan the daily lessons with a focus on all eight intelligences and consider ways to incorporate them in lessons.

**Key Learning Community.** Key Learning Community, located in Indiana, is another example of a multiple intelligence school. The school mission is to invent and research teaching methods and practice by using multiple intelligence theory (Key Learning Community, n.d.). The school focuses on how to strengthen the students’ eight intelligences. Key Learning transferred the multiple intelligence theory to reality. The students’ scores in standardized tests have ranked above average (Campbell & Campbell, 1999). Key Learning believes multiple intelligence do not depend on standardized testing as accurate measurement. Instead, the school developed its own testing scale that measures all eight intelligences (Campbell & Campbell, 1999).

**Howard Gardner School for Discovery.** From the name of the school, one can determine that it is a multiple intelligence school. Howard Gardner School for Discovery (HGSD) is located in Pennsylvania. The school curriculum and instruction is built on multiple intelligence theory. This school does not depend on national standardized testing; the school measures the students’ achievement in several ways such as projects (Howard Gardner School, n.d.). The school developed a learning environment that encourages students to explore their intelligences. The school has a student store, newspaper, art and music, dance, web-blogging, and a picture framing business to strengthen students’ intelligences and develop new skills (Howard Gardner School, n.d.). Multiple intelligence schools are growing because people are looking for life-learning journeys, not test-learning systems.
Multiple Intelligence: Teachers’ Perceptions and Practices

Limited research had been done in Canada to explore teachers’ perception and practices of the theory of multiple intelligence in classrooms. A study was done in 2002 to explore teachers’ perception and practices of multiple intelligence theory (MacLeod, 2002). The study measured the teachers’ perceptions and practices of the theory via survey. In this study responses of 88 teachers were analyzed to address the purpose of the study. The results showed that the majority of teachers participating in the study were at least somewhat familiar with multiple intelligence theory; participants were familiar with Gardner’s theory more than other intelligence theories (MacLeod, 2002). In addition, the results of this study indicated that teachers are using multiple intelligence theory for teaching and assessment strategies. Of the eight intelligences, interpersonal intelligence was the most frequently practiced and musical intelligence was the least practiced.

Moreover, the study explored the barriers teachers face when practicing multiple intelligence theory. The study showed that a lack of professional training was one of the obstacles teachers were experiencing. Other barriers were related to class size, lack of time to prepare and implement multiple intelligence, and lack of resources, such as financial resources (MacLeod, 2002).

Another study was done in 2004 to examine the effects of multiple intelligence theory on the beliefs and attitudes of pre-service math teachers (Leinenbach, 2004). The study was conducted in a private liberal arts institution in Kentucky. Pre- and posttesting were conducted to explore the effects of multiple intelligence theory on pre-service math teachers. The results of comparing pre- and posttests showed that pre-service math teachers’ beliefs toward mathematics and teaching mathematics had improved. Furthermore, interview and multiple intelligence
activities were conducted to collect more data. The study concluded that multiple intelligence theory positively affects pre-service math teachers’ beliefs and attitudes (Leinenbach, 2004).

A different study was done to identify the difficulties of implementing multiple intelligence theory in classroom. The study was conducted to explore barriers on implementing multiple intelligence in a junior secondary school in New Zealand (Scapens, 2007). In this study, four secondary teachers implemented a multiple intelligence based program in a junior secondary context. The results of the study showed an increase in teacher understanding of student diversity. The results also showed that teachers were more creative in their teaching strategies, improved their lesson planning skills, and increased their level of confidence.

The study also explored the difficulties teachers faced. The study indicated that leaders’ support and encouragement are important when implementing a multiple intelligence program. Participants reported that more support and interest from the school principal would be valuable. Another barrier was a lack of training; participants reported that teachers need more training on how to implement multiple intelligence teaching strategies. The study concluded that the major barrier was the external pressure to achieve higher scores in standardized testing; results of the study showed that teachers spend more time with students to focus on testing material than developing the students’ skills (Scapens, 2007).

The previous studies showed that teachers’ beliefs, attitudes and perceptions toward implementing multiple intelligence is very encouraging. The difficulties teachers experience when implementing multiple intelligence in a classroom are not related to the theory itself or to students; these difficulties are related to external circumstances such as leadership and environment.
Need for Further Studies

Believing in the effectiveness of multiple intelligence theory in the field of education will lead to the need to change. Students in traditional classrooms can be classified as gifted students with a simple shift. When using multiple intelligence theory to teach students in a traditional classroom, the content that is taught to students who have been classified as gifted will produce the change. People are waiting for this change. It is a change that will help students to achieve the highest level of their abilities. This change will be the first element in a new educational innovation model and will remove the classification in the educational system. In other words, students will be students. No longer will terms such as gifted or students with learning disabilities be used. Showing that the traditional student can accomplish the same tasks that gifted students can achieve when they are in the gifted enrichment program will be the evidence that all students are intelligent but need to find their strengths and improve their areas of weakness.

Conclusion

Literature supports that multiple intelligence theory has a positive influence on students and teachers. Student achievement increases and attitudes to learning are positively changing. Also, teachers found Gardner’s approach an effective approach to teaching. For gifted students, the literature did not contain data about the influence of utilizing multiple intelligence theory on students’ achievement. Indeed, the literature did not reflect any comparison of gifted programs with other programs that used different models. Comparing two groups of gifted students whereby one uses the multiple intelligence model while the other uses a traditional model will help in reporting clear results of the influence of multiple intelligence theory on gifted students.
It would be significant if the comparison was made between gifted and traditional students to develop a deeper understanding about achievement results.
CHAPTER 3

Methodology

The goal of this mixed methods study was to investigate the possibility of adopting multiple intelligence theory in a traditional classroom to achieve gifted and talented standards. A concurrent design was used as the mixed method design for the purpose of converging both qualitative and quantitative data. A cross-sectional survey was used to seek information about teachers’ perceptions toward multiple intelligence theory and to describe the frequency of implementing Gardner’s theory in classrooms at Edwin Rhodes Elementary School, located in Chino, California. At the same time, data were collected to explore how the implementation of the theory of multiple intelligence in a traditional classroom at Edwin Rhodes Elementary School affected students’ achievement level.

Research Questions

Data collection and analysis intended to answer the following research questions:

1. How frequently do teachers at Edwin Rhodes Elementary school implement Gardner’s multiple intelligence theory?
2. What are the teachers’ perceptions at Edwin Rhodes Elementary school toward the theory of multiple intelligence?
3. How does multiple intelligence theory increase the level of achievement of traditional students at Edwin Rhodes Elementary school when their achievement is compared to a similar traditional school?

4. How does multiple intelligence theory increase the level of achievement of traditional students at Edwin Rhodes Elementary school when their achievement is compared to students at a gifted and talented school?

Study Design

The study was a mixed methods research design. In early 1959, Campbell and Fiske supported the idea of collecting data from multiple forms of qualitative and quantitative data (as cited in Creswell & Clark, 2007). Campbell and Fiske introduced this idea to improve the validity of the research (as cited in Creswell & Clark, 2007). In other words, a mixed methods research design is the process that combines both quantitative and qualitative research methods to provide data, in order to analyze the research questions (Creswell, 2008). This style of research aims to provide better understanding of the research questions and to provide in-depth analysis for the collected data (Creswell, 2008)

Mixed methods research design assists in addressing research questions that cannot be asked using only one approach, i.e. quantitative or qualitative (Creswell & Clark, 2007). For that, I chose to conduct a mixed methods study to address the research questions. The characteristics of mixed methods research design allowed me to explore deeply multiple intelligence theory and to discover the teachers’ perceptions toward multiple intelligence theory.

For the purpose of the study, the mixed methods design was a concurrent design. Concurrent design is a one-phase design, in which the research attempts to collect both quantitative and qualitative data at the same time during the study, but not mixing the data
collected, and separating the analysis (Creswell & Clark, 2007). Researchers use concurrent mixed methods design to expand the results of quantitative and qualitative data by merging separately collected data into one overall interpretation. By using this design, the researcher will have a better understanding of the research questions. The purpose of using this method is to draw a valid conclusion about one complex phenomenon. This model of concurrent design is known as the variant model (Creswell, 2008). This model is designed to expand and validate quantitative findings collected through a survey (Creswell, 2008). The survey that was used in this study combined close-ended questions and a few open-ended questions; both data were within one survey. In this way, research questions of study were addressed through qualitative and quantitative approaches.

The Research Site

The purposeful sampling of this study followed the theory of sampling strategy. Sampling is a strategy used to discover a theory or particular concept (Creswell & Clark, 2007). This strategy allows the researcher to sample a site or individuals because they can assist the researcher to expand and generate a specific theory (Creswell & Clark, 2007). In this research study, one site that experienced multiple intelligence theory was chosen to discover how multiple intelligence theory increases students’ achievement on the California Academic Performance Index (API). The study also described teachers’ perceptions toward multiple intelligence theory at the selected site.

The chosen site for this study was Edwin Rhodes Elementary school. Edwin Rhodes Elementary school is located in Chino, California. It was established in 2003 (Chino Valley Unified, 2010), under Chino Valley Unified District. Edwin Rhodes Elementary is a public school with 616 students enrolled for the 2008-2009 academic year; 67.35% of the students are
Hispanic and 18.7% of the students are on free or reduced lunch (California Public School, 2009). Edwin Rhodes Elementary school had 29 full-time teachers and two full-time administrators (California Department of Education, 2010).

Edwin Rhodes School was the most suitable as a research site for several reasons. Edwin Rhodes School has a unique educational system based on multiple intelligence theory. Edwin Rhodes School follows a university theme. A university theme includes changing terms used typically for a school to university terms, e.g., teachers to professors, students to scholars, school office as admission office and so on (Chino Valley Unified, 2010). Every classroom is named after a high-status university such as Harvard, Stanford, Yale, and more. The core philosophy of the school is based on the belief that every student is gifted and every individual is unique. To address this philosophy, multiple intelligence theory is implemented in the school curriculum to meet the state standards as well as the school philosophy (Rhodes Handbook, 2009). Furthermore, staff development plays a major role at Edwin Rhodes School. Teachers, known as professors at Edwin Rhodes School, are provided with lesson plan samples and current research in the field of intelligence and education (Rhodes Handbook, 2009). Teachers present workshops on implementing multiple intelligence in education at the national level (Rhodes Handbook, 2009). Edwin Rhodes School is a public elementary school that has implemented multiple intelligence theory since 2003 through qualified staff who are recognized as experts in the field of multiple intelligence (Rhodes Handbook, 2009).

Another reason for choosing Edwin Rhodes School as the research site is the school educational system. Edwin Rhodes School’s educational system is very similar to a gifted and talented educational system. In education, one of the most common ways in to deal with gifted students is through enrichment programs. These kinds of programs can be during the academic
year as well as during summer. The enrichment program as a method for developing gifted students has been used worldwide for more than 15 years (Vantassel-Baska, 2003). Enrichment programs have shown their capability of increasing students’ achievement in their strength area. In such programs, gifted students learn through problem solving and critical thinking to solve real problems. Also, field trips, guest speakers, and experimental projects are other learning strategies that have been used in gifted enrichment programs (Vantassel-Baska, 2003). Gifted enrichment programs are based on the nontraditional model that uses different learning styles to meet different students’ needs.

By adopting multiple intelligence theory, Edwin Rhodes School’s learning environment is essentially considered gifted environmental learning. The Edwin Rhodes School theme, philosophy, curriculum design, staff, and goals all follow the principles of gifted programs. Edwin Rhodes School enriches the students’ learning experience by adopting multiple intelligence theory. In addition, Edwin Rhodes School philosophy is built on the belief that all students are gifted.

Data were also retrieved for a gifted and talented school and similar traditional school in order to answer the remaining research questions. The gifted and talented school was similar to the research site; similarity in this case is defined as similarity in school type, enrollment, student demographics, staffing, and state. Both sites follow California Department of Education standards. The only difference was in the students’ category; the research site was designed for traditional students, and the gifted and talented school addressed students who were classified as gifted students.

According to the California Department of Education, gifted schools are designed for students who have achieved a measured intelligence score of 150 or more points on an
assessments of intelligence or have established extraordinary skills and achievement in academic subjects as assessed by both the students’ teacher and principal (California Department of Education, Gifted and Talented, 2010). The gifted and talented school developed a differentiated curriculum that meets the state academic standards and curriculum structure (California Department of Education, Gifted & Talented, 2010). The differentiated curriculum is designed to develop the learners’ skills and abilities in creativity, problem solving, research skills, and advanced content. The gifted and talented curriculum is delivered with suitable instructional models and supported by technology and other appropriate materials.

The other site was a similar traditional school. The similarities between the research site and the traditional school were controlled to include similarity in type, enrollment, student demographics, staffing, and district. The difference was in the instructional methods. The research site was considered a multiple intelligence School, and the other site did not adopt the theory of multiple intelligence in its classrooms.

**Instruments**

**Factual information.** Numeric data that are available in public educational records are known as factual information (Creswell, 2008). Information can include students’ grades, attendance, enrollments, and more in numeric form (Creswell, 2008). These types of information are publicly available and can be accessed without passwords. Numeric data provide the researcher with data and records that the researcher cannot observe directly. For the purpose of this study, the annual report of API was collected from the California State Department of Education.
The California State Department of Education website provided the data and statistics about all the school sites. Data included test scores and reports for all schools in the state of California that are similar to the research site. The California State Department of Education also provided the API score for Edwin Rhodes Elementary School, the gifted magnet school, and the traditional school identified for this study.

The California Department of Education website provided statistical information that was used in selecting a similar traditional school and the gifted and talented school. The data website provided a compare schools function. Using this function, I followed the next steps in choosing schools:

a. Chose Edwin Rhodes Elementary School as the target school.

b. Chose schools like this tab to compare the target school with a similar school.

c. Checked all the values provided in the comparison that were the school type, location, enrollment number, classroom size, staffing and performance. In addition, I controlled the similarities by setting the close to tab value to +/- 5%.

The compare schools function provided information about schools that were +/- 5% close to the research site, Edwin Rhodes School, in structure, state, enrollment, student demographics, and staffing but different in instruction and student classification.

**Cross-sectional survey.** Cross-sectional surveys are broadly used in education (Creswell, 2008). The strength of the survey lies in its capacity to measure human attitudes and perceptions that are complex. Many researchers depend on the survey because it is a fast process in collecting the data, and surveys can identify populations by measuring small groups of individuals (Fink & Kosecoff, 1985; Fowler, 1993). Results from surveys can provide confidence in generalizing the findings (Creswell, 2008).
A cross-sectional survey developed by MacLeod (2002) was conducted to address the research questions. Open-ended and close-ended questions were included in the same survey. The benefit of using both types of survey, open- and close-ended, is to gather more information from participants about the study. Open-ended questions are helpful in exploring the unknown reasons for responses to the close-ended questions (Creswell, 2008). The survey that was used in this study was adapted in part from the study “Teachers' Perceptions and Practices of Howard Gardner's Theory of Multiple Intelligences” developed by MacLeod (2002).

Two sections of the survey were used to address the research questions 1 and 2 of this study. The first section was Teachers’ Perception. This section of the survey consisted of six items; all the items except item 5 were designed to measure the teachers’ perceptions toward multiple intelligence theory.

Question 1 in the Teachers’ Perception section was designed to obtain teachers’ familiarity with multiple intelligence theory using a Likert response scale. Participants were asked to specify their level of familiarity with multiple intelligence theory by choosing one of five responses in the Likert scale, ranging from unfamiliar to very familiar.

Question 2 was developed to obtain data about teachers’ source of knowledge about Gardner’s theory. Question 2 included three parts. Participants were asked to respond by choosing yes or no about their multiple intelligence education. If participants responded by choosing yes a space was provided to specify the type of education they received about multiple intelligence theory.

Question 3 was developed to seek teachers’ familiarity to other intelligence theories using a Likert response scale. Question 3 included two parts. In the first part, participants were asked to specify their level of familiarity with different intelligence theories by choosing one of five
responses in the Likert scale, ranging from unfamiliar to very familiar. A space was provided to add examples of the other intelligence theories with which participants are familiar. In the second part of question 3, participants were asked to indicate how well multiple intelligence theory described intelligence when compared with other intelligence theories by choosing one of five responses in the Likert scale, ranging from poorly to very well.

Question 4 was developed to examine applicability of multiple intelligence theory considering classroom teaching and assessment techniques using a Likert response scale. Question 4 consisted of two parts. For both parts, participants were asked to specify applicability level by choosing one of five responses in the Likert scale, ranging from not applicable to very applicable.

Question 5 was designed to examine the participants’ skill level with multiple intelligence theory. Therefore, question 5 was not employed in this study. The study only measured teachers’ perceptions toward multiple intelligence theory and Teachers’ practices of the theory.

Question 6 was designed to describe the challenges the participants experience when multiple intelligence theory was practiced in the classroom. Question 6 was an open-ended question and empty space was provided. Participants were asked to describe the barriers they experienced when applying multiple intelligence theory in the classroom.

The second section of the survey was developed to obtain teachers’ practices of multiple intelligence theory. This section consisted of 40 statements; each set of statements was designed to explore the practice of one intelligence of Gardner’s eight intelligences. For each of the eight intelligences, there were five statements. Linguistic Intelligence was addressed by statements 1, 9, 17, 25 and 33. The Intrapersonal Intelligence was reflected by statements 2, 10, 18, 26 and 34.
Logical-Mathematical Intelligence was examined by statements 3, 11, 19, 27 and 35. Spatial Intelligence was addressed by statements 4, 12, 20, 28 and 36. Interpersonal Intelligence was reflected by statements 5, 13, 21, 29 and 37. Statements 6, 14, 22, 30 and 38 addressed Bodily-Kinesthetic Intelligence. Musical Intelligence was examined by statements 7, 15, 23, 31 and 39. Naturalist Intelligence was reflected by statements 8, 16, 24, 32 and 40. Participants were requested to respond to each statement using numbers from 1 to 5, 1 indicated that the participant was not familiar with the teaching strategy, 2 corresponded with the awareness of using the strategy, 3 indicated that the participant was using the strategy rarely, 4 signified that the participant was sometimes using the strategy, and 5 indicated that the participant was frequently using the strategy. At the end of this section, a space was provided for participants to add their comments about Howard Gardner’s theory.

**Procedure**

The principal of Edwin Rhodes Elementary School was contacted to obtain permission to participate in the study by surveying the teachers and by using Edwin Rhodes Elementary School as the research site of the study. The final permission was obtained from the assistant superintendent of educational services. Another written permission was obtained from Matthew MacLeod to use the survey in the study titled “Teachers’ Perceptions and Practices of Howard Gardner's Theory of Multiple Intelligences.”

When permission was granted and the survey was ready, the teachers at the research site received an introductory letter that contained the importance of their participation, purpose of the study, and the confidentiality of the study. The teachers received the survey as well via postal mail service with a self-addressed envelope to return the survey anonymously. The survey was sent to the research site address.
Validity

MacLeod (2002) developed the survey that was employed in the study for the purpose of exploring the teachers’ perception toward multiple intelligence theory. The validity of the survey was established by two techniques (MacLeod, 2002). A team of experts from Mount Saint Vincent University and from Halifax Regional School Board reviewed the survey content. After that, the survey was field tested by 12 teachers working in schools. Feedback and comments were reviewed and necessary changes were made to the survey (MacLeod, 2002).

The survey employed in the MacLeod’s study (2002) addressed similar perceptions in the current study. This study measured teachers’ perceptions toward multiple intelligence theory and teachers’ practices. The survey was developed to measure the same variables. For that reason, the survey developed by MacLeod to examine teachers’ perceptions and practices toward Gardner’s theory was conducted in the current study.

In addition, to control the validity of the results, different tools in collecting the data, i.e., survey and factual information, were used. To answer the research questions of the study, cross-sectional surveys were conducted. Moreover, factual information was employed to collect data. Factual information tracks the research site reports in the established date range (2004-2008).

Furthermore, to be able to generalize the findings of the study, the model comparison strategy was employed (Merriam, 1995). The comparison model is a strategy employed to ensure the external validity of the findings. In this model, the description of the sample or research site was done by comparing the sample of the research with similar sites (Merriam, 1995). The study compared the research site data with a gifted and talented school and with a traditional school. All sites were public elementary schools in the state of California.
Data Analysis

The mixed methods concurrent design consisted of one phase. In this design, qualitative and quantitative data were collected and analyzed separately in the same timeframe. The data analysis was presented and analyzed by research question 1 as follows:

1. How frequently do teachers at Edwin Rhodes Elementary school implement Gardner’s multiple intelligence theory?

To address research question 1, section 1 of the survey: Teachers’ Practices was used. This section consisted of 40 close-ended questions and one open-ended question. Each item in this section of the survey measured only one of the eight intelligences. Each of the eight intelligences was measured by five items. The mean of every five items that measured one of the eight intelligences was rounded. For example, statements numbered 1, 9, 17, 25 and 33 measured the teachers’ frequency use of verbal/linguistic intelligence in the classroom; the mean of all five items was rounded to obtain one frequency number and one percentage number that answered the question of how frequently do teachers at Edwin Rhodes Elementary use verbal/linguistic intelligence in classroom. Data were analyzed using the Statistical Package for Social Science (SPSS) version 19.0 for Windows™ using descriptive statistics.

The last question in this section of the survey was an open-ended question. Using a quantifying qualitative approach, all data from the open-ended question were coded by assigning numbers to similar types of responses for each item. The number of times the assigned codes appeared was documented in numeric form. The data were statistically analyzed for frequency and percentage using descriptive statistics. The data analysis was presented and analyzed for research question 2, “What are the teachers’ perceptions at Edwin Rhodes Elementary school toward the theory of multiple intelligence?” To address research question 2, section 2 of the
survey, *Teachers’ Perceptions* was used. The close-ended question’s data were analyzed using SPSS version 19.0 for Windows™. Descriptive statistics were conducted to analyze the data.

To address research question 3, “How does multiple intelligence theory increase the level of achievement of traditional students at Edwin Rhodes Elementary school when their achievement is compared to a similar traditional school?” data were collected from an electronic database. The data were analyzed using inferential statistics. Inferential statistics were used to find the mean differences between the research site and a similar traditional school. The mean of compared groups was based on the API score data for the academic year 2004-2008. The purpose of selecting these academic years was because of the changes the State Board of Education had adapted to the API. The changes made to the API, as introduced in Chapter 1, affected students in grades 2, 3, and 5. API Base and Growth reports for the 2004-2008 academic years were used to compare the differences in mean in school achievement as well as differences in mean based on changes in achievement.

An independent samples *t*-test was used to find out the differences between the means of the two groups. Data were entered into SPSS version 19.0 for Windows™. Data were analyzed statistically. Alpha was set at .05. The hypotheses tested were directional one-tail hypotheses. The research hypothesis was $H_1$: $\mu_1 > \mu_2$

$\mu_1$: was Edwin Rhodes Elementary School

$\mu_2$: was the similar traditional school.

The hypothesis tested the differences in mean between the two groups: the mean of $\mu_1$ was statistically greater than the mean of $\mu_2$.

To address the research question, “How does multiple intelligence theory increase the level of achievement of traditional students at Edwin Rhodes Elementary school when their
achievement is compared to students at a gifted and talented school?” data were collected electronically. The data were analyzed using inferential statistics. Inferential statistics were used to find the mean differences between the research site and gifted and talented school. The mean of compared groups was based on the API score data for the academic years 2004-2008. The reason for selecting these academic years was due to the changes the State Board of Education had adapted to API. The changes made to API, as introduced in Chapter 1, affected students in grades 2, 3, and 5. API Base and Growth reports for 2004-2008 academic years was used to compare the differences in mean in school achievement as well as differences in mean based on changes in achievement.

An independent samples t-test was used to find out the differences between means of the two groups. Data were entered into SPSS version 19.0 for Windows™. Data were analyzed statistically. Alpha was set at .05. The research hypothesis that was tested was $H_1: \mu_1 = \mu_2$

$\mu_1$: was Edwin Rhodes Elementary School

$\mu_2$ was the gifted and talented school.

The hypothesis tested the differences in mean between the two groups: the mean of $\mu_1$ was statistically equal to the mean of $\mu_2$. A summary of the statistical analysis that was used in the study is provided in Table 1.
Table 1

Data Analysis

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data</th>
<th>Statistical Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ 1: Teachers frequently</td>
<td>Survey Section 2</td>
<td>Descriptive statistics for frequency and percentage</td>
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<tr>
<td>RQ 2: Teachers’ perception</td>
<td>Survey section 1, Q1, Q2, Q3, Q4 and Q6</td>
<td>Descriptive statistics for frequency and percentage</td>
</tr>
<tr>
<td>RQ 3: MI and students’ achievement compared to similar traditional school</td>
<td>Factual Information; API scores from 2004-2008 retrieved from CA Department of Ed database</td>
<td>Inferential statistics; tests of significant means</td>
</tr>
<tr>
<td>RQ 4: MI and students’ achievement compared to similar GT school</td>
<td>Factual Information; API scores from 2004-2008 provided by CA Department of Ed database</td>
<td>Inferential statistics; tests of significant means</td>
</tr>
</tbody>
</table>
CHAPTER 4

Results

The goal of this study was to explore a school that has adopted multiple intelligence theory and determine how their achievement aligns with the achievement of gifted students. The study aimed to show that the core of the multiple intelligence theory is true: all students are gifted; they need to know their strengths to be able to reach their highest level of potential. The study also examined the teachers’ perceptions toward using multiple intelligence theory in classroom.

Data Analysis

Research question 1. This research question stated: “How frequently do teachers at Edwin Rhodes Elementary school implement Gardner’s multiple intelligence theory?” Section 2, Teachers’ Practices of the survey was used to address this research question. The survey examined Edwin Rhodes Elementary School teachers’ practices of multiple intelligence theory in the areas of teaching strategies. The teaching strategies were measured through 40 statements, in which participants were asked to indicate how often they use the teaching strategy in the classroom.

The survey contained a total of 40 questions, five for each of Gardner’s eight intelligences. The eight intelligences are linguistic, intrapersonal, mathematical, spatial, interpersonal, bodily-kinesthetic, musical, and naturalist. These five questions were distributed
in the questionnaire with an additional eight questions in between. For example, the Linguistic intelligence questions were numbered 1, 9, 17, 25, and 33. Adding one to each of these questions indicates the questions that relate to the second intelligence, intrapersonal, etc.

This separation or distribution of the questions required an additional step in the analysis using SPSS. The data were entered using the scale codes in an Excel™ spreadsheet then imported to SPSS. The data were entered with the question number being the variable and the records were the respondents. Each respondent value ranged from 1 to 5. The lowest level in the scale was 1, which indicated the unfamiliarity of the respondent to the question asked. On the other end of the scale, 5 reflected the highest, which indicated that the respondent frequently used the intelligence strategy. New variable sets were created in SPSS to contain the five corresponding questions. A new set called linguist and labeled linguistic intelligence was created, and questions 1, 9, 17, 25, and 33 were included as variables of that set. The same steps were conducted for the other seven intelligences. The intelligence sets are discussed individually.

**Linguistic Intelligence.** The mean of all five items was rounded to obtain one frequency number and one percentage number that addressed the question of how frequently do teachers at Edwin Rhodes Elementary use Linguistic Intelligence in the classroom: 76.96% of the participants reported that they frequently used Linguistic Intelligence, 16.68% of the participants indicated that they sometimes used it in the classroom and only 6.36% of the participants reported rarely using Linguistic Intelligence.

Frequency analysis was followed for this set of strategies and the results are shown in Table 2. A simple count and percentages are summarized in the table in addition to median and mode for each strategy.
The first strategy in this section indicates that the teacher read or lectured to their students. Most of the sampled teachers responded with *frequently used this strategy*, 90%, and only about 9% indicated that they *sometimes use this strategy*. Due to the tendency of responses toward the upper end of the scale, the median and mode agree.

For the second strategy, “My students have the option to discuss or debate during class,” teachers responded by covering the upper level of the scale, nearly equally on each level. No responses were in the lower two levels, namely, *unfamiliar* and *aware of the strategy*, but of the 22 responses, six *used this strategy rarely*, eight *sometimes*, and eight *frequently used this strategy*. Since the responses were nearly equally distributed from the middle to the highest level

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Count</th>
<th>Valid</th>
<th>Unfamiliar</th>
<th>Aware</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Missing</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>I read or lecture to my students.</td>
<td>22</td>
<td>count</td>
<td></td>
<td>%</td>
<td></td>
<td>2.0</td>
<td>20.0</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>My students have the option to discuss or debate during class.</td>
<td>22</td>
<td>count</td>
<td></td>
<td>%</td>
<td></td>
<td>6.0</td>
<td>8.0</td>
<td>8.0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>I encourage students to employ their verbal skills to communicate, solve problems, and express inner feelings</td>
<td>18</td>
<td>count</td>
<td></td>
<td>%</td>
<td></td>
<td>5.0</td>
<td>13.0</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>I require my students to read during class.</td>
<td>18</td>
<td>count</td>
<td></td>
<td>%</td>
<td></td>
<td>1.0</td>
<td>17.0</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
on strategy usage scale, the median and mode agree to the middle of the distribution of the upper part of the scale. Said differently, the teachers’ average would be *sometimes* use this strategy which is less than *frequently* but more than *rarely*.

Requiring students to perform writing activities in the class as a strategy, one-third appeared *more frequently* than *sometimes* or *rarely* as a strategy used by the teachers in their classrooms. Only one teacher indicated the strategy was *rarely used* and one teacher indicated *sometimes used* this strategy out of the sample of 22. Twenty teachers indicated that they *frequently* used this strategy, more than 90%.

With the fourth strategy, “I encourage students to employ their verbal skills to communicate, solve problems, and express inner feelings,” there were almost twice as many teachers who claimed to use this strategy *frequently* compared to those who claimed to use this strategy only *sometimes*. However no teacher out of the 18 respondents claimed to use this strategy *rarely* or less. Again, due to the concentration of the responses in the upper level of the scale, the median and mode agreed to the highest level of response which was *frequently* to represent this strategy use in the classroom for this sample.

Last, the fifth strategy, requiring the students to read in class, most of the teachers adopted this strategy *frequently* rather than *sometimes*. There were 17 responses out of the 18 surveyed that showed they use this strategy *frequently* and only one response showed the *sometimes* use of this strategy. It was concluded that the overall use of Linguistic intelligence strategies in the classroom appeared between *sometimes* to *frequently* with *frequently uses* as the general representation of this intelligence strategy’s use.

**Intrapersonal Intelligence.** The mean of all five items was rounded to obtain one frequency number and one percentage number that addressed the question of how frequently do
teachers at Edwin Rhodes Elementary use Intrapersonal intelligence in the classroom. A total of 51.84% of the participants reported that they frequently use Intrapersonal intelligence, 28.20% of the participants indicated they sometimes use it in the classroom, and 9.96% of the participants rarely use Intrapersonal intelligence, but only 2.8% were aware of using Intrapersonal intelligence as a teaching strategy in classroom. Table 3 summarizes the results.

Table 3

Intrapersonal Intelligence

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Valid count</th>
<th>Unfamiliar</th>
<th>Aware</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Missing</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>My students have the opportunity to set their own personal goals.</td>
<td>22</td>
<td>2.0</td>
<td>2.0</td>
<td>10.0</td>
<td>8.0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My students have the opportunity for introspection or deep thinking.</td>
<td>22</td>
<td>4.0</td>
<td>11.0</td>
<td>7.0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I encourage my students to make connections between what is being taught in class and what they experience in real life.</td>
<td>22</td>
<td>1.0</td>
<td>21.0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I give my students opportunities to make decisions about their learning experiences.</td>
<td>18</td>
<td>1.0</td>
<td>3.0</td>
<td>6.0</td>
<td>8.0</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I allow my students to express their feelings during the class (e.g., excitement, etc).</td>
<td>18</td>
<td>1.0</td>
<td>4.0</td>
<td>13.0</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The first strategy explored was the teacher allowing the students to set up their own personal goals. The responses spread from aware to frequently for use of this strategy: the upper two levels of the scale shared more than 80% of the responses and the middle and lower levels shared about 18%. There were two responses for each, aware and Rarely, and there were 10 and eight for sometimes and frequently respectively. Median and mode for this strategy was approximately 4 or sometimes used this strategy.

The second strategy allows the student the opportunity for introspection and deep thinking. The teachers’ responses concentrated around the sometime use of the strategy with 50% and the rest to frequently use (32%) and rarely use (18%). It was thus an average representation of sometimes use as seen in the median and mode agreement of 4.

Connecting classroom learning to real life experience was the third strategy examined within the Intrapersonal intelligence. The majority of responses (95.5%) confirmed the frequent use of this strategy while only one out of the 22 indicated rarely using this strategy. This strategy seemed to be used most frequently among the Intrapersonal intelligence strategies that was confirmed by the median and mode agreement to the highest level of the scale 5, frequently used.

The fourth strategy responses for “I give my students opportunities to make decisions about their learning experiences” were disbursed over a wide range of levels. Teacher responses for the use of this strategy distributed over the upper four levels of the scale from aware to frequently use: 5%, 13.6%, 27.3%, and 36.4% respectively. Due to the dispersion of the responses over many levels and more concentration toward the upper levels, the median and mode did not agree but tended toward the upper two levels. Therefore, it was concluded that the teacher’s use of this strategy ranged between sometimes and frequently. Because the most
important issue was to obtain an overall impression about the intelligence use in general, the specific detailed use of the individual strategy was not relatively important.

Last, the fifth strategy regarding allowing the students to express their feelings during class demonstrated that about 60% of the teachers stated they use this strategy at the frequent level; 18% stated they sometimes use this strategy and 4.5% stated they rarely use this strategy. Median and mode for this strategy agreed at the highest level of the frequent use of this strategy although the mean was more representative of the usage with a sometime use of these strategies.

**Mathematical Intelligence.** The mean of all five items was rounded to obtain one frequency number and one percentage number that addressed the question of how frequently do teachers at Edwin Rhodes Elementary use Mathematical Intelligence in the classroom. A total of 54.9% of the participants reported that they frequently use Mathematical Intelligence. Another 37% of the participants indicated that they sometimes use this strategy in the classroom, 5.9% of the participants rarely used Mathematical intelligence, and 2.2% were aware of using Mathematical intelligence as a teaching strategy in classroom. Table 4 presents the response results for the five strategies within Mathematical Intelligence.
Table 4

*Mathematical Intelligence*

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Valid</th>
<th>Unfamiliar</th>
<th>Aware</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Missing</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>I encourage my students to think scientifically about things.</td>
<td>22</td>
<td>count</td>
<td>3.0</td>
<td>13.0</td>
<td>6.0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>14.0</td>
<td>59.1</td>
<td>27.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I encourage my students to logically organize and sequence concepts.</td>
<td>22</td>
<td>count</td>
<td></td>
<td></td>
<td>6.0</td>
<td>16.0</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td></td>
<td></td>
<td>27.3</td>
<td>72.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My students perform logical problem solving exercises.</td>
<td>22</td>
<td>count</td>
<td>1.0</td>
<td>7.0</td>
<td>14.0</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>4.5</td>
<td>31.8</td>
<td>63.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I incorporate mathematical problem solving in my teaching.</td>
<td>18</td>
<td>count</td>
<td></td>
<td></td>
<td>4.0</td>
<td>14.0</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td></td>
<td></td>
<td>22.2</td>
<td>77.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I encourage students to perform scientific demonstration/experimentation.</td>
<td>18</td>
<td>count</td>
<td>2.0</td>
<td>2.0</td>
<td>8.0</td>
<td>6.0</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>11.1</td>
<td>11.1</td>
<td>44.4</td>
<td>33.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The first strategy in this intelligence regards teacher encouragement of students to think scientifically. As reflected in Table 4, about 60% of the responses demonstrated that teachers use this strategy *sometimes*, 27% demonstrated they *frequently* use this strategy, and 14% demonstrated that they *rarely* use this strategy. There were no responses for the lower two levels of the use scale for this strategy. This led to the agreement between the median and mode of 4, which indicated the sample of teachers on average *sometime* use *think scientifically*.

The second strategy encourages students to logically organize and sequence concepts. The responses showed 3:1 that teachers encouraged this strategy *frequently* over those who
encouraged this strategy *sometimes*. Based on the median and mode agreement of 5 on the usage scale level, there is a good indication of frequent use of this strategy.

The third strategy stated that the students performed logically on exercises provided by the teacher. About 63% of the teachers chose *frequently*, 32% chose *sometimes*, and 4.5% chose *rarely* use this strategy in their classrooms. The median and mode for this strategy use tended toward the higher end of the scale due to the concentration of more than half the respondents that chose *frequently* use this strategy.

Regarding the fourth strategy about the teachers’ incorporation of mathematical problem solving in their teaching, 3:1 indicated their *frequent* use over the *sometimes* use of this strategy. Almost 78% used it *frequently* while only 22% used it *sometimes*. There were no responses for the usage scale level of *rarely* or below. This resulted in an agreement between the median and mode of 5 to be a logical representation of frequent use of this strategy by the teachers.

Scientific demonstration/experimentation as the fifth strategy within Mathematical Intelligence was responded to by teachers as widely scattered over the response scale of usage. Out of the 18 responses, two indicated *aware* (11%), two indicated *rarely* (11%), 8 indicated *sometimes* (44%), and 6 indicated *frequently* (33%) used this strategy. Most of the responses were in the 4 and 5 scale level of usage which indicated a *sometimes* to *frequent* level of usage. Since more than 77% of the respondents indicated a *sometimes* to *frequent* use of this strategy, the median and mode agreed to the *sometimes* usage level as a good reference for this strategy within the Intrapersonal intelligence.

**Spatial Intelligence.** The mean of all five items was rounded to obtain one frequency number and one percentage number that addressed the question of how frequently teachers at Edwin Rhodes Elementary use Spatial intelligence in the classroom. A total of 72.8% of the
participants reported that they *frequently* used Spatial Intelligence, 17.38% of the participants indicated they *sometimes* use it in the classroom, and 9.88% of the participants were *rarely* using Spatial Intelligence. Table 5 presents the response analysis results for the five strategies within Spatial Intelligence.

Table 5

*Spatial Intelligence*

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Valid</th>
<th>Unfamiliar</th>
<th>Aware</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Missing</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use visual presentations during class (e.g., write on chalkboard, use overhead projector, etc).</td>
<td>22</td>
<td>count</td>
<td></td>
<td>%</td>
<td>count</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I encourage my students to visually represent the concepts being taught/discussed.</td>
<td>22</td>
<td>count</td>
<td></td>
<td>%</td>
<td>count</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I encourage my students to visualize what they read or hear during class.</td>
<td>22</td>
<td>count</td>
<td></td>
<td>%</td>
<td>count</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I use visual aids in class such as maps, charts, and diagrams.</td>
<td>18</td>
<td>count</td>
<td></td>
<td>%</td>
<td>count</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I show video, slides, or movies during class.</td>
<td>18</td>
<td>count</td>
<td></td>
<td>%</td>
<td>count</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Using visual presentation by the teachers, the first strategy in the survey, revealed that nearly all teachers in the sample did *frequently* use (95.5%) a visual presentation. Only one out of the 22 surveyed indicated a *rare* usage of this strategy, 5%. Median and mode for this strategy use reinforced the highest level of usage for this strategy of using visual presentation at the *frequent* level of use on the usage level scale.
The second strategy asked how often teachers encouraged students to visually represent concepts being taught/discussed in the class. Six of the respondents (27%) answered *sometimes* used, and 16 of the respondents (73%) answered *frequently* used; there were no answers for the *rarely* or less choices. This resulted in an agreement between the median and mode at the level of 5 on the usage scale.

The third strategy dealt with the encouragement of teachers to their students to visualize what they read or heard. The result, as above, split between the highest two levels—*sometimes* and *frequently*—with a ratio of 1:2. There were twice as many teachers who answered they elected to use this strategy *frequently* (31%) as those who used it only *sometimes* (68%). Again, the median and mode remained at the highest use level 5 on the scale.

A very wide gap between the *frequent* and *sometimes* use of the fourth strategy regarding the teacher use of visual aids such as maps, charts, and diagrams was detected. The number of responses for the *frequent* use (11%) of the strategy was almost nine times less than that of the * sometime* use (89%). There were no answers for other levels of use on the scale—namely *rarely* or less.

When the strategy was changed to showcase the use of video, slide, and movies in the classroom, teachers’ opinions split into two peaks with a valley in between for the *sometimes* use. Almost 40% of the sample showed a *frequent* use, 44% showed a *rare* use, and only about 17% chose the valley which was *sometimes* use. These two troughs caused a disagreement between the median which was 4 and the mode which was 3.

**Interpersonal Intelligence.** The mean of all five items was rounded to obtain one frequency number and one percentage number that addressed the question of how frequently teachers at Edwin Rhodes Elementary used interpersonal intelligence in the classroom. A total
of 62.4% reported that they *frequently* use interpersonal intelligence, 33% of the participants indicated that they *sometimes* use it in the classroom and 3.6% of the participants were *rarely* using interpersonal intelligence. Table 6 summarizes the results.

Table 6

*Interpersonal Intelligence*

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Count</th>
<th>Valid %</th>
<th>Unfamiliar Aware</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Missing</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>I encourage my students to perform group brainstorming.</td>
<td>22</td>
<td>3.0</td>
<td>14.0</td>
<td>45.5</td>
<td>40.9</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Students have the opportunity to work in cooperative groups.</td>
<td>22</td>
<td>9.0</td>
<td>40.9</td>
<td>59.1</td>
<td></td>
<td>0</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>I encourage students to peer tutor or help each other in class.</td>
<td>22</td>
<td>1.0</td>
<td>4.5</td>
<td>31.8</td>
<td>63.6</td>
<td></td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>I encourage students to develop socially thorough their classroom interactions.</td>
<td>17</td>
<td>5.0</td>
<td>29.4</td>
<td>70.6</td>
<td></td>
<td>5</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>I encourage students to share with one another.</td>
<td>18</td>
<td>4.0</td>
<td>22.2</td>
<td>77.8</td>
<td></td>
<td>4</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

When the teachers surveyed were asked if they encourage their students to perform group brainstorming, the first strategy in interpersonal intelligence, more than 86% stated the *sometimes* or *frequent* use this strategy. Out of the 22 responses in Table 6, only three (14%) stated that they *rarely* use this strategy. The highest percentage for the *sometimes* use and the small downward pull of *rarely* use made the median and mode agree on the middle ground level of *sometimes* use of this strategy.
Regarding the cooperative groups opportunity, the second strategy, the teachers split their opinion nearly four to six between *sometimes* and *frequent* use of this strategy. Since 60% shared the responses for *frequent* use and 40% shared responses for *sometimes* use, the median and mode agreed on the highest level of use for this strategy.

The third strategy again shared the top three levels of use for encouraging students to peer-tutor or help each other in class. The biggest share (63.6%) of the 22 responses went to the *frequent* use of this strategy, a moderate share 31.8% went to *sometimes* use, and only 4.5% went to *rarely* use. The median and mode were equal at the highest level of the scale, 5.

Similar to the second strategy, the fourth strategy concentrated in the top two levels of use of encouraging students to develop socially through class interactions. There were five of the 17 responses that indicated *sometimes* use while the other 12 indicated a *frequent* use of this strategy in their classrooms. The high level of 5 for median and mode was expected because of the spread of the responses toward the higher end of the usage scale.

The last and fifth strategy in the survey asked the teachers how often they encouraged student to share with each other. The responses were contained in the upper two levels of the usage scale, namely, *sometimes* and *frequently*. There were 22.2% who used this strategy *sometimes* and 77.8% who used this strategy *frequently* out of the 18 teachers who responded to this statement. The upper level with the heavy concentration of responses tipped the median and mode agreement toward the higher level of 5 on the use of this strategy scale.

**Bodily Intelligence.** The mean of all five items was rounded to obtain one frequency number and one percentage number that addressed the question of how frequently do teachers at Edwin Rhodes Elementary use Bodily intelligence in the classroom. The data show 41.9% of the participants reported that they *frequently* use Bodily Intelligence, 38% of the participants
indicated that they *sometimes* use it in the classroom, 17.3% of the participants were *rarely* using Bodily Intelligence, and 3.1% were *aware* of using Bodily Intelligence as a teaching strategy in the classroom. Table 7 presents the response analysis results for the five strategies within Bodily Intelligence.

Table 7

*Bodily Intelligence*

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Valid</th>
<th>Unfamiliar</th>
<th>Aware</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Missing</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>I provide my students with the opportunity to learn by manipulating objects or by making things with their hands.</td>
<td>22</td>
<td>1.0</td>
<td>5.0</td>
<td>5.0</td>
<td>36.0</td>
<td>54.5</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>I provide my students with tactical materials and experience.</td>
<td>22</td>
<td>1.0</td>
<td>4.5</td>
<td>45.5</td>
<td>50.0</td>
<td></td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>I teach my students physical relaxation exercises.</td>
<td>22</td>
<td>1.0</td>
<td>5.0</td>
<td>31.8</td>
<td>36.4</td>
<td>27.3</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>My students have the opportunity to use drama, dance, or physical activity as a part of their learning process.</td>
<td>18</td>
<td>1.0</td>
<td>5.6</td>
<td>27.8</td>
<td>33.3</td>
<td>33.3</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

The first strategy in the survey regarding Bodily Intelligence asked if the teacher provided the opportunity for the students to learn by manipulating objects or making things with their hands. *Frequent* use responses totaled more than all other uses of *sometimes* and less.
There were 12 for frequent use, eight for sometimes use, and one each for rarely use and aware as shown in Table 7. Since more than 54% claimed frequent use of this strategy, the median and mode reaffirmed the highest level of use, or frequent use of this strategy.

The tactical material and experience strategy, which was second, was spread across the range more than the first strategy. Although it still had a higher concentration in the upper two levels of use, it had one response for the rare use and nothing for the other levels of uses. Eleven of the 22 responses indicated frequent use, 10 indicated sometimes, and only one indicated rare use of this strategy. Based on the distribution of the responses toward the upper end of the usage scale, the median and mode agreed to the highest level of use, 5, for this strategy.

The third strategy which was about teaching students a physical relaxation exercise, showed that teachers’ responses were dispersed all over the scale except the lowest level, unfamiliar. There was more concentration around the sometimes use (36%), whereas 31.8% declared rare use, 27% indicated frequent use, and only 5% chose aware. This concentration around the middle of the upper half of the usage scale fixed the median and mode on level 4, which is sometimes use of this strategy.

For encouraging students to react and use body language as part of the classroom communication, the teachers’ responses increased from the rare use upward toward the frequent use. Out of the 18 responses, three said that they used this strategy rarely, seven said sometimes, and eight said frequently. Due to this increasing trend path, the mode was more than the median that indicated a sometimes use. As before, the median and mode agreement was not of great concern at this time because the overall strategies for the Bodily Intelligence were important to this research, not the details of the individual strategies.
The fifth and final strategy within the Bodily Intelligence asks if the teacher provides the opportunity for the students to use drama, dance, or physical activities as part of their learning process. For this strategy, the teacher responses spread from the second level of the scale, *aware*, to the highest end of the scale, *frequently*, regarding the use of this strategy. *Aware* received 5.6%, *rarely* received 27.8%, *sometimes* received 33.3%, and *frequently* received 33.3%. From this equal distribution of the responses, it is reasonable to assume the median-mode agreement on the level 4, *sometimes* usage, of this strategy. The relatively wider dispersion of responses for the overall strategies taken together led to an overall average of 4.3 which implied a conservative estimation for the use of these strategies within the Bodily Intelligence is estimated as *sometimes*.

**Musical Intelligence.** The mean of all five items was rounded to obtain one frequency number and one percentage number that addressed the question of how frequently teachers at Edwin Rhodes Elementary use Musical intelligence in the classroom. A total of 35.5% of the participants reported that they *frequently* use Musical Intelligence, 23% of the participants indicated that they *sometimes* use Musical Intelligence in the classroom, 27.6% of the participants *rarely* used Musical intelligence, and 13.4% were *aware* of using Musical Intelligence as a teaching strategy in classroom. Table 8 summarizes the results.
### Table 8

**Musical Intelligence**

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Count</th>
<th>Unknown</th>
<th>Aware</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Missing</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>I play recorded music to my students.</td>
<td>22</td>
<td>3.0</td>
<td>5.0</td>
<td>14.0</td>
<td>23.0</td>
<td>64.0</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>My students have the opportunity to express their ideas musically.</td>
<td>22</td>
<td>1.0</td>
<td>9.0</td>
<td>6.0</td>
<td>6.0</td>
<td>27.0</td>
<td>0</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>I incorporate the use of musical instruments into my classroom teaching.</td>
<td>22</td>
<td>10.0</td>
<td>6.0</td>
<td>3.0</td>
<td>3.0</td>
<td>14.0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>I use rhythms, chants, raps, or songs in my classroom teaching.</td>
<td>18</td>
<td>1.0</td>
<td>3.0</td>
<td>7.0</td>
<td>7.0</td>
<td>39.0</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>I make tapping sounds or sing little melodies while teaching.</td>
<td>18</td>
<td>2.0</td>
<td>7.0</td>
<td>3.0</td>
<td>6.0</td>
<td>33.3</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

There were 22 responses for the first strategy in the survey that was related to playing recorded music to the students in the classroom. As reflected in Table 8, out of these 22 responses, three teachers rarely used, five teachers sometimes used, and 14 teachers frequently used this strategy as a Musical intelligence strategy. The continuous increase in usage from rarely and higher with concentration in the highest level of use, frequently, resulted in an agreement between the median and mode that the frequent use is representative of this strategy use.

In reference to the opportunity for the students to express their ideas musically, the second strategy in the survey, teachers’ use of this strategy scattered between being aware to
frequently use this strategy. Being aware consisted of 5%, rarely consisted of 41%, sometimes consisted of 27%, and frequently consisted of 27% of the responses. Rarely pulled 41% of the median toward the middle percentage of sometimes, while the mode implied the highest percentage (41%), which was rare, used this strategy.

The third strategy referred to incorporation of the use of musical instruments in classroom teaching and represented a downward slope for the responses. The use of this strategy based on the 22 provided responses indicated that 10 teachers were aware, six teachers indicated rare use, three teachers indicated sometimes use, and three teachers indicated frequent use of this strategy. Thus, there were fewer teachers using this strategy in general within Musical Intelligence. This led to disagreement between the median and mode being 3 and 2, respectively.

The fourth strategy explored the use of rhythms, chants, raps, or songs in the classroom. Only 18 teachers responded to this strategy question out of the 22 surveyed. From Table 8, the responses for this strategy seemed to contain an upward trend starting from aware all the way to frequently use of this strategy. One or 6% chose aware, 17% chose rare use, 39% chose sometimes, and 39% also chose frequent use of this strategy within the Musical intelligence items in the survey. The median and mode remained closer to the middle of the distribution at level 4.

The distribution of responses to the fifth strategy, which corresponded to making tapping sounds or singing little melodies while teaching, can be imagined as a wave that peaks twice and bottoms twice. Levels 2 and 4, aware and sometimes use received 11% and 16.7% but levels 3 and 5, rare and frequent use, received 38.9% and 33.3%, respectively. This wavy distribution gave a median of 4 and mode of 3.
Furthermore, the collected data for the strategies within Musical Intelligence and their use in the classroom by the teachers provided an overall average of 3.9. The contradictions within these strategies presented this lower overall impression about Musical Intelligence. It was at most a sometimes use, but a more reasonable and conservative estimation of rarely use represents the use of these strategies in the classrooms by teachers.

*Naturalist Intelligence.* The mean of all five items was rounded to obtain one frequency number and one percentage number that addressed the question of how frequently do teachers at Edwin Rhodes Elementary use Naturalist intelligence in the classroom. A total of 24.6% of the participants reported that they frequently use Naturalist Intelligence, 35.8% of the participants indicated that they sometimes use it in the classroom, 30% of the participants rarely used Naturalist intelligence, 9% were aware of using Naturalist Intelligence as a teaching strategy in classroom, and 1% of the teachers were unfamiliar.

The survey included five strategies within the Naturalist intelligence as shown in Table 9. The first of these strategies examined the incorporation of nature into curriculum themes. Most of the teachers’ responses fell in the rarely use level in the scale (45%). The second largest share was for the sometimes use of this strategy. Frequent use gained about 18%. Only one of the 22 (5%) was at the aware level. This followed the largest appearance of responses and became a 3 while the median remained around the middle and scored 4.

The second strategy stated, “My students classify or sort objects, events, living things, or phenomena into clusters according to their common characteristics.” Twenty-one teachers replied to this statement and their responses ranged from being aware to frequently use with an increasing number of teachers leaning toward the frequent use of this strategy. One claimed awareness, five claimed rare use, eight claimed sometimes use, and eight claimed frequent use
of this strategy in their classrooms. Since the upper two levels of the scale received about 72% of the responses, the median and mode agreed to the level 4, which is *sometimes* use of this strategy.

Table 9

*Naturalist Intelligence*

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Valid count</th>
<th>Unfamiliar %</th>
<th>Aware %</th>
<th>Rarely %</th>
<th>Sometimes %</th>
<th>Frequently %</th>
<th>Missing %</th>
<th>Median</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>I incorporate nature into curriculum themes.</td>
<td>22</td>
<td>1.0</td>
<td>10.0</td>
<td>7.0</td>
<td>4.0</td>
<td>0</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>My students classify or sort objects, events, living things, or phenomena into clusters according to their common characteristics.</td>
<td>22</td>
<td>1.0</td>
<td>8.0</td>
<td>8.0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Students have the opportunity to work with or study about natural phenomena.</td>
<td>21</td>
<td>1.0</td>
<td>5.0</td>
<td>10.0</td>
<td>5.0</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>I provide field trips for my students to explore the natural environment.</td>
<td>17</td>
<td>4.0</td>
<td>24.0</td>
<td>47.0</td>
<td>24.0</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>My students have the opportunity to study about different plants and animals.</td>
<td>18</td>
<td>2.0</td>
<td>2.0</td>
<td>7.0</td>
<td>7.0</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

The third strategy asked if the students had the opportunity to work with or study natural phenomena. One response that arose came out to be *unfamiliar*, leaving a gap between other responses to levels of use. The other 20 responses were split into one-quarter for *rarely* and
frequently use and one-half for the middle sometimes use of this strategy. Discarding the outlier response (unfamiliar) produced a symmetric distribution having mean, median, and mode of level 4, sometimes use. Therefore, this single response could be considered an outlier and the potential explanation for this as clarity of the question or statement itself.

For the fourth strategy, providing field trips for the students to explore the natural environment as a strategy within Naturalist Intelligence, teachers’ responses appeared to hold to the middle ground with 47% indicating rarely use this strategy. However, 24% indicated awareness but not used, another 24% indicated sometimes used, and only 6% indicated frequent use of this strategy. Because there were fewer teachers who indicated frequent use of this strategy, the median and mode indicated level 3 of use, which was rarely use this strategy.

The fifth strategy was about allowing students the opportunity to study different plants and animals. Responses for the use of this strategy split into two equal parts for levels 2 and 3 with 11% each and two equal parts for levels 4 and 5 or 39% each. The 80% of responses in the highest two levels of use with the lower two levels small share fixed the median and mode at level 4 or sometimes use of this strategy.

The overall use of these strategies within Naturalist intelligence strangely was expected to be around the level of 4 or sometimes use of this strategy due to the many 4’s in the table and fewer 3’s. However, examining all the responses together gave a different level of use which was 3.7 leaning toward the conservative rare use of this strategy.

**Research question 2.** This research question stated, “What are the teachers’ perceptions at Edwin Rhodes Elementary school toward the theory of multiple intelligence?” Section 1: *Teachers’ Perceptions* of the survey was used to address this question. This section consisted of a total of five questions that were divided into three parts. Part I contained the questions that
required choosing from the five-point scale ranging from 1 to 5. Part II included only those questions that required a yes or no answer. Part III contained the open-ended question.

Although the questions were mixed in the survey, rearrangement was required to allow for the analysis using SPSS. Thus, Part I question 2 and its entire subparts a, b, and c were grouped together as a yes or no variable. The same process was done to analyze questions 1, 3a, 3b, 4a, and 4b for part II.

**Part I.** In section 1 of the survey, Teachers’ Perception, question 2 contained three questions to gather data about teachers’ source of knowledge about Gardner’s theory. Question 2 investigated the respondent awareness and knowledge about Gardner’s theory and whether it was gleaned through school requirement, professional development, or self-instruction. Each question of these sub-parts of question 2 had a choice of yes or no and the respondent had to choose one. Considering the ease of use, the survey data were inserted in an Excel™ spreadsheet using Y for yes answers and N for no to answer questions in part I. The Excel spreadsheet contained three columns, each representing a question as the variable and 22 records as the respondents.

The Excel™ spreadsheet was imported into SPSS and the analysis was started by checking the data whereby two missing values were found. After reviewing the questionnaires again to make certain the data entry and transfer to SPSS was correct, it was confirmed that two different respondents did not answer the b and c questions. Table 10 depicts the results of the three questions.
The participants in this study were asked in question 2a if they had any education at the univeristy level concerning the theory of multiple intelligence of which 86.4% responded No and 13.6% responded yes. Moreover, only three out of the 22 sampled answered yes and indicated it was a part of their curriculum requirements.

The participants in this study were asked in question 2b if they had any professional development concerning the theory of multiple intelligence with 60% who indicated that they did not have any professional development in the theory of multiple intelligence. However, the data

<table>
<thead>
<tr>
<th>Question</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a Education at the university level concerning MI?</td>
<td>Yes</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>22</td>
</tr>
<tr>
<td>2b Professional development concerning MI?</td>
<td>Missing</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>22</td>
</tr>
<tr>
<td>2c Self-instruction concerning MI?</td>
<td>Missing</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>22</td>
</tr>
</tbody>
</table>

*Descriptive Statistics for Education Background*
indicated that there was one respondent who did not answer this question. Some participants who answered yes indicated that attending PLC professional training for more than six years was one way of developing their knowledge. Other participants who answered yes indicated that attending workshops, meetings, and conferences developed their knowledge of the theory. The participants in this study were asked in question 2c if they had ever initiated any self-instruction concerning the theory of multiple intelligence. A total of 59.1% answered no, 36.4% answered yes, and one participant did not respond to this question.

The overall conclusion that was drawn from these results was, in general, the sample respondents who did not learn or were not required to formally learn the theory of multiple intelligence was almost two to one. Figure 1 presents the size of the group who claimed not to have formally learned about the theory with those who claimed to have learned about the theory in one form or the other. It appears that those who did not learn in the university, through professional development, or by themselves were twice as many as those who claimed to learn about the theory in university, professional development, or by self-learning.

Exploring the data more closely revealed eight of the sample of 22 answered no to all questions with one who claimed to have been exposed to the three ways of learning, four who claimed at least two ways of learning, and seven who answered one yes, which indicated at least one method of learning about the theory of multiple intelligence. Although the overall percentage was that there were twice the no answers as that of the yes, the individual question or respondent examination revealed that there were 13 of the sample of 22 who were exposed to at least one learning method about the theory of multiple intelligence. Thus, almost 60% of the sample knew or had learned something about the theory of multiple intelligence, whereas 36% claimed they had no past learning about the theory of multiple intelligence.
Part II. In section 1 of the survey Teachers’ Perception, Question 1, 3, and 4 contained questions to gather data about teachers’ familiarity with Gardner’s theory and how they are enhancing the theory in classrooms. Following the same procedure for part I, the data were entered into an Excel™ spreadsheet in the form of numbers ranging from 1 to 5. Question 1 values ranged from unfamiliar to very familiar if the respondent was familiar with Gardner’s theory of multiple intelligence while the middle answer was somewhat familiar. The respondent also had the option to select something in between 2 or 3, depending on the magnitude of familiarity with the theory. The same scale of magnitude was used for the other questions but with different wording depending on the question. Question 3b, for example, contained the range from poorly to very well while questions 4 and 5 ranged from not applicable to very
applicable. The scale of magnitude remained the same although the wordings were different based on the question content.

The analysis began with coding the answers into an Excel™ spreadsheet by giving the questions a number sequence from 1 to 5 instead of the survey numbers that were distributed among other questions. A code of 1 was inserted for the lowest scale answer and 5 for the highest on the scale. Questions that were not answered were left blank. The Excel™ spreadsheet was imported into SPSS to begin the analysis. The data were examined for any missing values and checked again with the original Excel™ spreadsheet and the survey.

In the survey question “How familiar are you with Gardner’s theory of multiple intelligences?” participants were asked to indicate their familiarity level with Gardner’s theory. Five percent responded between unfamiliar and somewhat familiar, 18% responded somewhat familiar, 14% responded between somewhat familiar and very familiar, and 59% responded very familiar. For this question, 13 answers represented the highest level of the scale, very familiar with the theory or theories, four answered adequately familiar with the theory, and no one answered not familiar. All of the tendency statistics ranged between 4 and 5, with 5 being a reasonably valid representation of the answer magnitude for the familiarity question.

In the survey question “Are you familiar with any other theories regarding the structure of intelligence (e.g., Sternberg, Binet, Jensen, and Piaget)?” participants’ familiarity with other theories of intelligence was examined. Of those examined, 14% responded not familiar, 14% responded between not familiar and somewhat familiar, 51% responded somewhat familiar, 14% responded between somewhat familiar and very familiar, and 5% responded very familiar. This question presented a mixture of results ranging from the lowest level of the scale to the highest level while tending to tip toward the lower middle of the distribution. Adequately familiar is a
good indicator for the answer to this question. When teachers were asked if they were familiar with other intelligence theories, their answers hovered around the 50% mark of having as many teachers familiar and as many teachers who were not familiar with other theories.

In the survey question “Compared to other theories of intelligence, how well does Gardner’s theory portray intelligence?” participants were asked to indicate their familiarity with Gardner’s theory compared with other theories of intelligence. Nine percent responded between poorly and adequately, 18% responded adequately, 27% responded between adequately and very well, and 36% responded very well. In this question participants were asked to compare Gardner’s theory to other theories in regard to its applicability. Teachers’ answers trended upward toward the higher end of the scale. Out of the 20 teachers who answered the question, two answered semi-adequate, four answered adequate, six answered more than adequate, and eight answered very adequate. In general it was concluded that the teachers thought that Gardner’s theory was more than adequate to portray intelligence.

In the survey question “How applicable do you perceive Gardner’s theory to be with regard to classroom teaching strategies?” participants were asked to indicate the theory’s applicability level with regard to teaching strategies. Nine percent responded between not applicable and somewhat applicable, 5% responded somewhat applicable, 36% responded between somewhat applicable and very applicable, and 46% responded very applicable. In this question more than 82% answered applicable which was the result of adding the 8 and 10 answers for applicable and very applicable out of the 21 total valid answers. This skewed distribution led to disagreement between the mean, median, and mode. However, in general it was concluded that the sample had a general consensus of the theory being applicable.
In the survey question “How applicable do you perceive Gardner’s theory to be with regard to classroom assessment techniques?” participants were asked to indicate the applicability level of Gardner’s theory with regard to assessment techniques. A total of 23% responded between not applicable and somewhat applicable, 27% responded somewhat applicable, 23% responded between somewhat applicable and very applicable, and 23% responded very applicable. The answers distributed fairly equally from 2 to 5 in the scale having an average between somewhat adequately to adequately applicable. Having no single answer in the lowest scale level shifted the mean to be between 3 and 4 computed as 3.48, which was not very different from the median and mode.

Since the concern of this research was to measure the teachers’ perception about the multiple intelligence theory in regard to familiarity, intelligence portrayal, and its applicability, the whole frequency distribution was considered. The last raw data in the table reflects a simple count of all the answers in each bin (scale level) and their corresponding percentages. More than half of the 104 answers measured 4 and above on the teacher’s perception scale. This indicated the positive perception of teachers regarding the multiple intelligence theories in general and Gardner’s theory of multiple intelligence in particular at Rhodes Elementary School. Therefore, it was concluded from this part that the teacher’s perception at Rhodes Elementary school was high in regard to their familiarity, theory portrayal, and applicability of the theory in the classroom.

Part III. Participants were asked to state their comments on possible barriers that they were experiencing or had experienced that would affect their capability to practice the theory of multiple intelligence in the classroom. One barrier that was reported by more than two participants was the lack of district support. They reported that the district mandated teaching
and teaching style as well as assessment techniques. In addition, they reported that district testing was paper-pencil which does not allow creativity. Other barriers reported included large class size, limited physical space, lack of materials, and that the technique was time consuming. Two participants reported that there were not any difficulties experienced when practicing multiple intelligence theory within the classroom.

**Research question 3.** The research question stated “How does multiple intelligence theory increase the level of achievement of traditional students at Edwin Rhodes Elementary school when their achievement is compared to a similar traditional school?” This question examined the students’ achievement at Edwin Rhodes Elementary School compared with traditional school student achievement. This examination was conducted by comparing the means of both schools’ student achievement and tested whether there was any statistical significance for the difference.

In order to conduct such a statistical test, the school district was contacted and the information was extracted from the district website. Due to the relatively recent establishment of Rhodes Elementary School and its few years of available data, the data available for comparison were limited to those years between 2004 and 2010. The data were further limited to 2004-2008 due to significant changes by the California to the API in 2009. These were standard API scores for all schools within the Chino Unified School District jurisdiction. To assure the validity of comparison, the API was considered because it was the standardized test for all the schools used in this research.

In this section of the study the research question explored whether Edwin Rhodes student achievement was better, on average, than traditional school student achievement. Assuming student achievement mean was $\mu$, thus $\mu_{Rhode}$ was the Edwin Rhodes student achievement mean
and $\mu_{Traditional}$ was the traditional school student achievement. Formulating the above statistically, the hypothesis was constructed as follows:

$$H_0: \mu_{Rhode} \text{ is not } > \mu_{Traditional}$$

$$H_a: \mu_{Rhode} > \mu_{Traditional}$$

To test the above hypothesis, the level of significance was set at 5% (0.05) and as a one-tail test.

There were two types of API scores or comparisons that the school district used to compare schools performance. Thus this research analysis attempted to use both types for the analysis to better support the results. Since there were two types of data available, the analysis was divided into two subsections. The first section discussed the analysis of the Base API scores and the mean differences, and the second section discussed the Growth API scores mean differences.

**Base.** Table 11 demonstrates that the assumption of population equal variance was not rejected. Still, with both assumptions, the two-tail test revealed a significant difference in the API Base scores between the Rhodes Elementary School and its comparable traditional school.

**Table 11**

*Independent Samples Test Differences Between the Research Site and Traditional School: API Base Score*

<table>
<thead>
<tr>
<th>API Base Score</th>
<th>Equal variances assumed</th>
<th>$F$</th>
<th>sig.</th>
<th>$t$</th>
<th>df</th>
<th>sig.</th>
<th>Mean Difference</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.248</td>
<td>.636</td>
<td>.143</td>
<td>.000</td>
<td>.000</td>
<td>142.750</td>
<td>9.985</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Equal variances not assumed</td>
<td>.143</td>
<td>.000</td>
<td>.000</td>
<td>142.750</td>
<td>19.985</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on the results of the analysis depicted in Table 11, there is on average a difference of almost 143 points more for Rhodes students on the test than the traditional school student. With 95% confidence it was assumed that the Rhodes student achievement ranged between 93 to 191 marks more than their mates in a traditional school. The estimate was expected to be within 20 points based on the standard error in Table 11.

**Growth.** The same analysis was conducted for Growth scores to confirm the previous results. The results are presented in Table 12.

Table 12

*Independent Samples Test Differences Between the Research Site and Traditional School: API Growth Score*

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>sig</th>
<th>t</th>
<th>df</th>
<th>sig.</th>
<th>Mean Difference</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>API Growth Score Equal variances assumed</td>
<td>.863</td>
<td>.389</td>
<td>.133</td>
<td>6.000</td>
<td>.001</td>
<td>152.000</td>
<td>4.785</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>6.133</td>
<td>5.410</td>
<td>.001</td>
<td>152.000</td>
<td>4.785</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Again, equal variance was not assumed based on the $F$ test significance but the two-tail test for both was very significant. The mean difference remained fixed at 152 points for Rhodes students, which was higher than the traditional school student. Accordingly, the mean difference standard error was increased. The upper limit for the difference estimate also increased from 191 to 214.
The general conclusion from this analysis was that there was a significant difference, on average, between the Rhodes students’ achievement on the standardized test and their counterparts in the traditional school. Based on the analysis and results it was fairly assumed that Rhodes students achieved higher than other students at traditional schools. This difference was expected to be, on average, about 147 marks higher for Rhodes students. Therefore, the hypothesis of assuming there was no difference between Rhodes students’ achievements measured in API scores was rejected, and the alternative hypothesis was accepted.

Research question 4. The research question “How does multiple intelligence theory increase the level of achievement of traditional students at Edwin Rhodes Elementary school when their achievement is compared to students at a gifted and talented school?” tested student achievement for difference in achievement compared with gifted and talented school student achievement. To assure the validity of comparison, the API was considered because it was the standardized test for all the schools that were used in this research.

The same analysis procedures used previously in the Base subsection was used again for this subsection. However the hypothesis in this section was that there is no difference between Rhodes students’ achievement and gifted and talented students’ achievements based on the API scores.

\[ H_0: \mu_{Rhode} \neq \mu_{Gifted} \]
\[ H_a: \mu_{Rhode} = \mu_{Gifted} \]

Repeating the previous analysis but for gifted and talented students’ scores and testing the difference at 95% confidence resulted in the data generated for Table 13 for Base and Table 14 for Growth.
Table 13

*Independent Samples Test Differences Between the Research Site and Gifted School: API Base Score*

<table>
<thead>
<tr>
<th></th>
<th>$F$</th>
<th>sig.</th>
<th>$t$</th>
<th>df</th>
<th>sig.</th>
<th>Mean Difference</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances assumed</td>
<td>.590</td>
<td>.107</td>
<td>-6.822</td>
<td>6.000</td>
<td>.000</td>
<td>-97.000</td>
<td>14.219</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-6.822</td>
<td>.045</td>
<td>.006</td>
<td>-97.000</td>
<td>14.219</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 14

*Independent Samples Test Differences Between the Research Site and Gifted School: API Growth Score*

<table>
<thead>
<tr>
<th></th>
<th>$F$</th>
<th>sig.</th>
<th>$t$</th>
<th>df</th>
<th>sig.</th>
<th>Mean Difference</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances not assumed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As seen in the preceding subsection, the equal variance assumption was rejected, but still with or without this assumption, it appeared that there was a significant difference between the scores for two-tail tests. Said differently, adopting both assumptions, Rhodes students appeared to score lower on the API test than gifted and talented school students. On average, Rhodes students scored 97 points lower than the gifted and talented school students. However, the upper
and lower limits of the estimates clearly varied. The point was that Rhodes students scored lower than their counterpart gifted and talented students on API based on the Base type. Following the same statistical procedure to confirm this result or raise suspicion about it, Table 14 reflects the analysis results based on the Growth type of score analysis. There seems to be a repeated pattern rejecting the equal variance assumption about the population in spite of difference in the magnitude. The results are nearly the same as the analysis above except that the mean difference was reduced from 91 points to 71 points in the difference anticipated for Rhodes students to achieve lower (negative sign) than students from the gifted and talented school. Therefore the hypothesis of no difference between Rhodes students’ performance and gifted and talented school students was rejected based on the statistical significance.
CHAPTER 5

Discussion and Summary

The current research explores how implementing the theory of multiple intelligence in classrooms at Edwin Rhodes Elementary School affected student achievement levels, as compared to the achievement at a gifted and talented school and a traditional school. This study was also designed to capture teachers’ perceptions and practices of multiple intelligence theory. In this chapter, the results of the analyzed data are summarized and presented.

Discussion of Study Results

Throughout history, teachers are the key element upon which the educational process depends; an ideal education requires an experienced and skilled teacher for every student (Gardner, 2006). Thus, teachers who are implementing multiple intelligence strategies in classrooms are in charge of preparing, planning, arranging, and applying the theory. That is why the current research investigated teachers’ perception of the theory of multiple intelligence as part of understanding how multiple intelligence theory affects students’ achievement. The research site was classified as a multiple intelligence school. I found it sensible to examine teachers’ familiarity with and practices of the theory to support the fact that the research site is a multiple intelligence school that implements the theory’s strategies in the classroom.

Research question 1. How frequently do teachers at Edwin Rhodes Elementary school implement Gardner’s multiple intelligence theory? The study examined teachers’ practices of the
eight different intelligences within the classroom. Teaching strategies were evaluated through 40 statements in which the participants rated how often they used each strategy in the classroom. For each of the eight intelligences, there were five corresponding statements. The mean of all five items was rounded to obtain one frequency number and one percentage number that answered the question of how frequently teachers at Edwin Rhodes Elementary use each of the eight intelligences in the classroom. The results showed that Linguistic Intelligence was the most frequently used; 77% of teachers practiced Linguistic Intelligence frequently, 72.8% of teachers frequently practiced Spatial Intelligence, 62.4% of teachers practiced Interpersonal intelligence frequently, 54.9% of teachers practiced Mathematical Intelligence frequently, 51.8% of teachers practiced Intrapersonal intelligence frequently, 41.9% of teachers practiced Bodily-Kinesthetic Intelligence frequently, 35.3% of teachers practiced Musical Intelligence frequently, and 24.58% of teachers practiced Naturalistic Intelligence frequently. Naturalistic Intelligence was the least frequently practiced. According to Gardner (2006), Naturalistic Intelligence was added to the other seven intelligences, thus, teachers may find limited sources on the practices of Naturalistic Intelligence. The participants’ responses arithmetic average was 4.3 which was at least sometimes they used all or some of the multiple intelligence theory components. This arithmetic average was calculated including the no responses on survey questions.

**Research question 2.** What are the teachers’ perceptions at Edwin Rhodes Elementary school toward the multiple intelligence theory? The study was designed to examine teachers’ perceptions of multiple intelligence theory. The teachers’ perceptions included familiarity, education background, applicability, comparison with other theories, and barriers. The majority of the participants were very familiar (59%) with the multiple intelligence theory. Few participants reported to be between unfamiliar and somewhat familiar (5%).
Upon measuring participants’ familiarity with Gardner’s theory, it was reasonable to explore how participants gained their knowledge of multiple intelligence theory. About 68% responded \textit{no} to questions of whether they had any education at the university level, or had professional development, or had ever initiated self-instruction concerning the theory of multiple intelligence. It was concluded that although Rhodes teachers did not learn about multiple intelligence theory in university, in professional development programs, or by self-instruction material, they were familiar with it and its use. The theory of multiple intelligence is relatively new in education, and that is why \textit{knowledge obtained from university} was low (13.6%), whereas \textit{knowledge obtained from professional development and self-instruction} was 36.4%.

Furthermore, professional development is an ongoing form of education that many school districts require, which is why 36.4% of the participants’ knowledge was obtained from professional development programs. It is encouraging that teachers are expanding their knowledge about the theory through self-instruction materials. That shows that teachers are willing to learn about Gardner’s theory and take the initiative to educate themselves about multiple intelligence theory.

Regarding teachers’ perceptions toward multiple intelligence theory via familiarity, theory applicability, or knowledge about the types and structure of the theory, the arithmetic average teacher response was 2.9, which tended toward the higher end of the scale. In other words, Edwin Rhodes’s teachers tended to be \textit{familiar} or believe that the multiple intelligence theory was \textit{adequate, applicable}, or they were \textit{familiar} with it on average.

Participants indicated that district teaching conditions and assessment techniques are the major barrier when practicing multiple intelligence in the classroom. Time, class size, and space limitation were other barriers the participants reported. According to MacLeod (2002), teachers
reported that large class size is a barrier when implementing Gardner’s theory. Weber (1998) pointed out that time commitment is another barrier to implementing Gardner’s theory. The results of the study show the commitment required to plan and prepare lessons is an obstacle when practicing multiple intelligence in classroom.

However, the district authorization to practice the theory of multiple intelligence is the biggest challenge any school would face. The challenge comes in that school districts are measuring the school performance by a standardized tool that does not allow space for any assessment method other than paper-pencil. In accordance with Scapens’s (2007) findings, departmental curriculum and assessment requirements tend to focus on curriculum-driven programs and discourage student-centered learning, curriculum improvement, and teacher creativity. Teachers’ performance is measured through their students’ performance in the state or district standardized assessment. Thus, teachers’ priority will be on the preparing students to successfully pass the standardized tools, more than on developing students’ skills and strengths.

**Research question 3.** How does multiple intelligence theory increase the level of achievement of traditional students at Edwin Rhodes Elementary School when their achievement is compared to a similar traditional school? The school performances were compared based on the results of the API used in California for public schools in the form of a standardized test. Since the same test was applied to all schools, it was assumed to be a valid measure. Due to the limited availability of data, four years, the analysis could be somewhat unreliable; therefore, I tried to acquire more data from the school of concern (Rhodes) whether on a monthly or term basis. However, the reliability of the in-house test results can be questionable and not considered a valid measure since every school concentrated on certain subjects that were taught in classroom and, therefore, would tend to exaggerate the performance of achievement.
Therefore, the two types of scores available from the Chino Unified School District standardized test results were considered to be a better measure for the analysis. Although each score type had only four years of available data, using both types in support of each other could reinforce and confirm the results or raise suspicion if there were any difference. Some researchers might raise the question of a valid suspicion about the difference between the two test types, that they used the same results but for different purposes. This is a legitimate question and that answer can be deduced from the variability of mean difference in both analysis results. The result could be due to the small sample available, and one year (past or future) could make this difference but this was the only available data.

However, the results for both school types confirmed each other. The data reflected that Rhodes’s performance was higher when compared to the traditional schools. Students at Rhodes Elementary School scored an average of 147 points higher than students at the traditional school. In accordance with the results of SUMIT project (Kornhaber et al., 2004), student achievement in standardized tests was significantly improving.

**Research question 4.** How does multiple intelligence theory increase the level of achievement of traditional students at Edwin Rhodes Elementary School when their achievement is compared to students at a gifted and talented school? Both API type results confirmed each other by showing that Rhodes’s performance compared to the gifted and talented school was lower. Students at Rhodes Elementary School scored, on average, about 81 points lower than students at the gifted and talented school.

In general, Rhodes Elementary School performance lies between the traditional and the gifted and talented schools performances. One potential explanation for achieving better than the traditional school but less than the gifted and talented school is that Rhodes teachers did not learn
about the theory in university, in professional development programs, or by self-instruction material, yet they were familiar with it and tried to use it at least some of the time. Another possible explanation is that the school system is geared toward a higher standard of education, but its teachers still require more exposure and learning about the theory.

**Reflection on the Results**

The current research was built on the core of multiple intelligence theory: every student is gifted. The literature showed that multiple intelligence theory has a positive influence on students and teachers. Student achievement was developing and their attitudes to learning were positively changing (Bednar et al., 2002, Riedel et al., 2003). Also, teachers found Gardner’s approach an effective approach for teaching (Kaya et al., 2007; Snyder, 1999; Ucak et al., 2006). I predicted there would be no differences between the multiple intelligence school performance and gifted and talented school performance in API. However the results of this study were unexpected. Significant differences between API means of the multiple intelligence school and the gifted and talented school were not expected. The results showed that the multiple intelligence school scored 81 points lower than the gifted and talented school. This unpredicted result can be due to the following reasons:

- In accordance with Bednar et al. (2002), younger age students may not be influenced by the multiple intelligence model because the theory is based on knowing strength and weakness areas that young students may not recognize because of the age factor.

For the current study, the composed score of API included the performance of students in second to fifth grade. Students at the second grade level may perform lower than students at fifth grade level in the standardized test which would affect the API score.
The results of this study showed that teachers at the research site do not practice all eight intelligences in an equal amount. For instance, Linguistic Intelligence was practiced very frequently and Naturalistic Intelligence was less practiced. That means teachers are enhancing their teaching strategies with some intelligences more than others. The basic idea of multiple intelligence theory is to address all eight intelligence because students are not equal and every individual has strengths in some areas and weaknesses in other areas. It seemed that the teachers focused more on intelligences that are measured in the state standardized test than intelligences that are not included in the state assessment scale, such as Musical and Naturalistic Intelligences. Teachers indicated that the district assessment requirements do not support utilizing the theory of multiple intelligence.

The results of this study showed that most of the teachers at the research site were familiar with the theory of multiple intelligence but did not learn about it in a university, professional development program, or through self-instruction. The lack of professional education background may affect the implementation of multiple intelligence theory. The gifted and talented school was founded in 1970 and the field of study about gifted education is lengthy and offers a deep knowledge base. Hence, teachers in the gifted school are assumed to be experts in the gifted and talented field. This gap of differences in length of practice may be a logical reason to explain the differences in means between the two schools.

However, considering all previous reasons, the research site is a distinguished school. It was established in 2003 and was able in a short period of time to achieve 147 points higher than the
similar traditional school. It might be expected to find the differences in mean between the research site and gifted and talented school to be less than 80 points in the future.

During the data collection process, I had the opportunity to visit the research site. The research site environment is very encouraging for positive results in future studies. The school principal meets with the school staff once every month. During my visit, the monthly meeting was held. The school principal demonstrated a deconstruction of lesson standards example and showed the importance of this process in addressing students’ needs and how this process helps teachers focus more on the students’ needs in every lesson plan. The principal showed that lesson standards are not just a checklist that teachers mark after every lesson; it was the list that helps both teachers and students meet their goals. In addition, the principal had a different monthly meeting to discuss the assessment for every grade. Teachers were asked to provide data, assessments, lists of positives, and what needs to be improved during this meeting.

Moreover, the school has a program called *Comic Creator*. This program is designed for students to increase their writing and reading skills by writing a story, novel, or plot. The students work in groups to brainstorm ideas for their book. The students work on the book, which includes writing, illustrating, designing the cover, and so on. The final project is available for all the students to check out as a library book so they can enjoy reading it at home. This program is one of many different programs that the school designed during the school day for students to develop their skills and improve their abilities.

**Recommendations for Future Studies**

**Recommendation 1.** Experimental investigation is needed for the research site to observe the daily teaching strategies, assessment, and curriculum. The results of this type of study could examine if multiple intelligence theory is the only factor that affects the API score.
In addition, the results of this type of research could identify other factors that affect the students’ achievement and school performance.

**Recommendation 2.** Quantitative studies comparing differences in mean between the research site and similar schools should focus on 2008-2012 academic years’ API scores.

**Recommendation 3.** A cross-national study involving teachers’ perceptions toward implementing multiple intelligence theory in the classroom should be performed. This type of study could provide more definitive evidence on major barriers teachers are experiencing when implementing Gardner’s theory.

**Recommendation 4.** Further qualitative studies investigating education leaders’ perception on implementing multiple intelligence theory in the classroom are recommended. In this instance, school principals’ and superintendents perceptions of implementing Gardner’s theory should be examined.

**Recommendation 5.** It would be interesting to assess the effects of multiple intelligence theory on high achieving students’ ability. A comparison between two groups of high achieving students could be conducted. The experimental group could use Gardner’s theory as the teaching strategy, and then, the students’ scores on a standardized test could be compared to discover the effects of multiple intelligence theory on gifted and talented students.

**Recommendation 6.** Future studies analyzing the students’ performance in multiple intelligence schools on standardized tests is needed. The study should analyze performance data grade by grade to find out the effects of multiple intelligence theory within each grade level, especially with young students.

**Recommendation 7.** Further studies investigating how teachers and students can be classified using multiple intelligence tools are recommended. In this instance, teachers and
students will profile their strengths and weaknesses. The study should examine the effects teachers with different strengths and weaknesses have on students.

**Recommendation 8.** It would be interesting to compare years and levels of experience of the teachers in different multiple intelligence schools. The results of such study could show if years and level of experience are factors that affect utilizing multiple intelligence in the classroom or not.

**Recommendations for Practice**

It was found that Rhodes teachers were familiar with multiple intelligence theory but need more professional development on teaching strategies and practices of the theory, especially on teaching strategies using Naturalistic intelligence. There is, however, a definite need for professional development programs that include teaching practices of multiple intelligence theory.

It is recommended that districts support these teaching practices when implementing multiple intelligence theory in the classroom. This support could include providing teachers with appropriate training and materials and include Gardner’s theory as a central component in public schools. In addition, it was found that a district’s assessment requirements were a major barrier when utilizing multiple intelligence theory in classrooms. Validating more than one standard assessment tool could successfully expand the use of the theory in education.

**Conclusion**

During this research, I had two main goals in this study. The first goal was to investigate the effects of multiple intelligence theory on elementary students in terms of student academic achievement. The second goal was to investigate teachers’ perceptions of multiple intelligence theory. The results of the study showed that multiple intelligence school performance is between
traditional and gifted and talented school performances. The results of the study showed that teachers are familiar with the theory of multiple intelligence but they did not learn about it in a university, professional development programs, or by self-instruction material. The results showed that teachers are practicing the theory of multiple intelligence in their classrooms. Moreover, Linguistic Intelligence was the most frequently practiced intelligence as the results indicate, and Naturalistic Intelligence was the least practiced strategy in the classroom.

Cuban (2004) believed that cultural values are resistant to change and play a major role in shaping the teaching styles and content. Cuban (2004) pointed out that educational reformers have a powerful effect to change teaching strategies and content. Thus, accepting an idea that will change what they value is more difficult than the changing phase. However, introducing the idea of change is the first step to change. According to MacLeod (2002) and Scapens (2007), teachers indicated that educational systems value verbal and linguistic intelligences the most. Hence, students who show strength in one of these two types of intelligences are considered high ability students, while students who show strength in Naturalistic intelligence may not be considered high ability students because of cultural values. Education is the reflection of society, but should not be the reflection of what society wants; education is the reflection of what society needs.
References


