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This dissertation is dedicated to my parents, Camile and Mae Gaspard, my first teachers. They have been and always will be the examples I use for my life.

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This researcher concluded that there was a connection between Science scores and the scores in other academic subjects. He recommended that teachers in Science develop strong relationships with teachers in Math, ELA, Reading, and Social Studies in order to develop uniform techniques which students can use to raise test scores.

- vii. Apply reasoning and problem-solving skills.
 - b. Social Studies, including the following sub-tests:
 - i. Geography;
 - ii. Civics;
 - iii. Economics
 - iv. History.
 - c. Mathematics, including the following sub-tests:
 - i. Ratio, Proportion, and Algebra;
 - ii. Number System;
 - iii. Measurement, Data, and Geometry.
 - d. Science, including the following sub-tests:
 - i. Science as Inquiry;
 - ii. Physical Science;
 - iii. Life Science;
 - iv. Earth and Space Science
 - v. Science and the Environment.
 - 3. Determine if a relationship existed between overall science achievement (as measured by the Eighth Grade LEAP Test) and the following demographic characteristics:
 - a. Gender;
 - b. Race
 - c. Socioeconomic Status.
 - 4. Determine if a relationship exists between overall science achievement (as measured by the Eighth Grade LEAP Test) and overall achievement (as measured by the Eighth Grade LEAP Test) in the following other content areas:

- a. English Language Arts;
 - b. Social Studies
 - c. Math.
5. Determine if a model exists explaining a significant portion of the variance in science achievement (as measured by scores on the Eighth Grade LEAP Test) from the following demographic and academic measures:
- a. Math (overall and sub-scale scores);
 - b. Social Studies (overall and subscale scores);
 - c. English Language Arts (overall and sub-scale scores);
 - d. Socioeconomic Status (as measured by School Lunch Status);
 - e. Gender
 - f. Race

Education

Ipsa scientia potestas est is a Latin phrase which translates to “Knowledge itself is power” (Latin Phrases and Quotes, n.d.). Education has long been a subject of discussion. Many of history’s great thinkers provided quotes about the importance of education. Aristotle had numerous statements on this topic, but two of his statements that seem more meaningful to this researcher were “Education is an ornament in prosperity and a refuge in adversity” and “Wit is educated insolence” (Ancient Greek quotes, n.d.). Victor Hugo also had an interesting quote about education with “He who opens a school door, closes a prison” (BrainyQuote, n.d.).

In the United States, public education is an issue with a diverse group of stakeholders. People from all walks of life are concerned with this country’s educational system. Education benefits the individual as well as the society in which the individual lives by improving its

(ACT, 2008). This research also points to the fact that students in the middle school or junior high school grades are not given the attention that early elementary and high school students are provided (ACT, 2008). The ACT organization believes that a student's ability to successfully complete the eighth grade can predict the student's preparedness for life after high school, whether in the workforce or at the college or university level. The organization makes four recommendations for improving student achievement in the eighth grade. The first recommendation is to focus on those skills that are important for student success in careers and in post-secondary education. A second recommendation is to follow student progress in the grades leading up to middle school and then continue to follow the students through middle school, interceding if the student's progress does not reach acceptable levels. The third recommendation is to find ways to develop positive academic behaviors while in the middle school grades. The final recommendation is that educators work to gain funding from the federal and state governments in order to help meet the needs of the students in the middle school grades (ACT, 2008).

Science Education

The word science comes from the Latin word *Scientia* which translates into knowledge (The Free Online Dictionary, n.d.). Humans have been attempting to obtain knowledge since they began to develop tools and weapons for protection and hunting. The group with the best tools or weapons usually stayed protected from the many dangers of the outside world. Even with the globalization which is taking place during the early part of the 21st Century, Earth's individual nations are concerned about who has the best group of individuals to develop science and technology, modern day tools, and weapons, which will protect them from the dangers of the world.

Regardless of what an individual thinks about science, there is no doubt the lives of humans are made better by discoveries in science. Without scientific innovation there would be no satellite television, no near instantaneous communication across continents, and larger numbers of the world's population would be starving due to a lack of crop production. Nearly 2,300 years ago, Archimedes developed inventions which changed warfare and engineering forever. During the Middle Ages, Ibn Sina produced a book which became Europe's top medical resource for six centuries (Farndon, Wolf, Rooney, & Gorgerly, 2005). The Renaissance provided the world with such great inventors and scientists as Galileo Galilei and Leonardo da Vinci, the latter designing futuristic machines of war that would not be developed until the 20th Century. Later, Sir Isaac Newton and Anton van Leeuwenhoek continued to advance science to the point that their discoveries became legend. In the 1800s scientific thought began to take shape, formed by individuals such as Charles Darwin, Gregor Mendel, and Louis Pasteur. In the last century, the world saw the splitting of atoms and men walking on the moon. The code which determines everything about the human race was discovered, and scientists began to look at ways to improve the planet Earth. This is the century which provided the world with Albert Einstein, Francis Crick, James Watson, Rosalind Franklin, John Oppenheimer, and Stephen Hawking. Now, over a decade into the 21st Century, scientific advancement seems boundless. Unfortunately, as technology advances the steps taken to make these scientific progressions fade from memory. The general population understands the current technology well enough to use it, but within a few years, the knowledge required to make scientific advancements and discoveries becomes obscure. This leads to a society which has technology, but cannot explain how it acquired the capability or how to expand its expertise.

effect on achievement. The study also found that a teacher's confidence in his or her own ability to teach science was a factor related to achievement (Shaw, 2003).

Research concerning science achievement has found several factors which influence science achievement. Socioeconomic status is one factor found to affect science achievement. For example, students from lower socioeconomic backgrounds in Hong Kong were found to score lower on the science test given as a part of the Programme for International Student Assessment (PISA) (Sun & Bradley, 2012). Another study found that positive predictors of science achievement were student completion of homework, computer use, and hands-on activities (Jiang, Yau, & Wang, n.d.). Another area of interest has been science achievement by students who are taking other courses related to science (Chiasson & Burnett, 2001; Theriot, 2007).

mentioned the creation of nuclear weapons, breaking the sound barrier, and the beginning of computers (Hurd, 1958). In his article, Hurd indicated that he wanted individuals to be able to understand and apply science. He told his readers that they were growing up in an exciting time and that in order to maintain this period of innovation they must be competent in science (Hurd, 1958). What Hurd was saying in 1958 is applicable to 2014. In fact, Hurd's article is similar to some of the material in President Obama's 2011 State of the Union Address (Obama, 2011).

Alfred T. Collette and Eugene L. Chiappetta (1986) in their book *Science Instruction in the Middle and Secondary Schools* explained that it may be difficult to describe scientific literacy, so they described what a scientifically literate individual should be able to do. To be considered scientifically literate an individual must have a progressive view of technology and science's role in modern society. This individual would understand the methods and how science should be conducted. This individual would need to be able to evaluate data and use the proper skills to conduct scientific investigations. Finally, the individual should have a broader view of how science relates to one's environment (Collette & Chiappetta, 1986).

According to the National Academy of Sciences, "Scientific literacy is the knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity. It also includes specific types of abilities" (National Academy of Sciences-National Science Education Standards, 1996, p. 22).

Derek Hodson points out in *Towards Scientific Literacy* that there are many different ways of defining scientific literacy (Hodson, 2008). Hodson, like Hurd, does not really define scientific literacy. Instead, he tells the reader that his purpose is that all people become science literate, going so far as to use the phrase "universal critical scientific literacy" (Hodson, 2008,

Common Core State Standards Initiative-English Language Arts-Home-English Language Arts standards, 2011).

The Louisiana State Department of Education is currently working on a science curriculum. The state has not updated its curriculum in six years. The middle school curriculum consists of Physical Science in Grade 6, Life Science in Grade 7, and Earth Science in Grade 8. The students in Grade 8 take the Louisiana Educational Assessment Program (LEAP) Test which has a science component. The students are required to be knowledgeable in Physical Science, Life Science, Science as Inquiry, Science and the Environment, and Earth Science (LEAP Interpretive Guide Spring 2013, 2013).

Education and the United States

Education provides individuals with options. These options can be seen in the fact that the more levels of education an individual completes, the more money is earned. According to former United States Secretary of Education Margaret Spelling, those who drop out of high school each year cost the country 260 billion dollars (Spelling, 2005). In 2009, individuals who did not finish high school earned nearly \$10,000 less annually than those who earned a high school diploma (U.S. Census Bureau-Table 232, 2012). The amount of money earned increases with each additional level of education. The difference between the earnings of an individual who failed to complete high school and an individual who completed an undergraduate four year degree is almost \$40,000, with an individual who earned a four year degree earning \$56,665 and an individual who failed to complete high school earning \$20,241 (U.S. Census Bureau-Table 232, 2012).

As of September 2014, the unemployment rate for individuals with a four-year college undergraduate degree or graduate degree was 3.7%. The rate for high school graduates was

income which was the average for the entire country (*U.S. News and World Report*-Median U.S. Household Income by State, 2010).

Thus far, this document has looked at the unemployment rate of the nation as well as Louisiana and its surrounding states. The same process was followed to examine the median income level. From this data, the next step is to look at the dropout rates both nationally and the dropout rates of Louisiana and its neighboring states. The national high school dropout rate in 2012 was 7%. Males drop out at a rate of 7% while females dropout at a rate of 6%. Hispanics, dropping out at a rate of 13%, have the highest dropout rate in the country followed by African-Americans at a rate of 8%. Those individuals identified as white dropout at a rate of 4%, while Asians have the lowest dropout percentage at 3%. The overall dropout rate has declined from 12% in 1990 to 7% in 2012, but in the age of accountability, 7% is still considered high (National Center for Educational Statistics-Status Graduation Rates, 2014).

As of 2009, Wyoming had the lowest dropout rate in the United States with 1.1% of its students dropping out of school. Illinois had the highest dropout rate with 11.5% of its students dropping out of school. Louisiana's high school dropout rate was 6.8%. Bordering states, Mississippi, Arkansas, and Texas had high school dropout rates of 4.2%, 4.1%, and 3.2% respectively (Chapman, Laird, Ifill, & KewalRamani, 2011).

Dropout Predictors

Pre-high school grades depend on the policy of the school system in which the school exists. What is a middle school grade in one area may be an elementary grade in another. For instance, in many high schools in Louisiana a freshman student would attend classes in the same building as sophomores, juniors, and seniors. However, in other areas freshmen may be housed on a different campus than the final three grades of secondary school. For the purposes of this

study, middle school grades will be defined as grades six through eight. Regardless of the grade configuration of a middle school, these grades are important to the academic success of individuals when they reach high school and move on to any type of secondary education.

One of the reasons to view middle school as an important factor in academic achievement at the secondary and post-secondary level is the ability to use middle school grades to predict graduation from high school. “To achieve the nation’s goal of graduating all its high school students ready for college and career, it will be essential for students to enter high school with at least close-to-grade-level skills and knowledge” (Balfanz, 2009, p. 6). Balfanz (2009) found that students who attended school did not cause discipline problems, and who scored acceptable scores in Math and English were more likely to graduate from high school than those who had one or more of these factors. He believed a student’s chances of graduating from high school could be predicted using these factors as early as the Sixth Grade (Balfanz, 2009).

Concerned with the graduation rates of California high school students, Michal Kurlaender and Jacob Jackson of the University of California at Davis and Sean F. Reardon of Stanford University decided to study how middle school achievement related to a student’s academic achievement, ability to pass the California High School Exit Exam (CAHSEE), and complete high school. The researchers followed a seventh grade cohort from school districts in Long Beach, San Francisco, and Fresno, who began grade seven in 2000 and graduated in 2006 (Kurlaender, Jackson, & Reardon, 2008).

The academic middle school predictors used by Kurlaender, Jackson, and Readron (2008) for this study were: 1) the students’ scores on the California Standards Test (CST) in mathematics and English Language Arts; 2) when the students took algebra; 3) grade point average in Seventh Grade; and 4) the number of failures the students had in science, social

studies, English Language Arts, and mathematics. The demographic factors used in the study were the socioeconomic status (SES), gender, and race or ethnicity. The researchers also converted nominal factors such as whether or not the students were categorized as an English language learner (ELL) in grade 7, whether or not the student was given services due to a special education classification, and whether or not the student repeated a middle or high school grade (Kurlaender et al., 2008).

It was found that fewer students were not on grade level and those students who repeated a high school or middle school grade passed the CAHSEE during their first testing period. The researchers also found fewer students graduated from high school than those students who were the correct age for their grade or had not repeated a grade in high school or middle school (Kurlaender, et al., 2008). Students who, in middle school, had acceptable test scores on the CST, took algebra early, and did not have many failures in their core subjects passed the CAHSEE and graduated more often than students who did not score well on the CST, did not take algebra early, and had several failures in their core subjects. One example found in the study was the fact that students in the Fresno School District who took algebra in the Eighth Grade passed the CAHSEE during their first testing period 62% of the time, while those who did not complete algebra in the Eighth Grade only passed 9% of the time. The group which completed algebra in the Eighth Grade graduated at a rate of 54% as opposed to 22% for those who did not complete algebra in the eighth grade. Seventy-five percent of students in Long Beach who passed every subject in the Seventh Grade graduated. Only 37% of the students who failed two or more subjects in the Seventh Grade graduated from high school. The greatest disparity was found in the San Francisco School District where students who did not fail a subject in Seventh Grade graduated at a rate of 74%. Those who failed two or more subjects in

and move on to college or some other form of post-secondary education (ACT, 2008). The research also points to the fact that students in the middle school or junior high school grades are not given the attention that early elementary and high school students are provided (ACT, 2008). The ACT organization believes that a student's ability to successfully complete the Eighth Grade can predict the student's preparedness for life after high school, whether it be in the workforce or at the college or university level. The organization made four recommendations for improving student achievement in the Eighth Grade. The first recommendation was to focus on those skills that are important for student success in careers and in post-secondary education. A second recommendation was to follow student progress in the grades leading up to middle school and then continue to follow the students through middle school, interceding if the student's progress does not reach acceptable levels. The third recommendation was to find ways to develop positive academic behaviors while in the middle school grades. The final recommendation was that educators work to gain funding from the federal and state governments in order to help meet the needs of the students in the middle school grades (ACT, 2008).

Middle School or K-8

The grade targeted for this study is the final grade before entering high school, grade 8. In Louisiana, there are many different school configurations ranging from smaller schools that have a single school that houses grades pre-K to 12. There are some schools that contain grades pre-K to 8. There are also schools that contain grades 7 to 12 or simply house grades 6 through 8. Two studies which examine the importance of grade configuration are the 2007 study *Should Sixth Grade Be in Elementary or Middle School? An Analysis of Grade Configuration and Student Behavior* by Philip Cook, Robert MacCoun, Clara Muschkin and Jacob Vigdor, and Jonah E. Rockoof and Benjamin B. Lockwood's 2010 study *Stuck in the Middle*. Both of these

studies were conducted to determine if there is a difference between students who attend the same school until completing the Eighth Grade and those students who move from an elementary or upper elementary school to a middle school for grades 6, 7, and 8, or simply grades 7 and 8.

Due to the emphasis on improving academic achievement on standardized tests, researchers are focusing on all educational levels from pre-kindergarten to high school. This has led to an increase in research regarding middle schools. These studies found many negative aspects of middle schools which hinder academic achievement. One such study found that students in the Sixth Grade are twice as likely to get in trouble at school if they are at a middle school instead of an elementary school. These students are also at a greater risk of being involved in more serious negative conduct situations such as violent encounters and drug use (Cook, MacCoun, Muschkin, & Vigdor, 2007).

Christopher C. Weiss and Lindsay Kipnes (2006) conducted a study to see if Eighth Grade achievement was influenced by the grade configuration of the school these students attended. The study found that students in middle schools were more likely to be behind a grade level, came from a lower socioeconomic background, and had parents who had achieved a lower level of education (Weiss & Kipnes, 2006). These researchers also found that many students in middle schools did not have high levels of self-esteem and did not believe they were safe at school (Weiss & Kipnes, 2006). Even with these factors, the researchers did not find any conclusive evidence that the configuration of the grades at a school influenced the achievement of the Eighth Grade students at the school (Weiss & Kipnes, 2006,).

Other researchers tend to disagree with the conclusions presented by Weiss and Kipnes. In fact, researchers point to several common differences between K-8 schools and middle schools that make the K-8 school a more beneficial environment for students. These differences

include school size, the type of teachers who generally work at the two different types of schools, the population of the students within the two types of schools, and the number of moves the students have to make in the two different grade configurations being studied (Byrnes & Ruby, 2007). Middle schools are typically larger than schools using the K-8 configuration. Teacher training generally prepares teachers with the skills to best educate students in elementary school or high school. Middle school specific teacher training is not common. Middle school students tend to come from lower socioeconomic backgrounds than those who attend schools using the K-8 configuration. The final difference is the number of times a student has to change schools. Students who attend middle schools will make an additional school change during their academic careers because of the school's grade configuration (Byrnes & Ruby, 2007). In order to see if these advantages existed, Vaughan Byrnes and Allen Ruby of Johns Hopkins University conducted a study which compared the achievement of students in schools housing grades K-8 and middle schools. The study's participants were 40,883 students from Eighth Grade classes within the Philadelphia City School System (Byrnes & Ruby, 2007). The researchers measured student achievement using the Pennsylvania State System of Assessment (PSSA). The researchers found that the K-8 schools provided the students with more of an advantage than the middle schools (Byrnes & Ruby, 2007).

Mayhem in the Middle by Cheri Pierson Yecke (2005) uses case studies of three different K-8 schools to support the argument that middle schools are not as successful as K-8 schools. The case studies show that the teachers at the schools examined felt the students got more of what they needed to succeed academically due to the K-8 configuration of the school. Students at these schools also had greater academic success (Yecke, 2005).

Jonah E. Rockoff and Benjamin B. Lockwood (2010) conducted a study, which has become the basis for discussion of middle schools and their place in education, on students in New York City Public Schools. Students were followed from grade three to grade eight (Lockwood & Rockoff, 2010). The study found that the English and math achievement for students who went to middle schools diminished and that the drop amplified as the students progressed through middle school (Lockwood & Rockoff, 2010). Elizabeth Dhuey (2011) conducted a study in Canada in which she attempted to see how moving to a junior high school or middle school affected student performance. She found that students moving to junior high schools or middle schools did not do as well as those students who did not move to junior high schools or middle schools. However, she stated that she could not determine if this was due to the movement to a different grade configuration or simply changing schools (Dhuey, 2011).

Standardized Testing

It would be difficult for anyone to mention 21st Century public education in the United States without the issue of standardized testing coming into the discussion. The No Child Left Behind (NCLB) Act of 2002 created a need for a measurement of student efficiency in the different subject areas taught in American public schools. The first group of individuals to use standardized testing were the Chinese. Tests were given to individuals who wanted government jobs. (Fletcher, 2009).

The Chinese used the civil service examinations to determine who would work in the government's bureaucracy. The Armed Services Vocational Aptitude Battery (ASVAB) or a version of it has been in use by the United States military since the First World War. The first tests, the Army Alpha and Army Beta tests, were designed to help military leaders determine the knowledge and skills of their soldiers (ASVAB-History of Military Testing, n.d.). During the

Second World War, the Army Alpha and Army Beta tests were replaced with the Army General Classification Test (AGCT) and the Navy General Classification Test (NGCT). Both of these tests were used to assign individuals to jobs within their services. The AGCT was used for the Army and the Marine Corps. Additional tests were developed to find individuals with specific skills necessary to successfully complete difficult tasks required by each service (ASVAB-History Testing, n.d.).

The Armed Forces Qualification Test (AFQT) became a part of the selection process for future members of the military services. This test was designed to determine minimum standards for individuals entering military service while also calculating recruits' chances of being able to comprehend and apply the information presented to the new enlistees while going through military training (ASVAB-History of Military Testing, n.d.). The ASVAB first came into use in 1968. Six years later, the ASVAB, by decision of the United States Department of Defense, came into use by all United States Military Services as a method for assigning recruits to jobs within their respective services. In 1976, the ASVAB began to be used in the selection process. The ASVAB is still in use, testing potential recruits in mechanical comprehension, general science, electronics information, and other academic areas necessary for successful military service (ASVAB-History of Military Testing, n.d.; ASVAB Technical Bulletin No. 4, May 2012).

During the Industrial Revolution, standardized tests became necessary in order to make sure workers had the required ability and knowledge to properly do their jobs (Fletcher, 2009). At the beginning of the 20th Century the Stanford-Binet Intelligence Test came into use (Fletcher, 2009). In the late 1860s, the Massachusetts Institute of Technology (MIT) and Harvard University required future students to pass an entrance exam in order to enroll at the

university (A (Mostly) Brief History Of The SAT and ACT Tests, n.d.). In 1900, the College Entrance Examination Board was begun in order to standardize how students were admitted to a college or university. The Scholastic Aptitude Test (SAT) came into use in 1926, replacing the tests required by the College Entrance Examination Board. One of the test designers helped development the Army Alpha test discussed earlier (A (Mostly) Brief History Of The SAT and ACT Tests, n.d.). In 1959, the American College Testing (ACT) Program came into use. As well as a screening tool for college entrance, the ACT measured a student's preparation for college and allowed colleges and universities to enroll students in courses which fit their ability level. Both the ACT and the SAT are still used today for college admissions and scholarship considerations (A (Mostly) Brief History Of the SAT and ACT Tests, n.d.).

The nation's current concern about standardized testing stems from the requirements of the NCLB Act President Bush signed into law in 2002 (Ahn & Vigdor, 2013). In 1986, Louisiana implemented the Louisiana Educational Assessment Program (LEAP), designed to determine if students were acquiring the expertise specified by the state's curriculum (RS 17:24:4, 1986). Students would be tested in all grades. Beginning in 1991, students in high school would also be required to pass the Graduate Exit Examination (GEE). Students would begin taking the English, Math, and Writing parts of the exam in the Tenth Grade. Students who failed the test would have opportunities to retake the test. The following year, students would take the science and social studies portions of the GEE (LEAP Interpretative Guide 2013, 2013). In 1999, over two years before NCLB became law in the United States; Louisiana began using what was termed "LEAP for the 21st Century." The students in grades 4, 8, 10, and 11 would take tests which would determine their progression to the next grade. Students in grades 3, 5, 6, 7, and 9 would take the Iowa Test (LEAP Interpretative Guide 2013, 2013). Louisiana began

awards, such as the Nobel Prize presented to the institution's faculty members. A third factor is the number of graduates who hold chief executive officer positions at companies on the Forbes 2000 list. Still another factor is the number of publications faculty members have in prominent professional journals. The number of awards won by faculty members relative to the size of the university is also a factor used in the Center for World University Rankings. The sixth factor is the number of patents obtained by faculty members (Mahassen, n.d.)

According to the rankings by the Center for World University Rankings, 19 of the top 25 universities in the world are in the United States. Harvard University is the top rated university in the world, with Stanford University in the second spot. MIT was ranked fourth. The University of Oxford and the University of Cambridge, both of England, held the third and fifth spots in the rankings respectively. The bottom half of the top ten was made up of Columbia University, the University of California at Berkeley, Princeton University, the University of Chicago, and Yale University (Center for World University Rankings-Top 100 Universities, 2013).

Another organization which provides an international ranking of universities is the Ranking Web of Universities. The Spanish National Research Council also known as Cybematics Lab ranks universities on visibility and activity. Visibility is calculated by measuring the impact of the university's websites based on the number of times the website has been accessed and the number of domains. The second part of the score is activity which is broken into three equally weighted elements: excellence, presence, and openness. Excellence is measured by the number of papers the university's faculty publishes in prominent international journals. Presence is measured by the web domain's number of websites. Openness is measured

by the number of dedicated websites that contain published documents that are considered high quality collections of information (Ranking Web of Universities-Methodology, n.d.).

Ranking Web of Universities placed 21 universities from the United States in its top twenty-five. Harvard University and MIT held the top two spots in this ranking system. The University of Oxford which was third in the Center for World University Rankings' Top 100 was 18th in the Ranking Web of Universities top twenty-five. The University of Cambridge which ranked 5th in the CWUR Top 100, was 24th in the Ranking Web of Universities (Ranking Web of Universities-World, n.d.).

The Academic Ranking of World Universities placed eight United States universities in its top 10. The other two spots were filled by the University of Cambridge and the University of Oxford. This organization also ranked seven United States universities in its top 10 universities for science. Six of the top 10 universities in mathematics were from the United States. (Academic Ranking of World Universities, 2012).

Similar rankings in Physics find eight of the top 10 schools are from the United States, including the top six. Harvard University and MIT were the top two (Academic Ranking of World Universities, 2012). Seven of the top 10 schools ranked in biology were from the United States with Harvard University again in the top spot. Nine of the top 10 schools with computer science programs were from the United States. Among these schools Stanford University and MIT were the top two schools (Academic Ranking of World Universities, 2012).

Quacquarelli Symonds (QS) ranks universities each year. The criteria used by QS was based on a school's international faculty, international students, academic reputation, employer reputation, faculty to student ratio, and citations of its faculty members (QS: The world's leading network for top careers and education, n. d.). The QS ranks had six United States

universities in its top 10. MIT was ranked number one and Harvard University was ranked number three (QS World University Rankings-2012, 2012).

QS also ranks world universities by subject. This writer looked through the science programs and the Science Technology Engineering and Mathematics (STEM) majors. He did leave out psychology, but will summarize the science and STEM majors. Of the 16 programs, MIT was ranked in 14. The only two areas in which the school was not ranked were agriculture and medicine. MIT does not have its own medical school. There is a program in which students can get a Doctorate of Philosophy in medical studies and a Medical Degree from Harvard University's medical school. The most represented universities from this country were the University of California at Berkley, Stanford University, Harvard University, and MIT. The majority of the schools in the top 10 for each degree program were from the United States. The only programs in which the United States did not have the majority of the top 10 were medicine, in which only five U. S. schools were ranked; environmental sciences with only four schools represented; and pharmacy and pharmacology in which only two schools were represented (QS: The World's Leading Network for Top Careers and Education, 2013; QS World University Rankings-2012, 2012; QS World University Rankings by Subject 2013, 2013; QS World University Rankings by Subject 2013-Agriculture & Forestry, 2013; QS World University Rankings by Subject 2013-Biological Sciences, 2013; QS World University Rankings by Subject 2013-Chemistry, 2013; QS World University Rankings by Subject 2013-Computer Science & Information Systems, 2013; QS World University Rankings by Subject 2013-Earth & Marine Sciences, 2013; QS World University Rankings by Subject 2013-Engineering-Chemical, 2013; QS World University Rankings by Subject 2013-Engineering-Civil & Structural, 2013; QS World University Rankings by Subject 2013-Mechanical, Aeronautical & Manufacturing,

2013; QS World University Rankings by Subject 2013-Environmental Sciences, 2013; QS World University Rankings by Subject 2013-Engineering Electrical & Electronic, 2013; QS World University Rankings by Subject 2013-Materials Science, 2013; QS World Rankings by Subject 2013-Mathematics, 2013; QS World University Rankings by Subject 2013-Medicine, 2013; QS World University Rankings by Subject 2013-Pharmacy & Pharmacology, 2013; QS World University Rankings 2013-Physics and Astronomy, 2013).

Even though the United States is well represented, many of the students in these programs are not from the United States. *The New York Times* published an article stating that over half of the students who major in mechanical engineering, chemical engineering, industrial engineering and materials engineering are from outside the United States. The percentages of students from outside the United States who major in computer science and electrical engineering are even higher, 63% and 70% respectively (Lewin, 2013).

According to the Bloomberg Global Innovation Index, the United States ranked first in science. The United States was also ranked first in high-tech density, third in productivity, sixth in patent activity, ninth in research and development, and tenth in researcher concentration (Bloomberg Rankings, 2013). South Korea, one of the countries the United States' students trail in math and science, ranked second on the innovation scale. In fact, South Korea ranked first in patent activity and third in high-tech density and manufacturing capacity, and fifth in research and development (Bloomberg Rankings, 2013). Finland, another country the United States found itself behind, ranked first in researcher concentration and second in research and development (Bloomberg Rankings, 2013). Singapore was ranked seventh on the Bloomberg Global Innovation Index, but only had one top 10 rating, a ranking of fourth in research

concentration (Bloomberg Rankings, 2013). China ranks 29th on the scale, but was in the top 10 in high-tech density, manufacturing capacity, and patent activity (Bloomberg Rankings, 2013).

The United States ranks fifth on the Commitment to Development Index, a catalog of the aid given by the 22 wealthiest countries in the world to those nations who are not as financially strong (Center for Global Development-Commitment to Development Index, 2011; Center for Global Development-Commitment to development index 2011- Overall rankings with United State specifics). Seven areas are used to determine the rankings: migration, aid, security, investment, trade, technology, and environment. The area of interest to this study is the ranking of the United States in technology. To achieve a high ranking in technology countries spend money on research and development and limit the severity of their intellectual property laws. Due to the fact that the United States limits the movement of new technologies because of its strict intellectual property laws, the United States' score on technology is lower than nine other countries. Another reason for the lower ranking of the United States is the fact that the country does not provide research and development with a large tax subsidy (Center for Global Development-United States, 2011; Center for Global Development-Commitment to development index 2011-Overall rankings with United States specifics). These flaws rank the United States tenth in Technology, with the top two spots going to Portugal and South Korea (Roodman, Walz, & Velayudhan, 2011).

4th and 8th Grade World Rankings

In 2011, the fourth set of results from the Trends in International Mathematics and Science Study (TIMSS) showed that 4th grade students in the United States had an average science score of 541. This was 41 points above the average of 500. The United States was more

National Science Education Standards, 1996). The standards explain what a teacher needs to do in order to teach science using the standards. The standards also explain how students should be assessed and how the teacher should proceed through professional development (National Academy of Sciences-National Education Science Standards, 1996).

The CCSS is designed to provide students throughout the United States with the same instruction in Mathematics and English/Language Arts. Both of these national standards stress higher order thinking and problem solving. The goal is to enable every student to go on to some form of secondary education in order to enter the workforce. (Common Core State Standards-Home, 2011). The Next Generation of Science Education Standards are designed to provide these same attributes for students in science (Next Generation Science Education Standards-Development Overview, n.d.).

The National Research Council created a framework for science education. The council's brief criticized the current curriculum used in science education in the United States. One of the main concerns was the fact that the knowledge students obtain in science does not relate to other parts of their lives as well as other parts of science itself (The National Academies: A Framework for K-12, 2011). The brief also stated that science education needs to be revised in order to create a standardized view of science using up-to-date instructional techniques and incorporating advancements in science and technology (The National Academies: A Framework for K-12, 2011). The report brief provided the reader with a summary of how The National Research Council would like for Science Education to be conducted in the future. The framework summary showed a push towards limiting the number of concepts which would be covered. It also showed a desire to connect prior knowledge as well as information gained in other academic areas, to better understand and use science in the future. Students would obtain a

solid understanding of how scientific thought is used, how science is used in other areas of their education, and the importance of certain concepts in Life Science, Physical Science, Earth Science, and engineering and technology science (The National Academies: A Framework for K-12, 2011).

In a paper discussing science education, presented by the director of the national center for improving science education, Senta Raizen pointed to similar areas of concern focusing on developing science education that is applicable to everyday life (Raizen, 1997). The paper also discussed the types of activities which should be used to properly present middle school students with quality science instruction (Raizen, 1997).

Science, Technology, Engineering and Mathematics (STEM)

There is a concern over the ability of a nation to produce individuals who can compete internationally both technologically and scientifically. These nations need individuals who can work in the many different fields of science, technology, engineering, and mathematics, also known as STEM fields. Like the ranking methods discussed in the previous section of this chapter, there is not a definitive method which is used to identify a STEM field or STEM job. In a report from the United States Department of Commerce-Economics and Statistics Administration, the authors considered STEM fields to be fields connected with the physical and natural sciences, computer science, engineering, and mathematics (Langdon, McKittrick, Beede, Khan, & Doms, 2011). The United States recognizes over 350 college degrees as STEM (U.S. ICE-STEM-Designated Degree Program List, 2012). Some of the degree programs on the list such as Nuclear/Nuclear Power Technology/Technician appear obvious, but individuals may be surprised to see Business Statistics on a list of STEM degree programs (U.S. ICE-STEM-Designated Degree Program List, 2012). The United States Department of Commerce-

Economics and Statistical Administration identify fifty STEM professions (Langdon, et al., 2011).

According to *U. S. News and World Report*, as of June 2012 there were 13 million individuals in the United States who were not employed (Engler, 2012). One glaring statistic in these unemployment statistics is the fact that employers are not able to find workers who have the STEM background to fill the 600,000 STEM jobs in the United States economy (Engler, 2012). One interesting fact related to STEM fields is that individuals with an undergraduate degree in a STEM field earn 65 percent more than individuals who obtain degrees in fields not classified as STEM degree programs. In fact, 47% of the individuals with STEM undergraduate degrees earn more than individuals with doctoral degrees in fields not listed as STEM fields (Engler, 2012). In the United States, government researchers found that individuals with STEM degrees who worked outside of STEM fields made more money than individuals with degrees that are not in STEM fields (Langdon et al., 2011).

Even with these financial benefits there is a lack of individuals to fill STEM positions. It is estimated that between 2008 and 2018, the percentage of STEM jobs will increase by 17% (Langdon et al., 2011). Causes of this shortage are “Lack of rigorous K-12 math and science standards, lack of qualified instructors, lack of preparation for postsecondary STEM study, failure to motivate student interest in math and science; failure of the postsecondary system to meet STEM job demands” (Thomasian, 2011, p. 5). The deficit in this area of expertise has caused concern throughout the country as the interactions between countries continue to become more complicated and instantaneous due to advances in technology. President Obama called for 100 million more STEM graduates over the next ten years than the predicted total for the same time period (Gentile, 2012).

This enterprise of President Obama calls for the United States to “Increase STEM literacy so that all students can learn deeply and think critically in science, math, engineering, and technology, move American students from the middle of the pack to top in the next decade, and expand STEM education and career opportunities for underrepresented groups, including women and girls” (Educate to Innovate, n.d.). President Obama has referred to this period in America’s history as “our generation’s Sputnik moment,” (Obama, 2011) In place of developing the ability for this country to reach the moon, President Obama wants the United States to make gains in clean energy technology, biomedical research, and information technology (Obama, 2011).

In order to meet the goals put forth by President Obama, many school systems around the country are trying to develop a curriculum which will allow students to think critically while obtaining a solid understanding of the content of science and mathematics classes (Herschbach, 2011). The United States Government has provided colleges and universities with a thorough list of degree programs which are classified as STEM fields, but has not created a similar list for its elementary and secondary schools, leaving some ambiguity which will need to be addressed by school systems across the country. Dennis R. Herschbach, a professor of education at the University of Maryland, believes the fact that STEM fields can be defined in different ways is a weakness of any curriculum work in STEM. “Above all, STEM represents a way to think about curriculum change. It is a *concept* of how to restructure what we teach and what students learn “ (Herschbach, 2011, p. 98). According to this researcher, students will be able to connect the knowledge they have obtained in their classes in a way which will allow for practical use (Herschbach, 2011).

The second concern regarding the spread of STEM education to minority groups is addressed in research from many perspectives. At the moment, there are more men than women

in university STEM degree programs. The individuals who enter STEM degree programs are usually 19 or younger. Students from outside the United States are more likely to enroll in STEM degree programs than students from the United States, and students who come from a higher socioeconomic background are more likely to enter STEM fields. Once they enter these fields they are more likely to graduate than those who are not in STEM degree programs (Chen & Weko, July 2009).

A group of California researchers, Mitchel J. Chang, Jessica Sharkness, Christopher B. Newman, and Syliva Hurtado (2012), conducted a study with the goal of identifying what was necessary to keep students in science and engineering programs. The researchers found several factors which have a relationship with whether a student stays in a STEM major or leaves after a short period of time. Students from 217 colleges and universities, 1,522 in all, were part of the study. The study had two purposes. The first was to find out if a disproportional number of underrepresented students left STEM majors. The second was to find out what factors could be used as predictors of whether or not an underrepresented minority would complete a STEM undergraduate program (Chang, Sharkness, Newman, & Hurtado, 2012). The data were taken from responses provided by students as freshmen and then again as seniors. The findings of the study showed that it was just as probable for underrepresented minorities to persist in their STEM degree programs as those not classified as underrepresented minorities if a student's college preparation, as measured by high school education, was taken from the analysis (Chang et al., 2012). Underrepresented minority students who entered college with the aspiration of becoming a medical doctor were more likely to complete a STEM degree program than those who entered with the objective of obtaining graduate degrees in STEM majors. A student's own

belief in his or her academic ability was also a factor related to completing a STEM degree (Chang et al., 2012).

Chang and the other researchers wanted to examine the relationship between selected components of a student's experience within a STEM degree program and the student's decision to complete a STEM degree program. Of these factors the greatest was whether or not the student took part in a research study while in his or her undergraduate program. This was followed by being in a club related to the STEM major. A third factor was the frequency with which students studied with other STEM majors (Chang et al., 2012). The amount of time a student worked at an outside job, full-time or part-time, was a factor in whether or not the student received an undergraduate STEM degree. In addition, the more interaction a student had with a STEM instructor or professor, the more likely the student was to not finish the STEM degree program (Chang et al., 2012).

Another finding of the study was that if there was a large percentage of STEM majors at a college or university, a larger percentage of underrepresented minorities completed STEM degree programs. The researchers also found that the higher the SAT score required, the higher the percentage of students who left STEM majors (Chang et al., 2012).

Colleges and Universities

At the moment, the number of STEM graduates is growing at a rate that would allow the United States to meet President Obama's goal of 1 million more STEM graduates (Mervis, 2014). Engineering majors, biological and biomedical sciences, and computer science were the STEM fields which received the most undergraduate recipients (Kuenzi, 2008). At the master's level, engineering and computer science held the top two spots with 30,669 and 19,503 graduates, respectively. Engineering and biological and biomedical sciences held the top two

spots among those receiving doctoral degrees, with over 5,000 in each (Kuenzi, 2008; *Digest of Education Statistics, 2004*, NCES 2005-025, Table 249-252). Since 1971, the percentage of students who received degrees in Biology or Biomedical fields has remained in the low to middle 20s with a peak of 34% between the years of 1975-76 and a low of 17% during 1985-86 (Kuenzi, 2008). During this same time period computer science has made the largest jump from two percent in 1971 to 25% in 2003. The physical sciences and mathematics and statistics, like the biological sciences or biomedical fields, remained stable with slight fluctuations (Kuenzi, 2008). These percentages combined with the fact that more international students are obtaining graduate degrees in STEM fields at colleges and universities in the United States, show the reason for the government and private industries' concern about the United States and its future as a scientific leader in the world.

There are 385 colleges and universities that offer an undergraduate degree in teaching individuals to teach science to the country's students (Big-Future College Search, n.d.). In an attempt to help colleges and universities improve their level of science achievement, the Howard Hughes Medical Institute (HHMI) provided 50 million dollars to 47 small schools in the United States. The money was to be spent developing curriculum that would allow students to be science literate and to improve the instruction given to potential science teachers (HHMI News, 2012). For 25 years the HHMI has been providing small colleges and universities with money to improve the training of future science teachers. These funds have been used to develop new science education courses, provide future teachers with research opportunities, and find professors who can bring creativity to science education courses (HHMI News, 2012).

At the Teachers College at Columbia University, a Science Education Program has been developed to improve science instruction. The program provides students with the technical and

research related skills necessary to be competent in scientific matters as well as in educational matters (Columbia University Teachers' College Science Education Program-Program Description, n.d.). This and other programs like it will help science teachers develop confidence in their ability to present science concepts and skills properly. A Florida study found that eight out of 10 science teachers completing a survey about their science education training, responded that they did not consider their science training adequate to teach science. Seven out of 10 teachers responded that they did not comprehend Florida's educational standards in science. The same percentage of teachers did not think they had enough knowledge of their subject matter to teach science to elementary students (Davis, 2004).

High School Science Education

Louisiana along with other states is changing the way teachers are evaluated. The NCLB Act already requires teachers to be highly qualified in order to teach. Highly qualified teachers must be proficient in their subject matter, have an undergraduate degree, and be certified by the state in which they are teaching (New no child left behind flexibility: Highly qualified teachers-fact sheet, 2004). Even though a teacher is required to be highly qualified, teachers in the United States do not have to complete some of the additional education and training which is mandatory in other parts of the world. France, Spain, Portugal, and Finland are just four of the countries that require their teachers to obtain a graduate degree in order to be certified to teach. The United States requires its teachers to have an undergraduate degree. Mexico, Canada, and most of the countries in South America require their teachers to have an undergraduate degree, but also require training above this degree (Brady, 2013). According to the organization that administers the ACT and the organization that administers the SAT, high school students are not prepared to succeed in college after completing their secondary education (Marklein, 2012).

Student Achievement

Debra Wilkerson (2011) conducted a study on how high school sophomores and juniors taking business education classes scored on the Graduate Exit Exam (GEE) required of high school students who wish to graduate. Wilkerson focused on the English and mathematics sections of the GEE. Her study contained 47,942 students. She found that students who took business education scored higher in English and Mathematics than those students who did not take business education (Wilkerson, 2011).

Johnny Morgan (2011) also conducted a study of Louisiana students. In this case his study was of Fourth Grade students taking the LEAP test. His study contained 40,100 subjects in the Fourth Grade. Morgan found that students who were older scored higher in reading than those who were younger. Female students scored higher than males. Asians scored highest in reading. African-American students scored lower. Students who were classified as free or reduced lunch scored lower than those classified as not free or reduced lunch, meaning socioeconomic status is important (Morgan, 2011). Additionally, Morgan found a relationship between reading and English Language Arts scores and reading and math scores. He found that reading scores had the highest correlation between socioeconomic status and African-American students (Morgan, 2011).

Science Achievement

In Georgia a study conducted on middle school science performance found that students who attend middle schools with agriculture education programs were more likely to meet the grade level standards set by the state than those who attended schools without agriculture education programs. Although the researchers found this difference, they did not determine if the difference was due to student participation in agriculture education programs. (Rich, Duncan,

Navarro, & Ricketts, 2009). The type of professional development the science teacher undergoes does not have a relationship with student achievement (Huffman, Thomas, & Lawrenz, 2003).

A 2001 study which compared agriscience students and non-agriscience students found that students in agriscience had higher mean overall raw scores, higher mean scaled scores, and higher overall scaled scores (Chiasson & Burnett, 2001). A later study found that there was no significant difference between agriscience and non-agriscience students' science scores on the Louisiana Graduate Exit Examination (Theriot, 2007).

Students from lower socioeconomic backgrounds have been found to not increase their performance in science as quickly as those from higher socioeconomic background (Ma & Wilkins, August 2002). A study of the students in Hong Kong who participated in the PISA found that students from socioeconomic backgrounds considered high were more likely to score higher in science than those who came from lower socioeconomic backgrounds (Sun & Bradley, 2012)

A student's abilities to develop science problem solving skills and to understand science concepts are predictors of science achievement. The ability to learn the relevance of science in their daily lives provides a negative predictor of their science achievement (Jiang, Yau, & Wang, n. d.) This study also found that using computers in science class, hands-on activities, and completing homework were all positive predictors of science achievement. Reading the science textbook or talking about science issues in the daily news were negative predictors (Jiang et al., n. d.)

Douglas Huffman, Kelli Thomas, and Frances Lawrenz (2003) conducted a study in which they examined the relationship between middle school science and mathematics achievement and instructional methods used by the instructor, and the professional development

completed by the instructors. In the end the study found that none of the professional development completed by the instructors meaningfully correlated with their students' science achievement (Huffman, Thomas, & Lawrenz, 2003). Another study was conducted to scrutinize the relationship between teachers going through the reform model Talent Development (TD) Middle Grades and student achievement in science. The program was designed to help teachers improve their knowledge and instruction in science. The study found that the students of teachers who had gone through the program improved their scores and that proficiency was maintained (Ruby, 2006).

It has been found that a student who has parents that value science have higher science achievement (Sun & Bradley, 2012). Students from a middle school of grades 6-8 in California were surveyed about their attitudes about science. The data showed that students would prefer to complete science activities rather than read about science concepts in their textbooks. The study also found that students taking science as a central academic course understood more about the nature of science. The study also found that students who were surveyed liked science less at the age of 13 than they did at the age of 12 (Tegtmeir, 2009).

Another factor which can affect science achievement is the size of the school (Sun & Bradley, 2012). A study conducted on Eighth Grade science achievement in the Archdiocese of Philadelphia found that science achievement was not related to the size of the school. There was a significant relationship between science achievement and the school's science scores from the previous year and school location. The data showed that there was a significant difference between the science achievement of students from wealthier families and those from poorer families. There were no significant relationships between Eighth Grade science achievement and gender, number of years of teaching experience, the number of years teaching science, the

highest degree earned by the teacher, the teacher's undergraduate degree, or the number of science courses the teacher took while in college (Shaw, 2003).

According to one study done in Southern California, science achievement was increased by providing the students with a laptop which the students could use at home or in school. The majority of the students who took part in the study were categorized as free and reduced lunch and English Language Learners (ELL). As well as the previous two characteristics mentioned, the majority of the students were Hispanic (Warschauer & Zheng, 2013). Along with their test scores the students were given a survey in which they described the way they used their laptops. The primary use of the laptops was to create documents to be turned in as a part of their school classes. The computers were also used to conduct research for these documents as well as other assignments. The computers were used to take examinations from sources on the internet. The students also conveyed that use of the computers allowed them to have a more "hands-on understanding" (Warschauer & Zheng, 2013, p. 4).

The Southern Regional Education Board developed a list of 10 actions which can be undertaken by educational leaders and administrators to improve their schools' science achievement. The items on the list of actions administrators and educational leaders should take was made up of simple things such as the school administrator knowing what a good science classroom looks like to knowing what his or her school requires in order to improve science achievement. The actions on the list dealt with having standards and plans for science which were synchronized with the instruction provided to the students. The organization also believes teachers should be given the proper science training even after they have entered the classroom and that the students should be working on science concepts and skills which are considered rigorous (Southern Regional Education Board, 2007)

A relationship was found between student achievement and the teacher's confidence in his or her own ability to teach science. An additional relationship was found between the teacher being certified to teach science and student achievement in science (Shaw, 2003).

Another study from Turkey, conducted with 4,725 seventh grade students found that procrastination and gender were factors in science achievement, but that procrastination had a greater effect on females. The researchers used the results of a Science Achievement test and The Tuckman Procrastination Scale. With this data, the researchers conducted a multiple regression analysis which provided them with the results for the findings (Bezci & Vural, 2013).

A study conducted by Jing-Jin Lee and Fen-Ming Lee (n.d) found that the 442 students who participated in the study had positive attitudes towards science. Gender had no bearing on the attitudes. The researchers found that 1.1% of science achievement could be explained by a student's attitude toward science. Students who had taken a science course before were more likely to have positive views of science than those who had not taken a science course. The study also found that female students scored higher than males and students who had taken science courses before scored higher than those who had not taken science courses (Lee & Lee, n.d.).

Muhammad Shabbir Ali and Ahmed Sher Awan (2013) also examined the relationship between a student's attitude towards science and the student's scientific achievement. The sample for the research was made up of 1,885 students from four districts in Punjab province, Pakistan. The students' achievement in mathematics, biology, chemistry, and physics, as well as their answers to a survey of their attitudes towards science, were used as data for the study. The researchers found a positive relationship between students' attitudes towards these four subjects and achievement on the subjects' standardized test. The only exception was the negative

relationship between attitude towards science as a career and mathematics achievement (Awan and Ali, 2013).

Lynn Albers and Dr. Laura Bottomley (2012) conducted a study of college engineering students in which one group of students were instructed through lectures and were then given a quiz at the end of each lecture. The treatment group was given instruction through lectures, but this group was also given activities which allowed them to apply their knowledge (Albers & Bottomley, 2012).

A 2012 study of students in Islamabad found that students, who were instructed using problem-solving methods as opposed to standard lecture format, did better in science because they had the knowledge provided in a standard lecture, but they also understood how the information connected and could be used to solve problems. The study was conducted with students in grade nine from Federal Government Higher Secondary School, Rawat (Nafees, Farooq, Tahirkheli, & Akhtar, 2012). A similar study conducted with 557 ninth grade students in Taiwan found that students taught using inquiry based instruction as opposed to the more traditional methods used scored higher in science (Mao, S. & Chang, C., 1999). Beth Rosenthal Davis found that Fifth Grade students in Florida who took part in the study did better on the post-test used in the study if they had been taught using inquiry based or hands-on instruction (Davis, 2004).

In Temple, Texas researchers wanted to see if students who took part in a project in which they were required to maintain a garden would do better in science. The researchers found that those students who were part of the garden program did better in science than those who were not a part of the project (Klemmer, Waliczek, & Zajicek, 2005).

Summary of the Review of Literature

The discussion of the literature related to the topic of this study began with a look at the importance of science and an explanation of scientific literacy. This review of literature then began to look at education in the United States and its benefits, both economic and noneconomic. Once this was established the discussion moved to an examination of the high school dropouts and how they compare with those who continue their education. This led to a look into predictors which could be used to identify students who could potentially dropout of high school.

This discussion of predictors led to an examination of research related to middle school and its importance in an individual's overall educational future. After looking at this topic the review of literature considered standardized testing, even comparing middle school students in the United States with students from the rest of the world.

There was an analysis of science in education and how it is being treated in the United States. There is a push from President Obama to increase STEM graduates (Obama, 2011). Finally, there was a look at student achievement in science.

CHAPTER 3: METHODOLOGY

Purpose of Study

The primary purpose of this study was to determine the influence of selected demographic and academic factors on science knowledge among middle school students in Louisiana.

Dependent Variable

The primary dependent variable for this study was the academic achievement of Eighth Grade students in science as measured by the science portion of the Eighth Grade LEAP Test.

Objectives

Specific objectives formulated to guide the research included:

1. Describe Eighth Grade students in Louisiana on the following selected demographic characteristics:
 - a. Gender;
 - b. Race;
 - c. Type of Education Enrollment (defined as Regular Education or Special Education);
 - d. Whether or not students were classified as Limited English Proficient;
 - e. Whether or not students were classified as 504 status;
 - f. Type of 504 disability status;
 - g. Socioeconomic Status (SES) as measured by school lunch status (free lunch, reduced lunch, or paid lunch)

2. Describe Eighth Grade students in Louisiana on academic achievement as measured by the Eighth Grade LEAP Test in the following areas:
- a. English Language Arts, including the following sub-tests:
 - i. Read, comprehend, and respond;
 - ii. Write competently;
 - iii. Use conventions of language;
 - iv. Apply speaking/listening skills;
 - v. Locate, select, and synthesize information;
 - vi. Read, analyze, and respond to literature; and,
 - vii. Apply reasoning and problem-solving skills.
 - b. Social Studies, including the following sub-tests:
 - i. Geography;
 - ii. Civics;
 - iii. Economics; and,
 - iv. History.
 - c. Mathematics, including the following sub-tests:
 - i. Ratio, Proportion, and Algebra;
 - ii. Number System; and,
 - iii. Measurement, Data, and Geometry.
 - d. Science, including the following sub-tests:
 - i. Science as Inquiry;
 - ii. Physical Science;
 - iii. Life Science;

- iv. Earth and Space Science; and,
 - v. Science and the Environment.
- 3. Determine if a relationship exists between overall science achievement (as measured by the Eighth Grade LEAP test) among students enrolled in regular education programs and the following demographic characteristics:
 - a. Gender;
 - b. Race; and,
 - c. Socioeconomic Status.
- 4. Determine if a relationship exists between overall science achievement (as measured by the Eighth Grade LEAP test) and overall achievement (as measured by the Eighth Grade LEAP test) among students enrolled in regular education programs in the following other content areas:
 - a. English Language Arts;
 - b. Social Studies; and
 - c. Math.
- 5. To determine if a model exists explaining a significant portion of the variance in science achievement among students enrolled in regular education programs (as measured by scores on the Eighth Grade LEAP Test) from the following demographic and academic measures:
 - a. Math (overall and sub-scale scores);
 - b. Social Studies (overall and subscale scores);
 - c. English Language Arts (overall and sub-scale scores);
 - d. Socioeconomic Status (as measured by School Lunch Status);

- e. Gender; and,
- f. Race.

Population and Sample

The target population of this study was Eighth Grade students in the public schools of Louisiana who were required to successfully complete the LEAP test in order to reach the Ninth Grade. The sample for the study was made up of all Eighth Grade students in public schools of Louisiana who completed the LEAP test during the Spring testing period.

Instrumentation and Data Collection

The instrument for this study was an electronic recording form into which data provided by the Louisiana Department of Education were recorded from an archived database which included selected demographic information as well as the LEAP test scores for the four academic subjects tested and their respective sub-areas. The data did not include any information that could be used to identify specific students. The data were transferred from the electronic form into an Excel document and then into an SPSS document for analysis.

The process of collecting the data for this study required the researcher to complete a research proposal form provided by the Louisiana State Department of Education in which a specific request was made for the selected demographic characteristics and the academic test scores of all the public school Eighth Grade students in Louisiana who were required to take and successfully complete the LEAP test in order to enter the Ninth Grade. The variables which were provided by the Louisiana State Department of Education were:

- a. Gender;
- b. Race;

- c. Type of Education Enrollment (Defined as Regular Education or Special Education);
- d. Whether or not students were classified as Limited English Proficient;
- e. Whether or not students were classified as 504 status;
- f. Type of 504 disability status; and,
- g. SES as measured by school lunch status (free lunch, reduced lunch, or paid lunch);
- h. English Language Arts, including the following sub-tests:
 - i. Read, comprehend, and respond;
 - ii. Write competently;
 - iii. Use conventions of language;
 - iv. Apply speaking/listening skills;
 - v. Locate, select, and synthesize information;
 - vi. Read, analyze, and respond to literature; and,
 - vii. Apply reasoning and problem-solving skills.
- i. Social Studies, including the following sub-tests:
 - i. Geography;
 - ii. Civics;
 - iii. Economics; and,
 - iv. History.
- j. Mathematics, including the following sub-tests:
 - i. Ratio, Proportion, and Algebra;
 - ii. Number System; and

- iii. Measurement, Data, and Geometry; and
- k. Science, including the following sub-tests:
 - i. Science as Inquiry;
 - ii. Physical Science;
 - iii. Life Science;
 - iv. Earth and Space Science; and,
 - v. Science and the Environment.

Data Analysis

The data analysis was organized by the individual research objectives.

The first objective was to describe Eighth Grade students in Louisiana on the following selected demographic characteristics:

- a. Gender;
- b. Race;
- c. Type of Education Enrollment (defined as Regular Education or Special Education);
- d. Whether or not students were classified as Limited English Proficient;
- e. Whether or not students were classified as 504 status;
- f. Type of 504 disability status;
- g. SES as measured by school lunch status (free lunch, reduced lunch, or paid lunch).

To summarize the data for accomplishment of this objective, the researcher presented the frequencies and percentages in categories of respondents on each of the measures collected.

The second objective of the study was to describe Eighth Grade students in Louisiana on academic achievement as measured by the Eighth Grade LEAP Test in the following areas:

- a. English Language Arts, including the following sub-tests:
 - i. Read, comprehend, and respond;
 - ii. Write competently;
 - iii. Use conventions of language;
 - iv. Apply speaking/listening skills;
 - v. Locate, select, and synthesize information;
 - vi. Read, analyze, and respond to literature; and,
 - vii. Apply reasoning and problem-solving skills.
- b. Social Studies, including the following sub-tests:
 - i. Geography;
 - ii. Civics;
 - iii. Economics; and,
 - iv. History.
- c. Mathematics, including the following sub-tests:
 - i. Ratio, Proportion, and Algebra;
 - ii. Number System; and,
 - iii. Measurement, Data, and Geometry.
- d. Science, including the following sub-tests:
 - i. Science as Inquiry;
 - ii. Physical Science;
 - iii. Life Science;

- iv. Earth and Space Science; and,
- v. Science and the Environment.

The data analyzed in objective two was both ordinal and interval. Each student received an ordinal score and an interval score for each academic subject. The ordinal scores were Unsatisfactory, Approaching Basic, Basic, Mastery, and Advanced. These scores were based on the interval score obtained on the academic subject test and varied by subject.

A score which is Basic in one subject may only be Approaching Basic in another. The interval scores range from 100 to 500 on each subject test (LEAP Interpretive Guide 2013, p. 7). To describe the ordinal data, the median was used as a measure of central tendency and the relative frequencies in categories as a measure of variability. For the interval data, measures of the means were used to describe the data. Standard deviations were used to calculate variability. Raw scores were provided for the overall test as well as the subtests. These scores were described using measures of central tendency and standard deviation to describe variability.

The third objective of the study was to determine if a relationship existed between overall science achievement (as measured by the Eighth Grade LEAP test) and the following demographic characteristics:

- a. Gender;
- b. Race; and,
- c. Socioeconomic Status.

To determine if a relationship existed between overall science achievement and gender an independent t-test was used to make a comparison. To determine the relationship between overall science achievement and ethnicity and socioeconomic status comparisons using the one way ANOVA were conducted.

The Fourth objective of the study was to determine if a relationship existed between overall science achievement (as measured by the Eighth Grade LEAP test) and overall achievement (as measured by the Eighth Grade LEAP test) in the following other content areas:

- a. English Language Arts;
- b. Social Studies; and,
- c. Math.

Data used to analyze this variable was interval. In order to determine if a relationship existed between overall science achievement and the other academic content areas this researcher used the Pearson Product Moment Correlation Coefficient.

The fifth objective of the study was to determine if a model exists explaining a significant portion of the variance in science achievement (as measured by scores on the Eighth Grade LEAP Test) from the following demographic and academic measures:

- a. English Language Arts, including the following sub-tests:
 - i. Read, comprehend, and respond;
 - ii. Write competently;
 - iii. Use conventions of language;
 - iv. Apply speaking/listening skills;
 - v. Locate, select, and synthesize information;
 - vi. Read, analyze, and respond to literature; and,
 - vii. Apply reasoning and problem-solving skills.
- b. Social Studies, including the following sub-tests:
 - i. Geography;
 - ii. Civics;

- iii. Economics; and,
- iv. History.
- c. Mathematics, including the following sub-tests:
 - i. Ratio, Proportion, and Algebra;
 - ii. Number System; and
 - iii. Measurement, Data, and Geometry; and
- d. Socioeconomic Status; (as measured by School Lunch Status)
- e. Gender; and,
- f. Race.

Multiple regression analysis was be used to accomplish this objective. Based on previous research SES was entered into the model as the first variable. Stepwise entry of the remaining independent variables was employed in which variables were included that added 1% or more to the explained variance as long as the overall model remained significant. Nominal variables were restructured as binary measures for each category (e.g. race becomes African American or not, Caucasian or not, Hispanic or not, Pacific Islander or not, Asian or not, Native American or not, etc.). Tests were made for multicollinearity prior to conducting the Multiple Regression Analysis.

CHAPTER 4: FINDINGS

The primary purpose of this study was to determine the influence of selected demographic and academic factors on the science knowledge of middle school students in Louisiana. The primary dependent variable for this study was the academic achievement of 8th grade students in science as measured by the science portion of the 8th Grade LEAP Test. Findings of the study are presented by objective.

Research Objective One

The first objective of the study was to describe Eighth Grade students in Louisiana on the selected demographic characteristics:

- a. Gender;
- b. Race;
- c. Type of Education Enrollment (defined as Regular Education or Special Education);
- d. Special Education category;
- e. Whether or not students are classified as Limited English Proficient;
- f. Whether or not students are classified as 504 status;
- g. Type of 504 disability status;
- h. Number of 504 accommodations; and
- i. SES as measured by school lunch status (free lunch, reduced lunch, or paid lunch).

Gender

One variable on which subjects were described was gender. Of the 57,640 students in the study, data regarding gender were available on 57,341 students. Of these 28,192 (48.9%) were female and 29,149 (51.1%) were male.

Race

A second variable used to describe the subjects in the study was race. The race of all but 264 students were identified. The largest ethnic population within the study was Caucasians ($n=27,495$, 47.9%). There were 27,164 African Americans in the study meaning that this race provided 47.4% of the data in the study. The smallest group in the study were the Native Americans who numbered only 417 (0.7%) (See Table 1).

Table 1 Race of Eighth Grade Students in Louisiana Completing the LEAP Test

Race	Frequency	Percent
Caucasian	27,495	47.9
African American	27,164	47.4
Hispanic	1,513	2.6
Asian	787	1.4
Native American	417	.7
Total	57,376	100.0

Note. Data regarding Race were not available for 264 study subjects.

Type of Enrollment

When subjects were examined on the variable type of enrollment, 47,765 (86.3%) were classified as regular education students. The remaining 7,874 (13.7%) were classified as special education students. One student was not classified as regular or special education. For subsequent objectives (other than description), the special education students were eliminated from the data.

504 Classification

The largest number of students in the study, 54,852 or 95.2%, were not classified as 504 students. Two thousand seven hundred eight-eight (4.8%) of the students taking the 8th Grade LEAP Test were classified as 504 students. These students were also eliminated from the final four objectives of the study.

504 Status

In addition to describing students on their 504 status, the researcher also identified the 504 accommodations provided for each of the subjects. Eleven 504 accommodations were available to students. Students could receive multiple accommodations. The accommodation that was provided to the largest number of students was Extra Time, (n=2,192 or 30.1%). The category with the second highest number of students was Individual/Small Group Administration with 1,943 or 27.4%. Test Read Aloud was the accommodation provided to the third largest group with 1,401 students or 19.8% (See Table 3).

Table 3 504 Disability Accommodations of Eighth Grade Students Completing the LEAP Test

Special Education Category	Number ^a	Percent ^b
Extra Time	2,192	30.1
Individual/Small Group Administration	1,943	27.4
Test Read Aloud	1,401	19.8
Assistive Technology	913	12.9
No Accommodation	316	4.5
Other	203	2.9
Transferred Answers	62	.88
Answers Recorded	33	.47
Large Print	10	.14
Communication Assistance	6	.08
Braille	0	.00

^aTotal number of Students Classified as 504 was 2,788.

^bPercentages do not total 100 since subjects could have multiple accommodations.

Research Objective 2

Objective two of the study was to describe Eighth Grade students in Louisiana on academic achievement as measured by the 8th Grade LEAP Test in the following areas:

- a. English Language Arts, including the following sub-tests:
 - i. Read, comprehend, and respond;
 - ii. Write competently;
 - iii. Use conventions of language;
 - iv. Apply speaking/listening skills;
 - v. Locate, select, and synthesize information;
 - vi. Read, analyze, and respond to literature; and,
 - vii. Apply reasoning and problem-solving skills.
- b. Social Studies, including the following sub-tests:
 - i. Geography;
 - ii. Civics;
 - iii. Economics; and,
 - iv. History.
- c. Mathematics, including the following sub-tests:
 - i. Ratio, Proportion, and Algebra;
 - ii. Number System; and,
 - iii. Measurement, Data, and Geometry.
- d. Science including the following sub-tests:
 - i. Science as Inquiry;
 - ii. Physical Science;

- iii. Life Science;
- iv. Earth and Space Science; and,
- v. Science and the Environment.

In addition to the raw scores, each of the sections of the 8th Grade LEAP Test is given a scaled-score. This scaled-score is then used to determine which category of achievement the students have reached. Each of these scaled-scores has a possible range of 100 to 500. Table 6 contains the scaled-score ranges and their corresponding achievement categories. The “Advanced” level recognizes that the student “has demonstrated superior performance beyond the level of mastery” (LEAP and GEE 2011 Interpretative Guide, 2011, p. 1). Scoring “Mastery” means the student “demonstrated competency over challenging subject matter and is well prepared for the next level of schooling” (LEAP and GEE 2011 Interpretative Guide, 2011, p. 1). The “Basic” level includes the student who “demonstrates only the fundamental knowledge and skills needed for the next level of schooling” (LEAP and GEE 2011 Interpretative Guide, 2011, p. 1). “Approaching Basic” scores mean the student “partially demonstrated the fundamental knowledge and skills needed for the next level of school” (LEAP and GEE 2011 Interpretative Guide, 2011, p. 1). The “Unsatisfactory” category represents student scores in which the student “has not demonstrated the fundamental knowledge and skills needed for the next level of schooling” (LEAP and GEE 2011 Interpretative Guide, 2011, p. 1). The minimum requirement for an Eighth Grade public school student in Louisiana to be promoted to the Ninth Grade is one “Basic” score and one “Approaching Basic” score in English Language Arts and Mathematics. The scores in Science and Social Studies are not used in determining promotion.

Table 6 Eighth Grade LEAP Scaled-Score Ranges and Corresponding Achievement Levels for Academic Subjects

Achievement Category	English Language Arts-Scaled-Score Range	Mathematics Scaled-Score Range	Science Scaled-Score Range	Social Studies Scaled-Score Range
Advanced	402-500	398-500	400-500	404-500
Mastery	356-401	376-397	345-399	350-403
Basic	315-355	321-375	305-344	297-349
Approaching Basic	269-314	296-320	267-304	263-296
Unsatisfactory	100-268	100-295	100-266	100-262

Each academic section of the 8th Grade LEAP Test is different, but there are certain factors common to all sections. For instance, each section has a scaled-score used to determine the achievement levels discussed in the previous paragraph. Each test has a raw score which is based on the number of points earned for correct answers to questions. Finally, each test has a group of subtests which require students to answer different types of questions. The English Language Arts, hereafter referred to as ELA, portion of the Eighth Grade LEAP Test is provided the longest amount of time to administer of any of the portions of the Eighth Grade LEAP Test, and like the Math portion, takes two days to administer in its entirety. The ELA section of the test has four subtests. Students are required to complete an essay based on a writing prompt (12 points); a seven question section requires students to use resource materials to answer questions (9 points); a reading and responding section which requires students to answer twenty multiple choice questions, eight constructed response questions, and an essay (40 points); and finally, students have to answer eight multiple choice questions based on proofreading (8 points).

The ELA portion of the Eighth Grade LEAP Test is broken down more completely than Social Studies, Mathematics, and Science portions of the test. Like the Social Studies, Mathematics, and Science portions of the test, the ELA portion of the test is broken down by scaled-scores, raw score, achievement category, standard, and subtest. However, the ELA

The next data examined were the ELA standards used to develop this specific section of the 8th Grade LEAP Test. The number of possible points earned was different for each standard. For example, a student could score eighteen points on questions linked to Standard 7, but could only earn eight points from questions based on Standard 6. Therefore, in addition to the number of correct responses in each standard, the researcher computed a percentage score for each standard. This percentage score was computed by dividing the number of correct responses by the number of possible correct responses for each participant. Students got the highest percentage of items correct (75%) on Standard 3 “Students communicate using standard English grammar, usage, sentence structure, punctuation, capitalization, spelling, and handwriting” (LEAP and GEE 2011 Interpretative Guide, 2011, p. 1). Standard 6 “Students read, analyze, and response to literature as a record of life experiences” (LEAP and GEE 2011 Interpretative Guide, 2011, p. 1) received the smallest percentage of correct answers with only 50% of the questions answered correctly (See Table 9).

Table 9 English Language Arts Standard Scores for Eighth Grade Students Who Completed the Relevant Portion of the LEAP Test

English Language Arts Standard ^a	Mean ^b	Standard Deviation	Minimum	Maximum	Percent Correct
Standard 3-Students communicate using standard English grammar, usage, sentence structure, punctuation, capitalization, spelling, and handwriting	8.96	2.21	0	12.0	75
Standard 2-Students write competently for a variety of purposes and audiences	5.62	.10	0	8.0	70
Standard 5-Students locate, select, and synthesize information from a variety of texts, media, references, and technological sources to acquire and communicate knowledge	6.26	1.58	0	9.0	70

(Table 9 Continued)

English Language Arts Standard ^a	Mean ^b	Standard Deviation	Minimum	Maximum	Percent Correct
Standard 7-Students apply reasoning and problem-solving skills to their reading, writing, speaking, listening, viewing, and visually representing	11.47	2.92	0	18.0	64
Standard 1-Students read, comprehend, and respond to a range of materials, using a variety of strategies for different purpose	6.19	2.04	0	10.0	62
Standard 6-Students read, analyze, and respond to literature as a record of life experiences	5.99	2.18	0	12.0	50

^a Students were not tested on Standard 4.

^b n=41,465.

In addition to the breakdown of the ELA Test by standards, the test was organized into four subtests. Each of the four subtests had a different possible highest score. Subtest 1 had a maximum possible score of 12 and a mean score of 8.92 (74% answered correctly). Subtest 2 only had a maximum score of 9, but had a mean score of 6.26 (70% answered correctly). Subtest 3 had the highest possible raw score, 38, but had the lowest percentage of correct answers of any of the ELA subtests (59%). The maximum score for Subtest 4 was 8. However, the mean of 5.66 was the second highest percentage among the students at 70%. (See Table 10).

The ELA test was also broken down into multiple choice questions and constructed response questions. The students taking the ELA portion of the Eighth Grade LEAP Test were required to answer a total of thirty-three multiple choice questions across three subtests. They were responsible for answering five multiple choice questions for the Using Information Resources subtest; twenty multiple choice questions for the Reading and Responding Subtest; and eight multiple choice questions for the Proofreading subtest (See Table 11).

Another component of the ELA test that was examined was Reading. This component was presented as both a raw and scaled-score. Two additional ways in which the Reading data was divided was into a Reading raw score and a Reading scaled-score. This score is based on the Reading and Responding subtest. The mean reading scaled-score was 328.95 with a standard deviation of 32.60. The mean Reading raw score was 23.65 with a standard deviation of 6.03 (See Table 13).

Table 13 Overall Reading Scaled-Scores for Eighth Grade Students Who Completed the Relevant Portion of the LEAP Test

Reading Score	Mean ^a	Standard Deviation	Minimum	Maximum
Reading Scaled Score	328.95	32.60	100	500
Reading Raw Score	23.65	6.03	0	40.0

^a n = 41,465

Another unique aspect of the ELA section is that the Reading portion of the test has three achievement categories. Over half (54.3%) of the students scored Basic on the Reading section of the ELA portion of the test. The next largest percentage, 28.4 percent, of students scored in the Below Basic achievement level (See Table 14).

Table 14 Reading Achievement Levels Attained by Eighth Grade Students Who Completed the Relevant Portion of the LEAP Test

Achievement Category	Frequency	Percent
Above Basic	7,202	17.3
Basic	22,497	54.3
Below Basic	11,766	28.4
Total	41,465	100.0

Like the reading subtest, the Writing subtest was further broken down. Students completed an essay and were scored on the essay based on the six dimensions of writing. The mean score for the essay completed by the students taking the 8th Grade LEAP Test was 8.92 with a standard deviation of 1.54. The scores ranged from a low of 0 to a high of 12. The writing total score was calculated by adding student scores on the six dimensions of writing. The

first two dimensions had scores ranging from 0 to 4. The remaining four dimensions had a range of 0 to 1. Writing Dimension 5 “Sentence fluency, which includes sentence structure and sentence variety” (Grade 8 English Language Arts (Writing) Student Work 2012, 2012, p. 95), had a mean score of .96. This was out of a possible score of 1, meaning the percentage correct was 96%. “Word choice,” Writing Dimension 6 had the lowest mean score ($\bar{M} = .67$) among the writing dimensions .67. The highest possible score for this dimension was 1 (See Table 15).

Table 15 Writing Dimensions Scores for Eighth Grade Students Who Completed the Relevant Portion of the LEAP Test

Writing Dimension	Mean ^a	Standard Deviation	Minimum	Maximum	Percent
5-Sentence fluency, which includes sentence structure and sentence variety	.96	.16	0	1.0	96
6-Voice, the individual personality of the writing	.88	.2778	0	1.0	88
3-The organization of the student's ideas	.80	.34	0	1.0	80
2-The development of that idea, including the appropriate and accurate use of information from the passage(s)	2.81	.50	0	4.0	70
1-The focus of the student's central idea	2.81	.49	0	4.0	70
4-Word choice	.67	.41	0	1.0	67
Writing Total	8.92	1.54	0	12.0	74

^a n = 41.465

Social Studies

The next part of this objective describes the Social Studies portion of the Eighth Grade LEAP Test. The test consisted of sixty-four multiple choice questions and three extended constructed response questions (LEAP-GEE 2011 Interpretative Guide, 2011, p. 5). There are two subtests within the larger examination and four separate strands in which the students are expected to show proficiency: Strand G: Geography-Physical and Cultural Systems; Strand C:

Table 18 Social Studies Subtest Scores for Eighth Grade Students Who Completed the Relevant Portion of the LEAP Test

Social Studies Subtest	Mean ^a	Standard Deviation	Minimum	Maximum
Subtest 1-Multiple Choice	36.82	10.41	0	60.0
Subtest 2-Constructed Response	6.44	3.03	0	16.0

^a n = 39,800

Of the four strands used to develop questions for the Social Studies portion of the 8th Grade LEAP Test, Strand G-Geography: Physical and Cultural Systems received the highest percentage of correct answers with students answering 59% of these questions correctly. The next highest percentage came from student answers in Strand H-Time, Continuity, and Change Questions, with correct answers on 57% of the questions for this strand. (See Table 19).

Table 19 Social Studies Strand Scores for Eighth Grade Students Who Completed the Relevant Portion of the LEAP Test

Social Studies Strands	Mean ^a	Standard Deviation	Minimum	Maximum	Percent
Strand G-Physical and Cultural Systems	11.17	3.63	0	19.0	59
Strand H-Time, Continuity, and Change	15.91	5.13	0	28.0	57
Strand C-Civics-Citizenship and Government	8.91	3.18	0	16.0	56
Strand E-Economics-Interdependence and Decision Making	7.27	2.55	0	13.0	56

^a n = 39,800

Mathematics

The third academic subject described in Objective Two was Mathematics. The Mathematics portion of the Eighth Grade LEAP Test consisted of a section of 60 multiple choice questions and a constructed response section made up of four questions. The test questions were formulated using six strands: Strand N: Number and Number Relations; Strand A: Algebra; Strand M: Measurement; Strand G: Geometry; Strand D: Data Analysis, Probability, and

Table 31 Comparison of Science Scaled-Score by Socioeconomic Status for Eighth Grade Students Who Completed the Relevant Portion of the LEAP Test

ANOVA					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	9,927,219.813	2	4,963,609.907	3088.702	<.001
Within Groups	63,313,422.65	39,398	1607.021		
Total	73,240,642.46	39,400			

Table 32 Science Scaled-Score Broken Down by Socioeconomic Status for Eighth Grade Students Who Completed the Relevant Portion of the LEAP Test

Socioeconomic Status-Based on Lunch Status	Frequency	1	2	3
Free	21,585	297.63		
Reduced	3,355		316.72	
Paid	14,461			331.32
		1.00	1.00	1.00

Research Objective 4

The fourth objective was to determine if a relationship existed between overall science achievement (as measured by the Eighth Grade LEAP Test) and overall achievement (as measured by the Eighth grade LEAP Test) among students enrolled in regular education programs in the following other content areas:

- a. English Language Arts;
- b. Reading;
- c. Social Studies; and
- d. Math.

The mean scaled-scores were used to measure achievement in each academic subject. The Pearson Product Correlation Coefficient was used to determine if a relationship existed between Science achievement and ELA achievement; Science achievement and Social Studies achievement; Science achievement and Math achievement; and Science achievement and Reading achievement. The highest correlation coefficient was found between Science

regression was overall science achievement as defined by the overall raw score on the Science portion of the Eighth Grade LEAP Test. The independent variables included gender, race, socioeconomic status (as measured by lunch status), the ELA overall score and subtest scores converted to percentage scores, the Social Studies overall score and subtest scores converted to percentage scores, and the Mathematics overall score and subtest scores converted to percentage scores.

The two independent variables, ethnic group and lunch status were modified in order to allow them to be measured as dichotomous variables instead of categorical variables. The first of these variables was ethnic group. Students chose their ethnicity from five categories: African American, Asian, Caucasian, Hispanic, and Native American. In order to make these variables dichotomous, each student's response to the question of ethnic group was compared to the question, "Is the student a member of the African American ethnic group or not?" This same question was asked for the remaining four ethnic groups. The answer would be "no" for the ethnic groups the student did not belong to and "yes" to the one in which the student was a member.

The second independent variable which required modification from a categorical variable to a dichotomous variable was lunch status. The lunch status of a student could be placed in one of three categories, "Paid," "Reduced," or "Free." As with the variable "ethnic group," The student's lunch status would be compared to the question, "Does the student pay for his or her lunch?" The students would get "no" for the two groups they did not fit into and a "yes" for the group in which they were a member. Previous research has shown that socioeconomic status influences academic achievement. In this study, a student's lunch status was used to determine socioeconomic status. For this reason, free lunch status was entered into the model first. The

remaining variables were entered using the stepwise method. The independent variables were retained in the regression model that explained 1% or more of the variance while the overall regression model remained significant.

Due to the fact that the independent variable gender was logically dichotomous no adaptation was necessary. The remaining variables were continuous and, therefore, did not require the modifications necessary for the independent variables ethnic group or lunch status. The first step was to examine the bivariate correlations.

The independent variable with the highest correlation to the dependent variable was Social Studies SubTest 1 Percentage score, with a correlation coefficient of .810. The Social Studies Subtest 1 was the multiple choice section of the Social Studies Tests which consisted of sixty multiple choice questions. The independent variable with the next highest correlation coefficient was Social Studies Strand 1 Percent ($r = .756$, $p < .001$). This strand was made up of Geography questions. Social Studies Strand 4 Percent, made up of History questions, had the third highest correlation ($r = .746$) with the dependent variable. Gender ($r = -.139$, $p < .001$) had the fourth lowest coefficient. This variable was followed by Race-Asian ($r = .047$, $p < .001$), Race-Hispanic ($r = -.019$, $p < .001$) and Race-Native American ($r = .016$, $p < .001$).

Four of the independent variables had a negative relationship with the dependent variable, meaning that as the independent variable gets higher the dependent variable tends to get lower and as the independent variable gets lower the dependent variable tends to get higher. The independent variable being Race-Hispanic had the lowest negative correlation coefficient with $-.019$. The independent variable with the highest negative correlation was age ($r = -.392$, $p < .001$). The remaining two independent variables that had a negative relationship with overall Science Raw Score were Lunch Status-Free and Race-African American with r values of $-.368$ and $-.343$,

respectively. Students who received their lunch free tended to score lower than those students who paid full price for their lunch or those who paid a reduced price for their lunch.

Table 34 Relationship Between Science Scores and Selected Demographic Characteristics and Other Academic Area Scores for Eighth Grade Students who Completed the Relevant Portions of the LEAP Test

Variable	<u>R</u>	<u>P</u>
Social Studies SubTest 1 Percent ^a	.810	<.001
Social Studies Strand 1 Percent ^b	.756	<.001
Social Studies Strand 4 Percent ^c	.746	<.001
Math Raw Score Percent	.744	<.001
Math SubTest 1 Percent ^d	.728	<.001
Social Studies Raw Score Percent	.713	<.001
ELA Raw Score Percent	.710	<.001
Social Studies Strand 2 Percent ^e	.696	<.001
Reading Raw Score Percent	.689	<.001
ELA Multiple Choice Percent	.685	<.001
Social Studies Strand 3 Percent ^f	.686	<.001
Math Strand 3 Percent ^g	.679	<.001
Math SubTest 2 Percent ^h	.676	<.001
Math Strand 5 Percent ⁱ	.641	<.001
Math Strand 2 Percent ^j	.631	<.001
Social Studies SubTest 2 Percent ^k	.631	<.001
Math Strand 1 Percent ^l	.611	<.001
Math Strand 6 Percent ^m	.605	<.001
Math Strand 4 Percent ⁿ	.595	<.001
ELA Standard 7 Percent ^o	.591	<.001
ELA Constructed Response Percent	.585	<.001
ELA Standard 6 Percent ^p	.571	<.001
ELA Standard 1 Percent ^q	.570	<.001
ELA Standard 3 Percent ^r	.507	<.001
ELA Standard 5 Percent ^s	.447	<.001
ELA SubTest 2 Percent ^t	.447	<.001
ELA SubTest 1 Percent ^u	.443	<.001
Writing Total Percent	.443	<.001
ELA SubTest 4 ^v	.442	<.001
Writing Dimension 4 Percent ^w	.422	<.001
Age	-.392	<.001
Lunch Status-Free	-.368	<.001
Race-African American	-.343	<.001
Race Caucasian	.325	<.001
Writing Dimension 2 Percent ^x	.333	<.001

(Table 34 Continued)

Variable	<u>R</u>	<u>P</u>
ELA Standard 2 Percent ^y	.329	<.001
Writing Dimension 3 Percent ^z	.320	<.001
Writing Dimension 1 Percent ^{aa}	.311	<.001
Lunch Status-Paid	.301	<.001
Writing Dimension 5 Percent ^{bb}	.186	<.001
Writing Dimension 6 Percent ^{cc}	.158	<.001
Gender	-.139	<.001
Race-Asian	.047	<.001
Race-Hispanic	-.019	<.001
Race Native American	.016	<.001

n=38,349

^aSocial Studies SubTest 1 Percent stands for the percentage of questions students answered correctly on the multiple choice section Social Studies test.

^bSocial Studies Strand 1 Percent stands for the percentage of questions based on Social Studies Strand 1(Strand G-Physical and Cultural Systems) the students answered correctly.

^cSocial Studies Strand 4 Percent stands for the percentage of questions based on Social Studies Strand 4(Strand H-Time, Continuity, and Change) that the students answered correctly.

^dMath SubTest 1 Percent stands for the percentage of questions students answered correctly on the multiple choice section of the Mathematics test.

^eSocial Strand 2 Percent stands for the percentage of questions based on Social Studies Strand 2 (Strand C-Civics-Citizenship and Government)the students answered correctly.

^fSocial Studies Strand 3 Percent stands for the percentage of questions based on Social Studies Strand 3 (Strand E-Economics-Interdependence and Decision Making) that students answered correctly.

^gMath Strand 3 Percent stands for the percentage of questions based on Math Strand 3(Strand M: Measurement) that the students answered correctly.

^hMath SubTest 2 Percent stands for the percentage of questions students answered correctly on the constructed response questions.

ⁱMath Strand 5 Percent stands for the percentage of questions based on Strand 5(Strand D: Data Analysis) that the students answered correctly.

^jMath Strand 2 Percent stands for the percentage of questions based Strand 2(Strand A: Algebra) students answered correctly.

^kSocial Studies SubTest 2 Percent stands for the percentage of questions students answered correctly on the constructed response section of the Social Studies test.

^lMath Strand 1 Percent stands for the percentage of questions based on Strand 1(Strand N: Number and Number Relations) students answered correctly.

^mMath Strand 6 Percent stands for the percentage of questions based on Strand 6(Strand P: Patterns, Relations, and Functions) students answered correctly.

ⁿMath Strand 4 Percent stands for the percentage of questions based on Strand 4(Strand G: Geometry) students answered correctly.

^oELA Standard 7 Percent stands for the percentage of questions based on Standard 7(Students apply reasoning and problem-solving skills to their reading, writing, speaking, listening, viewing, and visually representing.) that students answered correctly.

(Table 34 Continued)

^pELA Standard 6 Percent stands for the percentage of questions based on Standard 6(Students read, analyze, and respond to literature as a record of life experiences.) that students answered correctly.

^qELA Standard 1 Percent stands for the percentage of questions based on Standard 1(Students read, comprehend, and respond to a range of materials, using a variety of strategies for different purpose.) students answered correctly.

^rELA Standard 3 Percent stands for the percentage of questions based on Standard 3(Students communicate using standard English grammar, usage, sentence structure, punctuation, capitalization, spelling, and handwriting.) that students answered correctly.

^sELA Standard 5 Percent stands for the percentage of questions based on Standard 5(Students locate, select, and synthesize information from a variety of texts, media, references, and technological sources to acquire and communicate knowledge.) students answered correctly.

^tELA SubTest 2 Percent stands for percentage of questions students answered correctly on Subtest 2-Using Information Resources.

^uELA SubTest 1 Percent stands for the percentage of SubTest 1-Writing the students completed correctly.

^vELA SubTest 4 Percent stands for the percentage of questions students answered correctly on SubTest 4-Proofreading.

^wWriting Dimension 4 Percent stands for the percentage of Writing Dimension 4-Word Choice students completed correctly.

^xWriting Dimension 2 Percent stand for the percentage of Writing Dimension 2(The development of that idea, including the appropriate and accurate use of information from the passage(s).) students completed correctly.

^yELA Standard 2 Percent stands for the percentage of questions related to Standard 2(Students write competently for a variety of purposes and audiences.) students answered correctly.

^zWriting Dimension 3 Percent stands for the percentage of Writing Dimension 3-The organization of the student's ideas students completed correctly.

^{aa}Writing Dimension 1 Percent stands for the percentage of Writing Dimension 1(The focus of the student's central idea.) students completed correctly.

^{bb}Writing Dimension 5 Percent stands for the percentage of Writing Dimension 5(Sentence fluency, which includes sentence structure and sentence variety.) students completed correctly.

^{cc}Writing Dimension 6 Percent stands for the percentage of Writing Dimension 6(Voice, the individual personality of the writing.) students answered correctly.

Due to the previous research that has shown the influence of SES on academic achievement, the variable lunch status was entered into the regression model first. This variable explained 13.5% of the variance. The remaining variables were entered using the stepwise method. Social Studies Raw Score Percent, the second variable in the regression model, explained an additional 55.3% of the variance. The third variable, Math Raw Score Percent, explained an additional 4.9%. The last variable which explained at least 1% of the variance, was

the fourth variable, Reading Raw Score, which explained 1% of the variance. The first four variables in the regression model explained a total of 74.7% of the variance in Science Raw Score on the Science portion of the Eighth Grade LEAP Test.

Students from lower socioeconomic backgrounds tended to score lower on the LEAP Test than did students from higher socioeconomic backgrounds. Students with high percentage raw scores in Social Studies tended to have higher Science scaled-scores. Students with high raw percentage scores in Math and Reading also tended to have higher scaled scores in Science.

Table 35 Regression of Science Scores of Eighth Grade Students Completing the LEAP Test on Selected Demographic and Academic Characteristics

ANOVA				
Source of Variance	<u>Df</u>	Mean Squares	F	<u>P</u>
Regression	4	603,257.561	28,342.6976	<.001
Residual	38,344	21.284		
Total	38,348			

Model Summary					
Model	R Square	R Square Change	F Change	Sign. F Change	Standardized Coefficients Beta
Lunch Status-Free	.135	.135	5,999.130	<.001	-.054
Social Studies Raw Score Percent	.688	.553	67,920.371	<.001	.514
Math Raw Score Percent	.737	.049	7212.293	<.001	.274
Reading Raw Score Percent	.747	.010	1,501.440	<.001	.144

Variables not in the Equation		
Variables	<u>T</u>	<u>P</u>
Race-Caucasian	34.312	<.001
Race-African American	-34.213	<.001
Math Strand 3 Percent	17.310	<.001
Writing Dimension 4 Percent	14.126	<.001
Math Strand 1 Percent	-13.891	<.001
Math Strand 4 Percent	12.687	<.001
Social Studies Strand 1 Percent	11.976	<.001
Gender	10.831	<.001

(Table 35 Continued)

Variables not in the Equation		
Variables	<u>T</u>	<u>P</u>
Math Strand 2 Percent	-9.489	<.001
Social Studies Strand 2 Percent	-9.447	<.001
Math Strand 6 Percent	-8.990	<.001
ELA Multiple Choice Percent	6.855	<.001
ELA Constructed Response Percent	-6.563	<.001
Math SubTest 1 Percent	-6.100	<.001
Math SubTest 2 Percent	6.110	<.001
ELA SubTest 1 Percent	5.655	<.001
Writing Total Percent	5.655	<.001
Writing Dimension 6 Percent	-5.194	<.001
Math Strand 5 Percent	4.975	<.001
Lunch Status-Paid	4.973	<.001
ELA Raw Score Percent	4.220	<.001
Age	-4.012	<.001
ELA Standard 5 Percent	3.570	.001
ELA SubTest 2 Percent	3.570	.001
Writing Dimension 5 Percent	3.242	.023
Social Studies Strand 4 Percent	-3.259	.001
Race-Asian	-3.034	.002
ELA Standard 3 Percent	2.916	.015
Race-Native American	2.293	.022
ELA Standard 6 Percent	-2.108	.018
Writing Dimension 2 Percent	2.021	.125
ELA Standard 2 Percent	1.783	.075
Writing Dimension 1 Percent	1.459	.145
Social Studies SubTest 1 Percent	1.332	.183
Social Studies SubTest 2 Percent	-1.332	.183
ELA Standard 1 Percent	1.088	.276
Race-Hispanic	-.941	.347
ELA Standard 7 Percent	.892	.372
Social Studies Standard 3 Percent	.714	.475
ELA SubTest 4 Percent	-.385	.701

CHAPTER 5: SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENATIONS

Purpose of the Study

The primary purpose of this study was to determine the influence of selected demographic and academic factors on science knowledge among middle school students in Louisiana. The primary dependent variable for this study was the academic achievement of 8th grade students in science as measured by the science portion of the Eighth Grade LEAP Test. Specific objectives formulated to guide the research included:

Research Objectives

1. Describe Eighth Grade students in Louisiana on the following selected demographic characteristics:
 - a. Gender;
 - b. Race;
 - c. Type of Education Enrollment (defined as Regular Education or Special Education);
 - d. Whether or not students were classified as Limited English Proficient;
 - e. Whether or not students were classified as 504 status;
 - f. Type of 504 disability status;
 - g. Socioeconomic Status (SES) as measured by school lunch status (free lunch, reduced lunch, or paid lunch); and,
2. Describe Eighth Grade students in Louisiana on academic achievement as measured by the Eighth Grade LEAP Test in the following areas:
 - a. English Language Arts, including the following sub-tests:
 - i. Read, comprehend, and respond;

- ii. Write competently;
 - iii. Use conventions of language;
 - iv. Apply speaking/listening skills;
 - v. Locate, select, and synthesize information;
 - vi. Read, analyze, and respond to literature; and,
 - vii. Apply reasoning and problem-solving skills.
- b. Social Studies, including the following sub-tests:
 - i. Geography;
 - ii. Civics;
 - iii. Economics; and,
 - iv. History.
- c. Mathematics, including the following sub-tests:
 - i. Ratio, Proportion, and Algebra;
 - ii. Number System; and,
 - iii. Measurement, Data, and Geometry.
- d. Science, including the following sub-tests:
 - i. Science as Inquiry;
 - ii. Physical Science;
 - iii. Life Science;
 - iv. Earth and Space Science; and,
 - v. Science and the Environment.

3. Determine if a relationship existed between overall science achievement (as measured by the Eighth Grade LEAP test) among students enrolled in regular education programs and the following demographic characteristics:
 - a. Gender;
 - b. Race; and,
 - c. Socioeconomic Status.
4. Determine if a relationship existed between overall science achievement (as measured by the Eighth Grade LEAP Test) and overall achievement (as measured by the Eighth Grade LEAP Test) among students enrolled in regular education programs in the following other content areas:
 - a. English Language Arts;
 - b. Social Studies; and,
 - c. Math.
5. To determine if a model exists explaining a significant portion of the variance in science achievement among students enrolled in regular education programs (as measured by scores on the Eighth Grade LEAP Test) from the following demographic and academic measures:
 - a. Math (overall and sub-scale scores);
 - b. Social Studies (overall and subscale scores);
 - c. English Language Arts (overall and sub-scale scores);
 - d. Socioeconomic Status (as measured by School Lunch Status);
 - e. Gender; and,
 - f. Race.

Methodology

Population and Sample

The target population of this study was Eighth Grade students in the public schools of Louisiana who are required to successfully complete the LEAP Test in order to reach the 9th grade. The sample for the study was made up of all Eighth Grade students in public schools of Louisiana who completed the LEAP Test during the Spring testing periods.

Instrumentation and Data Collection

The instrument for this study was an electronic recording form into which data provided by the Louisiana Department of Education were recorded from an archived database which includes selected demographic information as well as the LEAP Test scores for the four academic subjects tested and their respective sub-areas. The data did not include any information that could be used to identify specific students. The data were transferred from the electronic form into an Excel document and then into an SPSS document for analysis.

The process of collecting the data for this study required the researcher to complete a research proposal form provided by the Louisiana State Department of Education in which a specific request was made for the selected demographic characteristics and the academic test scores of all the public school Eighth Grade students in Louisiana who were required to take and successfully complete the LEAP test in order to enter the Ninth Grade. The variables which were provided by the Louisiana State Department of Education included:

- a. Gender;
- b. Race;
- c. Type of Education Enrollment (defined as Regular Education or Special Education);

- d. Whether or not students were classified as Limited English Proficient;
- e. Whether or not students were classified as 504 status;
- f. Type of 504 disability status;
- g. SES as measured by school lunch status (free lunch, reduced lunch, or paid lunch).
- h. English Language Arts, including the following sub-tests:
 - i. Read, comprehend, and respond;
 - ii. Write competently;
 - iii. Use conventions of language;
 - iv. Apply speaking/listening skills;
 - v. Locate, select, and synthesize information;
 - vi. Read, analyze, and respond to literature; and,
 - vii. Apply reasoning and problem-solving skills.
- i. Social Studies, including the following sub-tests:
 - i. Geography;
 - ii. Civics;
 - iii. Economics; and,
 - iv. History.
- j. Mathematics, including the following sub-tests:
 - i. Ratio, Proportion, and Algebra;
 - ii. Number System; and
 - iii. Measurement, Data, and Geometry.
- k. Science, including the following sub-tests:

- i. Science as Inquiry;
- ii. Physical Science;
- iii. Life Science;
- iv. Earth and Space Science; and,
- v. Science and the Environment.

Summary of Major Findings

Research Objective 1

The first objective of this research study was to describe Eighth Grade students in Louisiana on selected demographic characteristics. The researcher found that 47.9 percent of the 57,640 students in the study were Caucasian and 47.4 percent of the students were African American. The number of students enrolled in regular education classes was 47,765 (86.3%) and the number of students enrolled in special education classes was 7,874 (13.7%). The largest number of the 7,874 students enrolled in special education classes were identified as “Specific Learning Disability” ($\underline{n} = 2,940$). The number of students classified as Limited English Proficiency was 6656 or 1.2%. Only 4.8% ($\underline{n} = 2,788$) were classified as 504. The three accommodations which were the most common were Extra Time (78.6%), Individual/Small Group Administration (69.7%), and Test Read Aloud (50.3%). Of the 504 students, 847 (30.5%) had at least three accommodations. In this study Lunch Status was used as a measure of Socioeconomic Status. The study found that 64.8% ($\underline{n} = 35,921$) of the students were classified as receiving free lunch or paid at a reduced rate.

Research Objective 2

The second objective of this research study was to describe the academic achievement of Eighth Grade students as measured by the Eighth Grade LEAP Test. The test had four academic

sections: ELA, Social Studies, Math, and Science. The mean ELA scaled-score for the Eighth Grade LEAP Test was 325.61 ($\underline{SD} = 34.21$). The mean ELA Raw Score was 44.50 ($\underline{SD} = 8.95$). Twenty-eight thousand one hundred thirty-five (67.9%) of the students scored “Basic” or above on the ELA section of the test. The Reading Scale-Score was 328.95 ($\underline{SD} = 32.60$) and the Reading Raw Score was 23.65 ($\underline{SD} = 6.03$). On the Reading test, 29,699 (63.8%) scored “Basic” or higher.

The Social Studies mean scaled score was 305.22 ($\underline{SD} = 44.84$). The Social Studies Raw Score was 43.26 ($\underline{SD} = 12.78$). Over half (52.4%) of the students scored “Basic” or above on the Social Studies test. Math had the highest mean scaled-score at 334.14 ($\underline{SD} = 43.68$). The Math Raw Score was 45.31 ($\underline{SD} = 13.97$). Of the students completing the Math section of the Eighth Grade LEAP Test, 25,870 (62.5%) scored “Basic” or better. Science had the second lowest scaled-score, 311.50 ($\underline{SD} = 43.19$), but had the lowest percentage of students with a score of “Basic” or better ($\underline{n} = 22,573$, 56.7%). The raw score for the Science section was 33.72 ($\underline{SD} = 9.28$).

Research Objective 3

The third objective was to determine if a relationship existed between overall science achievement as measured by student scores on the Science section of the Eighth Grade LEAP Test and gender, race, and socioeconomic status. It was determined that there was a relationship between each of the independent variables gender, race, and socioeconomic status and the dependent variable science achievement. Males scored higher than females on the Science section, 314.94 and 308.47 respectively. Asians scored the highest on the Science section with a mean of 333.11, followed by Caucasian ($\underline{M} = 330.14$), and then Native Americans ($\underline{M} = 318.93$).

Hispanic students and African American students had the two lowest overall science scores of 318.02 and 291.84 respectively.

Additionally, a relationship was found between lunch status, which was used to determine socioeconomic status, and overall science achievement. Students who paid full price for their lunch had the highest overall science score of 331.32, followed by those who paid for their lunch at a reduced rate (316.72). The group with the lowest overall science score were those who did not pay for their lunch (297.63).

Research Objective 4

The fourth objective of this research study was to determine if a relationship existed between overall science achievement (as measured by overall science scores on the Eighth Grade LEAP Test) and overall achievement (as measured by scores on the ELA, Reading, Social Studies, and Math portions of the Eighth Grade LEAP Test). It was determined that a relationship existed between science achievement and achievement in ELA, Reading Social Studies, and Math. Social Studies had the highest correlation coefficient of .789, followed by Math ($r = .703$, $p < .001$). ELA had a correlation coefficient of .677 and Reading had a correlation coefficient of .651.

Research Objective 5

The final objective of the research study was to determine if a model existed that explained a significant portion of the variance in science achievement among students enrolled in regular education programs (as measured by scores on the Eighth Grade LEAP Test) from the demographic characteristics (gender, race, and socioeconomic status) and academic measures (ELA, Reading, Social Studies, Math, and their subtests).

Socioeconomic status, as measured by lunch status, was entered first. The remaining variables were entered using the stepwise method. Variables were entered as long as they could explain 1% of the variance. Lunch status-free explained 13.5% of the variance in science achievement. A student's Social Studies Raw score explained 55.3% of the variance. Math Raw Scores explained 4.9% of the variance, and Reading Raw Score explained 1.0% of the variance. The total variance explained by the model was 74.7%.

Conclusions and Recommendations

Conclusion One

Males scored higher on the Science section of the Eighth Grade LEAP Test than females. This conclusion is based on the following findings of the study. Males had a mean score of 314.94 (SD = 45.53). Females had a mean score of 308.47 (SD = 40.62). The t value for this comparison was 14.965 (df = 39,755, p < .001).

The stereotypical difference indicates that females score lower in Mathematics and Science than males. This researcher's experience indicates the opposite. The females in his Science classes both as a teacher and earlier as a student have been substantially stronger than the males in class. However, the results of this study show there is indeed a difference between the scores of females and the scores of males such that males score higher.

In order to address this difference, this researcher recommends adjustments be made in science instruction to raise the science scores of female students. The first recommendation would be to place females in a single gender classroom in which they can develop confidence in their science abilities. This will also alleviate some of the social issues which arise when males and females are in the same classroom. To make these classes even more effective it would be prudent to put the best female science teachers available into these classrooms. The female

teacher connected with the single gender classroom would allow these students to see that Science can be dominated by females.

These classes should also have guest lecturers from higher education and industry. These lecturers would be female scientists and professors who are successful in their given fields of study. Seeing that women can be successful in Science should help change the stereotype.

Another area that needs to be addressed in order to help female students improve their test scores is within the textbook industry. Textbook publishers and curriculum designers need to critically examine their textbooks to see if a bias exists regarding science instruction. The textbooks may overly rely on examples which involve male students instead of female students (especially in older materials). If female students are constantly looking at pictures in a textbook or reading scenarios in the textbook which do not include their gender, they will be less likely to believe they are a part of the world of science.

Additionally, teachers need to complete professional development which trains them to be aware of their own possible bias towards a particular gender. Many teachers subconsciously choose to call on one gender to the exclusion of the other. Being aware of this unintentional bias may help teachers better develop lessons which meet the needs of all students equally.

Conclusion Two

The majority of the students in the public schools in Louisiana were in the lower socioeconomic levels. Based on evidence from the study, this can be seen by the fact that 64.8% of the students in the study were in the categories free lunch or reduced lunch. Students who are from lower socioeconomic backgrounds are at a greater risk to fall behind in school and to fail to complete high school. These students may come to school without enough food to eat. They may not be able to buy the school supplies necessary for school. There are many obstacles faced

by students from lower socioeconomic backgrounds and this researcher is not sure that schools can address all of these obstacles.

There are already programs designed to provide students with meals and some basic school materials during the school day. Schools and school systems have received donated clothing or have in some cases bought clothing (especially uniforms) to distribute to students who are not able to purchase their own school clothes. Schools and school systems are trying to fill in the gaps which form due to a lower socioeconomic background. The problem with this is that it has not filled in the gaps as much as it has created an atmosphere in which more gaps can occur. Some of these programs have had the opposite outcome on the school population. Instead of evening the playing field for the students, some of these programs have developed a new class of student, in essence increasing the division between the groups of students.

The major implication from this conclusion is that teachers need to be aware of the backgrounds of their students and be prepared to face the risk factors brought about due to these backgrounds. Teachers cannot solve all the problems faced by their students, but they can make the classroom an area in which students do not need to be concerned about their socioeconomic backgrounds. Teachers can make sure the students in their classrooms have the supplies they need for the assignments required of the students. For example, if a student lacks access to the internet, the teacher can allow the student to conduct the internet part of the assignment in the classroom. If the student lacks the paper to complete an assignment, the teacher can provide paper for the student. The important thing for the teacher to be aware of is that the students can all achieve regardless of their socioeconomic background. It is the responsibility of the teacher to create the classroom environment in which this can occur.

In order to acquire some of the supplies discussed in the previous paragraph, this writer recommends that the school systems hire an individual whose sole responsibility will be to write grants that can provide resources to the students within the district. This individual would be responsible for identifying grants which would be beneficial to the students. The school system should attempt to hire an individual who is familiar with the schools in the area in order to meet the specific needs of the particular district. If an individual cannot be found within the school organization, this researcher recommends finding an individual who works in a similar school system. It may not be possible to find an individual who comes from a district that is exactly the same, but it is important to find someone who understands the demographics of the area and understands how to communicate with all the stakeholders in order to provide the school system with the resources it needs.

Conclusion Three

The three most frequently listed 504 accommodations were “Extra Time,” “Individual/Small Group Administration,” and “Test Read Aloud.” The important implication from this conclusion is that teachers who deal with 504 students need to be aware of how to properly implement these three accommodations within their classrooms. This is important for the teacher who is instructing 504 students and for the teacher who is instructing students who are going through the process of becoming 504 students. The teacher who does not properly implement these accommodations can face problems from parents and administrators as well as possible disciplinary action or even legal action.

This researcher recommends that middle school science teachers develop a strong working relationship with the special education teacher and have the special education teacher model how to properly implement these accommodations. This will provide the teacher with

experience in the use of the accommodations while also providing the teacher with professional development which can be documented and presented if any questions arise related to the students receiving the accommodations.

Conclusion Four

The majority of the students scored “Basic” or better on each of the academic subjects. Of the students in the study, 67.9% scored “Basic” or better in ELA. The percentage of students scoring “Basic” or better in Reading was 71.6%. Nearly sixty-three percent (62.5%) of the students scored “Basic” or better in Math. The percentage of students scoring “Basic” or better in Social Studies and Science was lower at 61.2% and 56.7% respectively. However, there is still a high percentage of students below basic.

Before discussing the repercussions of these scores it is important to review what these levels of achievement mean to the students, educators, and stakeholders. A student’s scores on the 8th Grade LEAP Test are used to determine which achievement category the student has reached and these categories describe how well students understand the material they have been presented during their time in Eighth Grade and previous years. Scoring “Basic” means the student understands the grade level’s essential material. “Mastery” level achievement identifies a student as able to deal with the material that is more complicated. A score of “Advanced” means a student’s understanding surpasses the understanding of students at the “Mastery” level. Achieving these levels of success is good, but large percentages of students in Louisiana are scoring below these levels. When a student scores “Approaching Basic” it signifies that the students only understand some of the essential material presented to them. “Unsatisfactory” tells the students, the educators, and all the stakeholders the students have not learned the bulk of the essential material necessary for that particular grade. Understanding these levels of achievement

make it clear there is still much ground that needs to be covered before Louisiana can be close to satisfied with its students' performances.

One of the main concerns of educators in the United States is the ability of students to compete with their counterparts around the world. The Programme for International Student Assessment results from 2012 placed the United States in the middle of the countries participating in the evaluation (United States Department of Education, December 3, 2013). Though Louisiana does not usually participate in these academic comparisons, the results of the 8th Grade LEAP Test show that the Louisiana students need to improve academic achievement.

As stated earlier 71.6% of the students scored "Basic" or better on the Reading component of the ELA section of the LEAP Test. This means that 28.4% of the students scored "Approaching Basic" or "Unsatisfactory." The percentage of students who scored "Approaching Basic" or "Unsatisfactory" in Math was even higher at 37.5%. The "Approaching Basic" and "Unsatisfactory" percentages for Social Studies and Science were even higher at 38.8% and 43.3%, respectively. These students do not fully understand the essential material presented to them in the Eighth Grade. This is important because success in high school is based on a student's background knowledge from middle school. Robert Balfanz, an educational researcher, states that, "To achieve the nation's goal of graduating all its high school students ready for college and career, it will be essential for students to enter high school with at least close-to-grade level skills and knowledge" (Balfanz, 2009, p. 6).

This is a concern for Louisiana educators as well as all the stakeholders in the state because academic achievement in ELA and Math are two of the predictors used to identify possible high school dropouts. Robert Balfanz points out that a student who does well in ELA

and Math has a greater chance of completing high school than students who do not score well in these two areas (Balfanz, 2009).

Based on this conclusion and findings the researcher recommends that in order to improve student performance in ELA and Math, schools develop a program which allows students to work independently on computers for one hour after school each day to develop the skills necessary to improve their achievement in ELA and Mathematics. School systems can use existing computer labs and find teachers willing to remain after school for an extra hour each day to monitor the labs. Students would be assigned to a computer lab based on which of the two academic areas needed the most improvement. For instance, if a student had “Unsatisfactory” scores in both ELA and Math, the student would be assigned to a skills lab based on which score was the closest to the “Approaching Basic” level. In this manner it will be possible for the student to move to the next level in that academic subject providing the student with success while also raising the school performance score. This after school program would provide the students with between 120 and 140 extra hours of practice in ELA or Math above instruction received during the regular school day. Some school systems already have after school programs which are federally funded and provide the students with help with their homework, a snack, and extracurricular activities. The program this researcher is proposing would not follow the same guidelines as any existing programs, but should be able to use certain resources, such as the buses to transport students home. The proposed program would be for students who did not score “Basic” or above on the previous years standardized test in either ELA or Math. The students would be broken down into an ELA section and a Math section.

The objective of the program would be to prepare students for that year’s standardized test. The focus would be on ELA and Math, because these are the two subjects that are

commonly monitored when predicting student dropouts. In Louisiana, these two subjects are also used to determine if a student moves from the Eighth to the Ninth Grade. The school system's grant writer or an individual at the school who is knowledgeable of the grant writing process could seek funding through a grant to fund the program. If this is not possible, the school system could attempt to raise the funds through fundraising among the stakeholders.

Conclusion Five

The percentage of students scoring "Basic" or better was lowest in Science. This conclusion is based on the findings that 56.7% of the students scored "Basic" or better in Science compared with the 63.8% in Reading, 67.9% in ELA, 62.5% in Math, and 61.2% in Social Studies. Additional evidence shows that the percentage of students scoring "Basic" in Science was also lower than the percentage in Reading, ELA, Math, or Social Studies. The mean scaled score in Science was 311.50 ($SD = 43.19$). The only lower mean score was in Social Studies (305.22).

Even though over half of the students scored "Basic" or better on the Science portion of the 8th Grade LEAP Test, the low mean score and the high percentage of students who scored below basic, 43.3%, does little to alleviate concerns about the scientific literacy of students in the United States. Based on these findings and this conclusion, this researcher recommends that school systems develop clubs and programs within the schools to increase interest in Science. Three of the basic methods which could be used to implement this recommendation might include the creation of clubs at the school level that promote science. One possible club which could be easily created and implemented would be a "Learning Science Through Science Fiction Club." The school would need an individual to sponsor the club and interact with the students. The teacher could begin by having students read a science fiction novel that explains actual

scientific concepts. The extra reading would also benefit student achievement in Reading and ELA. The teacher could also show students science fiction movies that present scientific concepts. Students and the sponsor would then discuss the books and films in order to draw connections between what they are taught in class and what they read or saw on film. This type of club would best fit into a middle or high school setting.

There could also be a more academically oriented science club which would conduct experiments at the weekly meetings allowing students to demonstrate their understanding of the science concepts presented during their science classes. This club would require more overhead as well as a sponsor who has a good understanding of the different types of science experiments demonstrated by club members. This type of club would best fit in the middle or high school setting.

The third method of implementing this recommendation would be to create after school programs which would allow students to improve their knowledge of basic science concepts while also increasing their test scores in science. These programs could use classroom instruction, computer labs, or scientific lab settings. These programs would need funding at the local, state, or federal level. It would probably be necessary to obtain grants which would fund these programs.

Conclusion Six

A relationship exists between Social Studies achievement and Science achievement. This conclusion is based on the finding of the multiple regression analysis. The three highest bivariate correlation coefficients between the independent variables (ELA, Reading, Social Studies, Math tests and their subtests) and the dependent variable (Science Raw Score) were Social Studies variables. The independent variable with the highest correlation coefficient was

Social Studies Subtest 1 ($r = .810$). The next two were Social Studies Strand 1 and Social Studies Strand 4 at .756 and .746, respectively.

This researcher did not expect the relationship between these two academic subjects to be as strong. This researcher believes possibly this relationship is strong because the formats of the two tests are similar. Both tests have a multiple choice section and a constructed response section. The relationship may also be strong because of overlap in the skills needed for the two tests. For instance, students are required to have an understanding of longitude and latitude in both Science and Social Studies. Students are also required to successfully read maps and charts on these two tests. Also, the time provided to take the Social Studies Test and the Science Test is closer in range than the amount of time allotted for ELA or Math.

Currently a large part of the development in Science Education is related to Science Technology Engineering and Mathematics (STEM). The reason is that there are presently over half a million jobs in STEM fields that cannot be filled because there are not enough people with the educational background to perform these jobs (Engler, 2012). President Obama has also called for the United States to increase the number of STEM graduates over the next decade by 100 million (President's Council of Advisors on Science and Technology-Engage to Excel, 2012).

Additionally, the controversy arising from the Common Core State Standards (CCSS) is causing most educators to focus on Math and ELA which may be to the detriment of Science and Social Studies. The researcher does not believe this trend is occurring due to a conscious effort on the part of educators. Instead he believes it is due to the fact that there is not enough time for teachers to place additional emphasis on Science and Social Studies. An example of this can be seen in Louisiana where new Science and Social Studies curricula were supposed to be created

for the 2014-15 school year. However with the 2014-15 school year underway, there have not been any changes to the curricula in these two subject areas.

Based on these findings and the current focus on Math and ELA curriculum design, this researcher recommends the creation of professional development programs designed to cultivate relationships between middle school science teachers and middle school social studies teachers. These professional development programs would be designed to help teachers in both subject areas see the overlap discussed previously while also allowing these individuals to discuss the issues they face due to the changes in curriculum.

Conclusion Seven

The lowest score among the science strands was “Science as Inquiry.” This conclusion is based on the finding that students only correctly answered 52.4% of the questions related to this strand. As stated several times in this study, there is a great concern in the United States regarding the scientific knowledge of its citizens. Understanding the use of the scientific method is the basis of scientific knowledge. “Science as Inquiry” is a big part of the hands on approach many educators believe is necessary to properly teach science. This researcher recommends adjustments in state certification requirements such that in order to obtain certification in science, a teacher must undergo some type of professional development which trains the teacher specifically to teach science as inquiry. “Science as Inquiry” is an important part of the Sixth Grade iLEAP Science Test. Therefore, students in the Eighth Grade should be well versed in its use. According to the test scores this is not the case. There are several possible reasons for this problem. There may not be enough time to teach students how to conduct scientific inquiry. There may not be enough resources to properly teach students to conduct scientific inquiry. The most probable reason is that the teachers do not fully understand how to teach science as inquiry.

The teacher may very well understand how a scientific experiment is conducted, but may have trouble translating this knowledge to his or her students.

One way to patch the gap in communication mentioned in the last paragraph is by providing science teachers with the skills and resources to properly teach “Science as Inquiry.” Teachers can read books and watch videos on how to teach students to use the scientific method or conduct an experiment, but if the teachers have actually conducted the experiments they are teaching and have been trained to conduct these experiments by individuals who are experts in this area, they should do a far better job passing this knowledge on to students.

The individuals who teach science at the middle school level do not always have to have specific training in science. For instance in Louisiana, a teacher certified in one area can add a middle school science certification by passing the PRAXIS test for Middle School Science. These teachers may have basic content knowledge, but may lack the hands on experience that would allow them to be good instructors in lab settings. Therefore, as stated earlier, this researcher believes that science teachers at all levels should be required twenty hours of professional development within a lab setting in order to become certified to teach science. This would require education programs at the college and university level to use more resources to appropriately instruct current and future teachers in the methods used to run a lab. If a teacher chooses to add science as an area of certification, that teacher will be required to complete an adequate number of hours of lab training before becoming certified. The teacher should need a certificate proving he or she completed the training, and would then need to submit a copy of this certificate with his/her test scores in order to add the science certification to his/her teaching certificate.

The argument against this added requirement for certification is that there is not enough time or resources to devote to training new teachers to use a lab. There is already a shortage of science teachers. One way to make this more feasible is to provide those teachers having some type of science background with the opportunity to go through this certification process. Individuals who teach Physical Education, Agriscience, and Health may already have enough of a background in science to make certification worthwhile for the schools and the teachers.

Another counter argument is that if teachers have that much training they can work in industry and make more money than they would teaching. The problem with these arguments is that if American society wants to produce individuals who are scientifically literate, it is necessary to have individuals who are trained in developing scientific literacy among middle school students. There are programs that allow teachers to attend science instruction workshops during the summer at colleges and universities, but this type of professional development is voluntary for the most part. This recommendation is that participation in this type of professional development be compulsory. Many of the voluntary programs mentioned above provide teachers with a stipend. The compulsory program this researcher is recommending would also provide stipends for those attending this professional development.

Funding can be obtained through grants from public and private foundations who support science education. School systems and individual schools can develop partnerships with colleges and universities in order to develop programs which will allow teachers to acquire the needed instruction while working as science teachers. It may also be possible to develop relationships with local businesses that use laboratories in order to create some type of internship or mentorship program in which teachers are trained to conduct scientific research. The internship program could employ teachers during the summer providing the companies with willing labor

while providing the teachers with the needed experience. As for the mentorship program, scientists at local companies could train teachers at the school laboratories. These scientists would be paid by the school or schools system in the same manner that educational consultants are paid.

This added requirement may be difficult for some, but it will help the teachers become better scientists which will allow the teachers to nurture the young scientists in their care. Due to the shortage of science teachers mentioned earlier, it would be important to gradually phase in these certification programs in order to protect those who have worked for their current certification. It will take time to implement the recommendation, so this should provide time for individuals to decide how they will obtain their lab hours necessary to obtain science certification.

Conclusion Eight

Eighth grade students scored low on the Life Science Strand of the LEAP Test. This is based on the finding that students only answered 56.7% of the Life Science questions correctly on the science portion of the LEAP Test. This percentage was the second lowest among the strands. One possible reason for these scores is the fact that students take Life Science in the Seventh Grade. Of the different strands of science on the LEAP Test, Life Science is the only one that is not taught during the Eighth Grade. The other strands, Science as Inquiry, Science and the Environment, and Earth and Space Science are taught specifically in the Eighth Grade. Though the majority of Physical Science is taught during the Sixth Grade, enough Physical Science is presented during the Eighth Grade due to the subject's relationship with other strands to properly provide students with a review of Physical Science which may allow them to score higher in Physical Science. Life Science, however, is not related to many of the strands taught

during the Eighth Grade. Therefore, so students only see the Life Science material during LEAP review questions.

This teacher recommends that the Louisiana State Department place a two week Life Science Refresher section in the Eighth Grade Science curriculum. This would allow students to be more familiar with the material when they are tested on LEAP. The state is currently working to rewrite the Science curriculum for Louisiana. This would be the perfect time to make the adjustment. The Life Science section would cover all the main points of Life Science (classification, photosynthesis, food webs, animal life cycles, etc.).

This adjustment should not require the addition of major resources. Eighth Grade science teachers are usually certified to teach all middle school science, so the Eighth Grade science teacher should be capable of teaching Life Science to the students preparing for the Eighth Grade LEAP Test.

The extra time spent on Life Science could help bring up the scores in the Life Science strand of the LEAP test. The extra time should not be a factor because the curriculum has some extra time currently built into it, so this could be used for Life Science review. This set of lessons would be more than a simple review. They would be developed by teachers with the focus on covering important areas of the curriculum that students consistently have problems with during the LEAP Test.

Conclusion Nine

There is a correlation between science achievement and achievement in the other academic subjects tested with the Eighth Grade LEAP Test. This conclusion is based on the findings that of the top ten independent variables with the highest correlation coefficients, five were Social Studies variables, two were Math variables, two were ELA variables, and one was a

Reading variable. The three highest were Social Studies Subtest 1 Percent ($\underline{r} = .810$), Social Studies Strand 1 Percent ($\underline{r} = .756$), and Social Studies Strand 4 Percent ($\underline{r} = .746$). The Math variables were Math Raw Score Percent ($\underline{r} = .744$) and Math SubTest 1 Percent ($\underline{r} = .728$). The first ELA variable in the top ten was ELA Raw Score Percent ($\underline{r} = .710$). The first reading variable in the top ten was Reading Raw Score Percent ($\underline{r} = .689$).

As stated in the second chapter of this document, there is a fear among many policy makers and stakeholders in the United States that the country is not producing scientifically literate students. Businesses and industries which rely on Science and Technology are already having difficulty finding workers. There is also a fear that this lack of scientific literacy will lead to a lag in innovation and technology in the United States, causing this nation to fall behind other nations in the world who produce new scientific advancements. One writer went so far as to say this shortcoming was a matter of national security (Klein, Rice, & Levy, 2012).

One of the methods being used to attempt to solve the problem of science proficiency is a focus on Science, Technology, Engineering, and Mathematics (STEM). In fact, President Obama has called for a significant increase in graduates with STEM degrees over the next decade (President's Council of Advisors on Science and Technology-Engage to Excel, 2012).

Scientific literacy is a legitimate concern. However this researcher sees a bigger problem facing the nation. Based on the results from this study, less than 70% of the students scored "Basic" in ELA, Reading, or Math. Less than 60% scored "Basic" in Social Studies and Science. Based on these findings, this researcher recommends that educators in the United States deliberately seek to implement programs designed to improve student academic achievement in all academic subjects. The country cannot expect students to excel in Science and Math without being able to read and write.

This researcher recommends that teachers work together to identify the areas of overlap within all the academic subjects and then develop strategies which will allow teachers to train students on how to use different skills which will allow them to be successful in all their academic subjects. For example, each academic subject in the LEAP Test assesses students in some form of reasoning. In Science it is “Science as Inquiry.” In ELA it is Strand 7 “Students apply reasoning and problem-solving skills to their reading, writing, speaking, listening, viewing, and visually representing.” In Social Studies it is “Strand E-Economics-Interdependence and Decision Making” and in Math it is Strand D: Data Analysis.” If teachers work together to develop reasoning strategies which will help students in all classes, and then implement those strategies, students should be able to improve all their academic subjects instead of a single subject.

This synergistic approach would only work if students used the same strategy to answer questions in Math reasoning that they used to answer questions in Social Studies reasoning or Science reasoning. The repetitive act of using the same strategy to answer reasoning questions will make the actions second nature to the students. This should improve their scores on reasoning. The major concerns with this would be the training of the teachers and the implementation of the reasoning strategy within classrooms. If teachers do not teach the strategy in the same manner, the repetitions required for turning the strategy into a habit will not be reached. If all the teachers do not implement the reasoning strategy, it will be hard for the habit to be formed.

Another challenge would be finding a reasoning strategy which all the teachers could agree upon. If they do not agree on the strategy it is unlikely the teachers will use the strategy in

class and the concept of using the overlap of academic subjects to raise achievement levels would be hindered.

An additional connection between the different academic content areas is the fact that each of the tests requires students to read charts and graphs. Teachers already teach graph and chart reading in their classrooms. This is primarily in Math, but can also be seen in Social Studies and Science. It can even be found in English and Reading. Teachers can work together to develop lesson plans which allow students to learn to effectively read graphs and charts. The teachers would then use the same technique in each class, allowing students the opportunity to practice the technique until the steps to reading a graph or chart become a reflex action.

The age of technology brought about by the internet and social media allows teachers to share ideas and lesson plans in ways that were unheard of just ten or fifteen years ago. Teachers can use this technology to raise test scores and improve student achievement in academic subjects instead of simply focusing on one area to the detriment of another.

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APPENDIX: INSTITUTIONAL REVIEW BOARD

Application for Exemption from Institutional Oversight

Unless qualified as meeting the specific criteria for exemption from Institutional Review Board (IRB) oversight, ALL LSU research/ projects using living humans as subjects, or samples, or data obtained from humans, directly or indirectly, with or without their consent, must be approved or exempted in advance by the LSU IRB. This Form helps the PI determine if a project may be exempted, and is used to request an exemption.



Institutional Review Board
 Dr. Robert Mathews, Chair
 130 David Boyd Hall
 Baton Rouge, LA 70803
 P: 225.578.8692
 F: 225.578.5983
 irb@lsu.edu
 lsu.edu/irb

-- Applicant, Please fill out the application in its entirety and include the completed application as well as parts A-F, listed below, when submitting to the IRB. Once the application is completed, please the completed application to the IRB Office or to a member of the Human Subjects Screening Committee. Members of this committee can be found at <http://sites01.lsu.edu/vp/ored/human-subjects-screening-committee-members/>

-- A Complete Application Includes All of the Following:

- (A) A copy of this completed form and a copy of parts B thru F.
- (B) A brief project description (adequate to evaluate risks to subjects and to explain your responses to Parts 1&2)
- (C) Copies of all instruments to be used.
 *If this proposal is part of a grant proposal, include a copy of the proposal and all recruitment material.
- (D) The consent form that you will use in the study (see part 3 for more information.)
- (E) Certificate of Completion of Human Subjects Protection Training for all personnel involved in the project, including students who are involved with testing or handling data, unless already on file with the IRB. Training link: (<http://phrp.nihtraining.com/users/login.php>)
- (F) IRB Security of Data Agreement: (<https://sites01.lsu.edu/vp/ored/files/2013/07/Security-of-Data-Agreement.pdf>)

1) Principal Investigator: John Dana Gaspard Rank: Student
 Dept: School of HREWD Ph: 225-625-4174 E-mail: gaspa6@tigers.lsu.edu

2) Co Investigator(s): please include department, rank, phone and e-mail for each

*If student, please identify and name supervising professor in this space

Dr. Michael F. Burnett, Professor *Michael F. Burnett*
 School of Human Resource Education and Workplace Development
 225-578-5748
 vocbur@lsu.edu

IRB# <u>E8456</u>	LSU Proposal #
<input checked="" type="checkbox"/>	Complete Application
<input checked="" type="checkbox"/>	Human Subjects Training
<input checked="" type="checkbox"/>	IRB Security of Data Agreement

3) Project Title: The Factors that Influence the Science Achievement of Louisiana 8th Grade Students on the Science Portion of the LEAP Test.

STUDY EXEMPTED BY:
 Dr. Robert C. Mathews, Chairman
 Institutional Review Board
 Louisiana State University
 130 David Boyd Hall
 225-578-8692 / www.lsu.edu/irb

4) Proposal? (yes or no) ☒ No If Yes, LSU Proposal Number

Also, if YES, either

☐ This application completely matches the scope of work in the grant

OR

☐ More IRB Applications will be filed later

Exemption Expires: 10/7/2016

5) Subject pool (e.g. Psychology students) Public School Students in Louisiana

*Circle any "vulnerable populations" to be used: (children <18; the mentally impaired, pregnant women, the ages, other). Projects with incarcerated persons cannot be exempted.

6) PI Signature John D. Gaspard Date 8-27-13 (no per signatures)

** I certify my responses are accurate and complete. If the project scope or design is later changes, I will resubmit for review. I will obtain written approval from the Authorized Representative of all non-LSU institutions in which the study is conducted. I also understand that it is my responsibility to maintain copies of all consent forms at LSU for three years after completion of the study. If I leave LSU before that time the consent forms should be preserved in the Departmental Office.

Screening Committee Action: Exempted <input checked="" type="checkbox"/> Not Exempted <input type="checkbox"/> Category/Paragraph <u>4</u>
Signed Consent Waived: Yes / No <u>Yes</u>
Reviewer <u>Mathews</u> Signature <u>Robert Mathews</u> Date <u>10/8/13</u>

VITA

John Dana Gaspard was born in Killeen, Texas to Camile and Mae Gaspard. At the age of four he and his family moved to Louisiana. After graduating from high school, he attended Louisiana State University where he received a Bachelor of Science in Vocational Agriculture Education in 1996. After teaching school for two and a half years he returned to Louisiana State University to earn a Bachelor of Arts in History. He then attended Baylor University where he earned a Master of Arts in History in 2005. His thesis was titled *The Rise and Fall of the Texas Catholic Interscholastic League*. After returning to the classroom, he entered the Educational Administration Program at Louisiana State University where he received a Master of Education degree in 2009. He is currently in his thirteenth year of teaching and he is working to complete his doctorate in Human Resource Education in the Fall 2014 Semester.