A Case Study: How Do Students with Severe Lead Poisoning Develop and Perform as Readers, and What, as Educators, Can We Do to Help?

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The findings of this research and case study will give me and other teachers insight into the effects of lead poisoning and help us to understand this problem, and how best to teach students who have been affected by lead poisoning.

The questions guiding this research are: How do students with severe lead poisoning develop and perform as readers? How do students with severe lead poisoning use reading strategies? How do students with severe lead poisoning view themselves as readers? How do students with severe lead poisoning progress as readers? How do students with lead poisoning verbalize those reading strategies that they use? What reading skills and strategies do students with lead poisoning use most frequently?

**Background**

Lead poisoning in children continues to be a prevalent problem affecting many urban youths in the United States. Learning processes and neurological functions for these affected children can become permanently damaged. Lead poisoning is an illness caused by the naturally occurring mineral, lead, that used to be found in paint, in pipes and pipe solder, and in or around older homes. Many government educational programs identify that there is a problem. Many tax payers' dollars go towards addressing the problem. Local research has shown that, “in 2003, Rochester was spending nearly one million dollars a year on special education programs for the twenty percent of children with blood-lead levels of greater than 25 μg/dL” (Stoss, 2005, p. 290).

Teachers in urban districts, as well as in other districts, are faced with the effects of lead poisoning every day. Teachers are confronted with battles of academic struggles,
learning disabilities, health issues, and behavioral issues. The affected students contend with those struggles, first hand, every moment of every day.

Due to economic situations, some families have no choice but to live in identified “at risk” areas. Parents and guardians are often unaware that they are exposing their children to detrimental lead poisoning. Lin, Kim, Tsaih, Sparrow and Hu (2004) tell us that sociodemographic factors, rather than genetic factors, such as low income and residing in older housing, contribute to the higher blood lead levels seen in black children. According to the Coalition to Prevent Lead Poisoning (2005), nine hundred children were poisoned by lead in Monroe County in 2004. In some Rochester neighborhoods, as high as thirty-four percent of children had elevated blood lead levels (Stoss, 2005).

As a result of lead poisoning, youths are struggling academically and socially in school. Students with lead poisoning tend to suffer cognitively. Some common traits or characteristics of students with lead poisoning are difficulties processing, trouble with retaining and recalling information; challenges with concentration, staying focused, and on task; reaction time and other motor delays; and many other possible neurological problems that effect learning. As Linakis (2000) discusses, “Lead has a myriad of effects on various organ systems...on neuropsychiatric function, most notably IQ and behavior” (p. 6). Needleman and Landrigan (2004) state that of those students who have “recovered” from lead poisoning, most still suffered from severe learning difficulties, behavior disorders, residual brain damage, IQ deficits, attentional dysfunction, and slowed growth.
The stunning statistics alone are enough to make anyone sit up and take notice as to how serious a problem this is. However, educators have an even greater vested interest, since this problem goes beyond the social, political, environmental, and economic factors. It directly impacts the classroom. These children are, “six times more likely to have learning disabilities”, and they “are seven times more likely to drop out of high school” (Stoss, 2005, p. 290).

There are organizations in urban areas to correct the factors that contribute to lead poisoning in youths, such as The Coalition to Prevent Lead Poisoning in Rochester, New York (Stoss, 2005). However, these changes come slow in low income areas, which are consistently fighting the socio-economic battle. The Third National Health and Nutrition Examination Survey acknowledged that African Americans continually have higher blood lead levels than Caucasians (Lin, et al., 2004). Rental housing containing unaddressed lead paint and irresponsible landlords still contribute to a high percentage of urban youths being poisoned each year (Krisberg, 2006). The U.S. Environmental Protection Agency (2007) warns that, certain renovations, if not conducted properly, can release lead contaminants in the form of dust into the air. Jackson (1999) reminds us that, “We hear and see terms ‘high risk,’ ‘at risk,’ and ‘risk factor’ frequently these days, and most of the time they appear in combination with the terms ‘African American,’ ‘minority,’ or ‘low income’” (p. 308). Of African American and other minority children between the ages of one and five, living in large cities, an astonishing thirty-seven percent have lead poisoning at levels associated with cognitive impairment and behavior problems (Jackson, 1999). Childhood lead poisoning is often associated with poor ethnic
neighborhoods. Lin, Kim, Tsaih, Sparrow and Hu (2004) make the connection that minority groups are therefore disproportionately affected.

*Statement of the Problem*

Lead poisoning is a serious problem for young students. It is the catalyst to many struggles that students will continue to face throughout their school years and throughout their lives. There are numerous ways in which lead poisoning affects the brain’s ability to function; therefore, there are various areas in which the learning process is affected.

As a teacher in an urban setting plagued by this issue, I encounter students with lead poisoning each year and recognize their struggles. The content area that I see most affected and of significant concern is reading. The majority of affected students fall below grade level, sometimes by more than one grade level. Literacy problems affect success in other content areas, due to the fact that all subjects depend on reading.

Teachers need guidance and support to address lead poisoning and its impact on their students. This case study will provide a better understanding of how students with lead poisoning function and perform when learning, and how they view themselves and learning.

*Significance*

I have recognized many recurring commonalities among the students that I have taught who are affected by lead poisoning. Most of the observable traits are linked to literacy struggles and surrounding issues. Currie (2005) notes that literacy struggles lead to profuse difficulties in other subject areas. This is due to the simple notion that a
student needs to be literate to be successful within all curricula. From my experience, districts with large populations of students suffering from lead poisoning tend to be least prepared to address the needs of these students. From what I have observed, my district does not have adequate funding and/or the funding is not being allocated properly to address the needs of these students with lead poisoning. I teach in a “high lead risk” neighborhood, and for the past six years that I have been in that setting, there have not been any seminars that focus on making the community aware of lead poisoning dangers and its effects. I believe that districts that have a lead exposure problem need to offer training to their present teachers, as well as literacy recovery specialists who are better trained and experienced in dealing with students with these special needs. These specialists could service identified students in addition to presenting professional development workshops for teachers that target strategies for helping lead exposed students.

I have observed a pattern in my school where affected students are brought to intervention teams year after year, an avenue which has been unsuccessful. Often times the team is not aware that the student suffers from exposure to lead. All too often, we begin to “intervene” this health problem with academic and behavioral modifications. Consequently, I have watched this process conclude with frustrations for all parties involved in the intervention process. Additionally, the continual grade level retention of affected students due to low grades is unproductive. As Stoss (2005) reveals, these students are more likely to drop out of school. The above-mentioned techniques act as a “band-aid” rather than a cure for the problem. I also feel that current reading programs do not account for individuals who may need a more intensive, independent design. The
reality is that classroom teachers are often left to figure out solutions on their own. Teachers then need to identify, assess, and design specialized education implementations within the classroom to meet the diverse needs of these students. This often occurs in a classroom that contains many other students that have varying special needs. Modifications and strategies are implemented daily by teachers for students with or without a classification. As educators, we need to take a look at teaching and learning strategies that have been effective for students dealing with the effects of lead poisoning. This modern education problem is a reality that is not going away!

With reassessment of content areas most affected by lead poisoning, six years worth of educational experience, training, and observations, I have determined where academic weaknesses in reading exist. I have used this information, along with other pertinent data from tests, medical files, surveys, interviews, conferences, etc., to design a month-long intensive, “Reading Skills Program.” This program was intended to make learning easier, more meaningful, and more productive, for students suffering academically because of their exposure to lead. My “Reading Skills Program” not only addresses the commonly noticed issues surrounding lead poisoning, such as the lack of reading strategies, but it also attends to deeper characteristics such as short attention spans, lower retention and comprehension, and hyperactivity.

Rationale

I have been an educator in an urban district for six years. My school district is recognized as a district with a high population of students affected by lead poisoning. Each year, I encounter numerous students who have been diagnosed with high lead
levels. These same students usually seem to suffer more academically and socially in comparison to their peers. I struggle trying to find ways to make a lasting difference in the way that those students learn.

Much of the research I have studied supports my suspicions that lead poisoning affects retention, comprehension, appropriate social interaction, and other afflictions. In short, learning is compromised. However, the research is lacking a solution. Educators need answers and strategies. Health problems can affect a child’s school readiness both directly and indirectly. Lead poisoning “directly impairs a child’s cognition and causes behavior problems” (Currie, 2005, p. 18). There is a long list of authors, and a wealth of information that supports the findings that lead poisoning affects the body, the mind, and negatively affects learning. Unfortunately, the list of strategies and solutions for teachers and students dealing with this social, academic, and medical issue in classrooms is virtually non-existent.

Therefore, educators caught in this dilemma of seeking strategies and solutions become frustrated. As a result, teachers may find it easier to just accept the fact that the affected students are performing below standards, and the possibility that they will never meet or exceed standards is inevitable. In the same respect, for students who are in this position, it may be easier to just resign themselves to failure and give up. The fight may seem too hard and the end too far away. I offer insight and some answers for teachers and students who are in the midst of these real world, every day frustrations.
Definition of Terms

Lead Poisoning- A medical condition, also known as Saturnism, Plumbism, or Painter Colic, is caused by increased blood lead levels when lead is absorbed by the body.

Intervention process- A process within schools, where a teacher presents academic or behavioral concerns about a student. The teacher and a team of colleagues brainstorm strategies and assessments to best support and improve the student’s academic and social achievements.

Intervention- The actions and strategies implemented by teachers, intervention team members, school staff members, administrators, students, and/or family members to address the concerns raised during the intervention process.

Processing (information)- To gain an understanding of.

Retention (information)- The act or power of remembering things; memory.

Recalling (information)- To remember; recollect. The ability to remember information.

Lead level blood test types- “F” representing a finger prick or capillary test, and “V” representing a venous test (from the vein). Also see Appendix: J.

DRA- Developmental Reading Assessment

CDC- Centers for Disease Control and Prevention

CUM- A file of a student’s cumulative education records.
Introduction

Lead is a natural occurring metal that has been known about and mined throughout history. There have been many uses for this soft metal. Its popularity and uses have risen and declined throughout time periods and civilizations. Historically speaking, the negative effects of lead were not truly recognized until recently. Currently, lead and its associated poisoning have been brought to the forefront of childhood health care as well as environmental concerns. Poisoning from lead, known as lead poisoning, affects the human body and mind in numerous ways. These negative affects from lead can severely harm children who are still developing. Students suffering from raised blood levels tend to have a higher percentage of academic problems.

Defining and Identifying How One Acquires Lead Poisoning

There is extensive literature and research on the topic of lead poisoning. Lead poisoning is a toxic medical condition caused by increased levels of lead in the bloodstream. These levels are produced by the ingestion, inhalation, or skin absorption of lead or lead compounds, resulting in various dose-related symptoms including nausea, muscle weakness, lowered I.Q., learning difficulties, hyperactivity, irritability, seizure, and coma (Demers, 2007). This condition is also known as Plumbism, or painter’s colic (Franklin, 2007). People have been aware of the effects of lead poisoning since ancient times, however until recently it was not truly recognized and taken seriously (Koller, et al., 2004). During the 1980s, lead poisoning came to the forefront of health and
socioeconomic concerns. During the 1990s, research took a different route and focused on the effects lead poisoning had on neurology and cognition.

Lead is a natural metal that has been mined and used for various purposes as far back as 6000-8000 years (Compton’s by Britannica, 2007). Coincidentally, about 2000 years later, health problems surrounding the use of lead began to be recognized. Lead poisoning, or at least the negative effects resulting from lead, had been observed and noted 4000 years ago (Encyclopedia Britannica, 2007). Formal research that recognizes lead poisoning as a true problem has emerged within the last 50-60 years.

Before the twentieth century, lead poisoning was seen as an occupational disease, only associated with lead laden jobs such as mining and smelting (Koller, et al., 2004). As we moved into the twentieth century, research identified lead poisoning as a socio-demographic, environmental, and economic disease affecting a wider population than previously thought. Despite the many years of noted concerns, lead is still being used in such products as leaded gasoline, plumbing fixtures, bullets, imported cosmetics, and imported low-cost jewelry. In addition, lead contamination still occurs as a result of smelting and mining activities.

There is no argument or question regarding where modern day childhood lead poisoning originates. Compton-Lilly (2002) and Linakis (2000) present very similar answers to the question, “How does one get lead poisoning?” Both authors state that the number one cause for raised blood lead levels is exposure to lead based paint and its associated contaminants. In addition, they both agree that secondary contamination risks include contaminated soil, lead pipe solder, ceramics, and renovation dust from construction. Compton-Lilly (2002) describes in more detail that sub sequential
poisoning can occur when water is taken for consumption from pipes that contain lead solder at their joints. In these cases, she discusses the importance of letting the water run for a couple of minutes before drinking. Linakis (2000), reports at greater length about the dangerous dust that comes from remodeling and/or working on older homes containing lead paint. He notes that many people are put at risk as the remodeling of older homes has become increasingly popular. The harmful dust from sanded; scraped, and disturbed lead based paint can also contaminate the soil surrounding work areas (Linakis, 2000).

Renovations and remodeling of older homes carried out by individuals who are uneducated, unaware, or remiss about the dangers of lead poisoning and its effects, and/or those individuals who are unaware that the job site contains lead contaminants, can prove very dangerous and damaging. Contaminated dust particles, deteriorating paint surfaces, paint chips, and accumulating garbage from renovated old windows and doors can dangerously pollute an environment unless appropriate containment and clean up procedures are followed (Jacobs & Nevin, 2006). Lead poisoning can be caused by inhalation of airborne particulate lead, ingestion of lead paint chips, and occasionally other sources. The most dangerous situation for children is anywhere contaminated dust settles. This can occur on horizontal surfaces, such as floors and window sills, and is then ingested by hand-to-mouth contact (Jacobs & Nevin, 2006).

The Effects of Lead Poisoning

Health problems induced by lead have numerous symptoms and effects however, lead poisoning is known as a silent offender (Liu, et al., 2002). For the most part
immediate symptoms and effects are not apparent in children, therefore the poisoning goes undiagnosed and untreated, sometimes for years (Krisberg, 2006). Unfortunately many children go untested, during which time the effects of the lead poisoning continue to compound. These problems are particularly critical while a child is young and still developing. When lead poisoning is finally diagnosed, in many cases the poisoning and effects could have been less severe if tested and recognized earlier. Haley and Talbot (2004) state that young children are more vulnerable and at risk of acquiring lead poisoning; children between birth and six years old are most at risk and suffer the most damaging results (Jacobs & Nevin, 2006).

Cranley (2002) offers an answer for these figures. She reports that children under the age of six are more susceptible to lead’s harmful effects because lead is easily absorbed into their still growing and developing brain and body. Lead poisoning then affects organs, body systems, and neurological development (Cranley, 2002).

Small children crawl around and play in areas where lead contamination is high (Hevesi, 1999). Also, young children put their fingers, toys, and other objects in their mouth that might be contaminated with lead paint dust or chips (Haley & Talbot, 2004).

Fortunately children lower their risk factor when they make the transition from crawling to walking (Cranley, 2002). Lead poisoning is very dangerous during a child’s development years. Children below the age of six are still developing physically and mentally, and it is very important that nothing impedes this process (Jacobs & Nevin, 2006). Any damage done during this critical time can have life long effects. Lead poisoning has become a priority in childhood health care because of these previously mentioned reasons.
Health, Intellect, and Behavior Problems

Childhood elevated blood levels resulting in lead poisoning can lead to many health, intellect, and behavior problems. Blood lead levels too low to evoke symptoms can still result in a lower IQ, attention deficit problems, and lower growth rates (Needleman & Landrigan, 2004). While lead poisoning may not show visible symptoms during its initial absorption, its cumulative effects prove to be very adverse. Low levels of lead in the bloodstream have been associated with decreased intelligence, behavioral problems, and developmental deficiencies. At high levels, lead can cause brain damage, coma, or death (Koller, et al., 2004). Cranley (2002) more specifically states that, “low level exposure can cause reduced IQ and attention span, hyperactivity, impaired growth, reading and learning disabilities, hearing loss, insomnia, and a range of other health, intellectual and behavioral effects” (p. 25). These mental and physical impairments can lead to other effects such as social withdrawal, increased aggression, higher involvement in crime and unwed pregnancy (Cranley, 2002). Currie (2005) points out that, Needleman argued that lead exposure can lead to delinquency and cause criminal behaviors. Research states that even if the unsafe environments are changed and the contaminations are removed, effected children will still be left with lasting results. Carey-Slechta (2003) found that even children who had recovered from acute lead poisoning were still left with permanent residual neurological and behavioral deficits.

Other Connections

Modern research has begun looking into the connection between another current social and educational dilemma; lead poisonings connection to the high percentage of
students being diagnosed with Attention Deficit Disorder (ADD) and Attention Deficit Hyper Disorder (ADHD). Brown, Kahn, Froehlich, Auinger and Lanphear (2006) observed similar characteristics of ADD/ADHD and lead poisoning. They revealed that lead poisoning, like ADHD, has been associated with and characterized by inattention, impulsivity, lower grades, lack of focus, and behavior problems.

The effects that lead poisoning have on children can lead to profound and lasting academic problems. Research shows that affected students tend to suffer in school. With children who are poisoned by lead before the age of six, school readiness becomes a primary concern (Currie, 2005). Poisoning during a child’s developmental years can forever damage their academic career. Cory-Slechta (2003) points out that lead exposure can hinder education, acquisition of knowledge, and learning procedures. Affected students are not the only victims in the battle against lead poisoning. High construction costs are required to remove contaminants from the environment. In addition, high educational costs of redeveloping programs to meet the needs of affected students have become the burden of taxpayers.

The more children that are diagnosed with lead poisoning each year, the worse off the nation will be. Our country will be forced to spend hundreds of millions of taxpayers’ dollars on such things as Medicare, hospital and doctor visits, and special education services (Hevesi, 1999). Haley and Talbot (2004) report that an estimated $43.4 billion is spent each year in the United States due to the cost of the health effects of lead exposure. This is much higher than the costs of other childhood diseases that stem from environmental origins. Many students affected by lead poisoning end up requiring some degree of special education services, if not just additional testing and intervention
processes. Special education services can cost three times as much as regular education services. When looking at the futures of children affected by lead, they "are less likely to grow up to be productive, taxpaying members of society" (Hevesi, 1999, p. 13).

Stoss (2005) states that unfortunately due to the adverse effects that lead poisoning has on one’s educational and social development, affected children are more likely to grow up and have lower than average incomes. Stoss also points out that this cumulative decrease in affected children’s lifetime earnings has dire consequences for the individual as well as allows for the negative cycle of poverty to continue.

The Negative Impact That Lead Based Paint Has Had

Lead based paint was not banned in the United States until 1978 (EPA, 2007). Therefore, any houses built, painted, and/or remodeled before 1978, most likely contain lead paint. In older homes as the paint layers increase and age, the paint begins to chip off. In areas such as window sills and door frames, where movement and friction is prevalent, accumulated lead paint is subsequently worn away. Consequently, the dangerous chips and dust collect awaiting ingestion (Krisberg, 2006). In these cases, the young are most at risk. Damaging, lead infected dust spreads from interior as well as exterior house walls, onto the surrounding floors and soil. As children play on the ground, inside or outside, they are exposed to harmful contaminants (Koller, Brown, Spurgeon, & Levy, 2004).

Numerous laws have been established to protect people against lead poisoning. The banning of lead based paints in 1978 lead to the Safer Homes Movement and we now see many laws force landlords to take action and ensure that they are providing safe
environments for their tenants. This could mean very costly and time consuming efforts for many landlords who own homes built before 1978. Costs stemming from lead and its effects reach far past affected children in older inner city neighborhoods.

Stoss (2005) discusses that even though lead paint was banned thirty years ago, many older homes throughout Rochester still contain lead based paint. Compton-Lilly (2002) tells us that a 1986 Environmental Protection Agency report revealed that nationally speaking fifty-two percent of homes in the U.S. still contain lead paint. Those settings contribute to a very high percentage of children diagnosed with poisoning in Rochester each year. During 2002, over nine hundred children were poisoned by lead in Monroe County. The staggering statistic repeated itself again in 2004 (Coalition to Prevent Lead Poisoning, 2005). Most of these cases are concentrated in pockets of the city containing a high percentage of low income and poorly maintained rental properties. The Coalition to Prevent Lead Poisoning (2007) reports that within some of Rochester’s city schools more than 40% of the students tested had raised blood lead levels at or above the Center for Disease Control and Prevention’s (CDC) level of concern.

Statistics Associated With Lead Poisoning

Research studies have revealed alarming statistics when discussing lead poisoning in the U.S. Cranley (2002) uncovered that nearly one million U.S. children are poisoned by lead every year. Thirty years ago, shockingly high numbers of U.S. children were being diagnosed with lead poisoning. There were about 14.8 million lead poisoned children in the United States in 1978. That number had declined to 890,000 children by the 1990s (Cranley, 2002).
As a result of raised concerns, education and awareness, along with changed laws and diligent action, this nation has been lucky enough to see the numbers of lead poisoned children decline. However, even in the United States this preventable disease is still occurring at alarming percentages. Consequently, in 1991 the Center for Disease Control and Prevention lowered the definition of lead toxicity. Blood lead levels are measured in micrograms per deciliter or $\mu$g/dL. The CDC lowered the definition from 60$\mu$g/dL, which had still been in place from the 1960s, to 10$\mu$g/dL (Needleman & Landrigan, 2004). As of this 1991 ruling, the CDC declared 10$\mu$g/dL as the new level of concern (Cranley, 2002). The mean blood lead level in the United States in 1975 was 15.5$\mu$g/dL and currently it is around 2$\mu$g/dL (Needleman & Landrigan, 2004).

As research increased, it became more evident that any level of lead in the system of a developing child, or any human during the course of their life, is unhealthy. While blood lead levels greater than 10$\mu$g/dL are clearly associated with harmful effects on a child's learning and behavior, there is also evidence of negative effects associated with blood lead levels that are less than 10$\mu$g/dL. However, currently there is no official recognition for these lower, but still evident, lead levels and their observed adverse effects. Blood lead levels less than 10$\mu$g/dL have been associated with intellectual impairments (Jacobs & Nevin, 2006). According to Needleman and Landrigan (2004), three recent studies showed that blood lead levels less than 10$\mu$g/dL can cause IQ deficits in children.

Every child and every lead poisoning case is different. There are many variables associated with lead poisoning; cause, effects, and intensity. Considering that the leading cause of lead poisoning in children is exposure to contaminants from lead based paint;
researchers have targeted older residences and their surrounding environment as the most critical variable. Families living in these targeted areas are putting themselves at a greater risk of becoming poisoned by lead. As families move from one contaminated home to another, reside in different contaminated homes for different lengths of time, move between older residences owned by different irresponsible landlords, and reside in poorly maintained homes, the cumulative adverse effects of lead begin to compound. Children in some of Rochester’s neighborhoods showed elevated blood lead levels at rates as high as thirty-four percent, with fourteen specific neighborhoods testing rates at twenty percent or higher (Stoss, 2005). On the other hand some Rochester neighborhoods showed rates as low as four percent (Stoss, 2005). There are many variables that contribute to these differences in percentages. Around seventy-four percent of the nations homes built before 1980 contain lead-based paint (Cranley, 2002). However, most of the concentrated cases of elevated blood lead levels occur in neighborhoods where families can not afford to make the necessary changes.

Affected Families and Surrounding Socioeconomic Issues

Knowing that modern lead poisoning comes mainly from lead based paint found in homes built before 1978, it is no surprise that the highest percent of diagnosed cases of adolescent lead poisoning are found in urban areas (EPA, 2007). Most inner city, urban neighborhoods are located in the oldest parts of town. These older urban areas, where shocking numbers of lead poisoning cases arise each year, are usually characterized by rental properties, lower income tenants, improperly maintained older homes, and
irresponsible landlords. The burden of these poor quality housing options mostly rests on the children in low-income families (Krisberg, 2006).

Jackson (1999) brings to light some of the unfair situations that low income families are subject to, and the vicious cycles in low income communities and their consequences. Minority children in the U.S. have a higher “at risk” factor for health hazards, poor development, ADHD, lead poisoning, and educational retention (Jackson, 1999). The Government Accounting Office (GAO) report found that seventy-seven percent of children, who have elevated blood lead levels, participated in one or more low-income programs (Cranley, 2002). Socioeconomic issues are directly connected with lead poisoning and together they further complicate life for at risk families.

As reported earlier, lead poisoning generally affects children who are in environments containing lead paint which has been abraded or chipped off surfaces (Hevesi, 1999). As children who are subjected to these conditions inhale and/or ingest paint dust and paint chips, their blood lead levels increase. The highest percentage of concentrated lead poisoning cases occurs in low income areas. Low income families living in contaminated settings are at the mercy of landlords. Irresponsible landlords, who do not address safety regarding their rental properties compounded with the lack of available education for tenants on the issue of lead poisoning, foster unfair, dangerous, and adverse outcomes. This is a preventable problem. Research agrees that there is a high association between minority races, predominantly African American, and lead poisoning. Each year, many minority children and low income children are unnecessarily afflicted. An astonishingly high percentage (36.7%) of African American urban children, as opposed to a relatively low percentage (6.1%) of European American urban children
were diagnosed with low-level lead exposure according to a 1991 National Health Survey (Jackson, 1999).

Cranley (2002) reported that in 2001, of the children who tested positive for lead poisoning, over seventy percent were minorities. Nationally, African American children are five times more likely to be poisoned by lead than Caucasian children (Cranley, 2002). Havesi (1999) found that African American, along with Latino children, make up eighty percent of the lead poisoning cases in the United States. In some of Rochester’s ZIP code areas, greater than twenty percent of the children tested showed raised blood lead levels (Haley & Tilbot, 2004).

These figures are staggeringly high enough to raise concerns. While not all African Americans are at risk and not all low-income families are at risk, as families compound their at-risk factors, their odds of being lead poisoned go up. There is not one exact definition of characteristic list for who will become affected by raised blood lead levels. However, there are certain known factors that contribute to lead poisoning. In addition, when these factors are compounded the effects can be even more devastating. Some risk factors include residing in a city or area known for having a high percentage of lead poisoning cases each year, choosing an older home that has not been updated and checked for lead contamination to rent or buy, not having children periodically tested by a physician for elevated blood lead levels, and allowing children to play on the ground around dusty and dirty areas. If a family takes preventative measures to eliminate these proven variables of lead poisoning, their children will most likely not suffer from elevated blood lead levels. Lead poisoning is preventable.
With that being said, sometimes families do not have the option, resources, choices, knowledge, and/or motivation to determine and manipulate these variables. Economics and socio-demographics often go hand-in-hand when discussing the U.S.'s class system and its connection with lead poisoning. Unfortunately in the same breath, the terms "low-income" and "minority" are often associated with this preventable disease. Cranley's (2002) studies show that a large percent of the lead poisoning cases fall on African American and minority children. Toppo (2003) also reports on studies showing that poor children are three times more likely to have higher blood lead levels. When it comes to childhood lead poisoning cases, poor, African American children are at the greatest risk in the U.S. As we are becoming more aware of this national problem, statistically speaking, the number of childhood lead poisoning cases is declining. However, as you look at this decline on paper, you also notice that, while the overall number is going down, "the disease's health disparity gap widens" (Krisberg, 2006, p. 22). The burden of this disease now almost solely falls on low-income and minority children, most likely living in older, poorly maintained housing. As discussed before, the monetary burden falls on the shoulders of taxpayers, and the educational burdens fall on the backs of teachers.

**Educating Affected Students**

The difficulties surrounding educating students affected by lead poisoning have come to the forefront of educational concerns in many urban and city school districts. Many of these school districts are already financially stretched thin. As budgets are decreased and resources become more limited, providing services for students in need
becomes more difficult. There is no debate that lead poisoning affects a student’s school readiness and future learning. There is, however, presently little research or information on how to overcome these hurdles and educate these affected students effectively.

Bleecker, Ford, Lindgren, Hoese, Walsh, and Vaughan (2005) state that ongoing lead exposure can cause delayed recall of previously learned verbal memory. Currie (2005) points out that affected students generally perform lower and are then consequently coddled by parents and teachers alike. Jackson (1999) identifies negative associations and stereotypes, which follow minority students affected or not, that also delay their fair education. These changing degrees of acceptance can further hinder a student’s development (Currie, 2005). While many researchers identify the negative outcomes associated with lead poisoning, few, if any, report on successful methods of dealing with this modern problem.

Summary

There is little research to be found reporting on reversing the adverse affects of lead poisoning. Once identified, it seems there are few choices for affected students and families. To remove the risk factor, families have a choice of abating lead from the residence, moving to a lead free residence, or clean up the residence and practice safer habits. In order for affected children to regain health, besides removing the contaminant from their surroundings, ensuring a healthy diet seems the only, yet futile, answer. As far as education is concerned, early identification, continual testing, specialist consultation, and addressing focus and attention issues seem to be the only available recommendations.
Research only suggests retention, special education services, and/or medications (for ADHD like symptoms).

This national problem is limited for the most part to urban, low-income neighborhoods and makes it easy for average citizens to turn a blind eye. Rochester contains zip code areas and poor neighborhoods that were defined in the upper fifth percentile of children living below poverty (Haley & Tilbot, 2004). Unfortunately, these are the same neighborhoods and schools that are affected by lead poisoning, and coincidentally, have much lower graduation rates. Impacting factors mount up on at risk families, compounding through generations, and make it difficult to break adverse cycles such as poverty and associated health hazards.
Applications and Evaluations

Introduction

This action research was conducted in the Rochester City School District, located in Western New York. While discussing the setting and context of the study, I felt it would be important to include some background information about the school district and its student population.

Rochester was founded in 1803 and eleven years later it was incorporated as a village. By 1834 Rochester was officially a city. As of the 2000 census, the city had a population of 219,773. There are twenty-nine communities and neighborhoods that make up Rochester (Stoss, 2005).

The Rochester City School District is a diverse setting. The student body includes children from twenty-eight foreign countries, speaking thirty-five different languages (RCSD, 2006). School #19, where this study took place, has a 93% attendance rate (RCSD, 2006). In 2005 it had a passing rate of 56% on the fourth grade English and Language Arts Exam and a 50% passing rate on the fourth grade math exam (RCSD, 2006). One hundred percent of the students at School #19 qualify for free or reduced cost breakfast and/or lunch (RCSD, 2006). At least 91% of School #19’s families’ primary means of support is the public welfare program (RCSD, 2006). In addition, 34% of the students attending School #19 test positive for elevated blood lead levels at or above 10ug/DL (RCSD, 2006). Ninety-two percent of the student population at School #19 is African American (RCSD, 2006). Sixty-seven percent of the families live below 80% medium income (RCSD, 2006). Within the surrounding community, of adults 25 years old and older, 46% did not graduate from high school (RCSD, 2006). School #19 services
students in grade levels pre-kindergarten through sixth and then its students feed into various secondary schools.

The biggest environmental concern effecting Rochester’s children is exposure to lead (Stoss, 2005). In the city of Rochester, the majority of homes were built before 1950, and 80% contain lead based paint (Stoss, 2005). Rochester is a target city due to having “high concentrations of homes with potential lead hazards” (Stoss, 2005, p. 290).

Participants

One contributing characteristic for this study is that the neighborhood and community that School #19 serves is considered a low income area. The parents and guardians of School #19’s students are more likely to live in rental properties rather than owning their own home.

For this study it was not difficult to establish a subject list. Unfortunately, there is a high percentage of students who test positive for elevated blood lead levels in the building. I utilized this adverse statistic to the benefit of this study. In addition, I wanted students that attended the school so that I would have easy access to their data, records, and the subjects themselves for observations, assessing, and interviewing. As Serafini (2000) offers, meaningful student involvement is important. It was necessary to choose subjects that I would have access to throughout the year and during the following years due to the longitudinal nature of this study. I would need access not only to the student subjects, but also to their records, assessments, and any other pertinent information. I needed to maintain good relationships and communication with the students’ current and future teachers as well as their parents.
My primary concerns were authenticity and availability. Availability was easy due to the high number of affected students in the building. To build authenticity I wanted to eliminate as many extraneous variables as possible. I narrowed my subject base down to three students. The study began with these three students for the first year. During the second year one student switched schools at which point I added a new student. There were four total participants however I was only focusing on three at any given point, “Kianna”, Asia”, and “Tierra” as subjects during the first year, and, “Kianna”, “Asia”, and “Catie” as subjects during the second year. At times during the second year I did meet up with Tierra and kept these updates in the back of my mind. To protect the confidentiality of the subjects I have used pseudonyms for this study. These four students all suffer from lead poisoning, are all female, and ranged in grade level from second to eighth grade. The number one factor and criteria for subject selection was that they must have or have had lead poisoning. I wanted subjects that did not have too many other compounding health or academic issues to skew the data.

I was lucky to find three subjects who spent their whole academic careers thus far at our school. This made for a complete and comprehensive record search. On top of this, three of the four subjects were my former students, adding weight and authenticity to my data. Being their former teacher, I could add first hand anecdotal and observational information. Another factor for selection was that I needed complete access to their reading scores and other pertinent information. Most importantly, parent consent, gave final say in the participation selection. I also took into consideration that I would continue this longitudinal case study throughout the year and re-visit my findings as part of an ongoing qualitative study the following year.
During the first year of this study I followed three students, Kianna, Asia, and Tierra. At the end of the first year, Tierra, a sixth grader, graduated on to middle school. Therefore, I was down to two subjects for the second year of the study. Fortunately, that following year, as I started the second year of the study, a new student transferred to our building from a neighboring school. She was placed in my classroom and fit the subject criteria perfectly. Her name is Catie. After some catch up with Catie, the second year of the study continued with Kianna, Asia, and Catie. Tierra came back periodically to check in.

*Student Subjects*

Kianna was the first student subject that qualified for the study. At the beginning of the study Kianna was a fourth grade student. She is now in fifth grade. She is now eleven years old and she is of African American decent. Kianna is one of seven children, two of whom live with and attend school with her. Kianna is a very quiet and shy girl. She is of average size for her age, if not taller than most of the other girls. She was diagnosed with lead poisoning as early as one year old. Kianna has no other compounding health factors except asthma. Kianna repeated first grade and has always been considered academically low. The three siblings that live together have switched residences between their mother and father. Kianna’s parents do not live together but maintain a healthy relationship for the children. Her parents both have some military training and education past their high school degrees. Kianna’s mother has suffered from some clinical depression.
Kianna’s first recorded lead screening was exactly one year from her birth. This was a finger prick test and she scored an F9. This was very close to the previously mentioned CDC’s level for concern, 10. Kianna had at least three screenings a year for the next three years. Her lead levels quickly peaked at a high number, signifying significant poisoning. These lead levels then quickly reduced. Her lead scores for the first five years of her life are as follows F9, F16, F20, V24, V12, V0, F9, F10, F6 (Appendix: J). “F” representing a finger prick test and “V” representing a venous test (from the vein). Her last recorded lead screening was five years ago. Any score above a 10 is reason for concern, and as noted most of Kianna’s tests were at or above that mark.

Kianna is now living with her father. When surveyed and interviewed, he came across as very knowledgeable, literate, and well spoken. More practical to the study, he expressed a lot of pertinent knowledge towards lead, its sources, and its effects. Kianna’s father is very active and supportive of his children’s academics. Kianna is tentatively planning on living with her mom next year.

Asia was the second student who qualified for the study. Asia was a fifth grade student at the beginning of the study. She is now in the sixth grade. She is now twelve years old and is of African American decent. Asia is one of three siblings, all of whom live with and attend school with her. Asia also has three cousins that attend our school. Usually all six children can be seen walking home from school together. Asia has a very unique personality. While she is usually eager to please adults, she has trouble getting along with her peers. She is usually seen as an outsider. Asia has very impulsive tendencies. Asia is above average height for her age. She was diagnosed with lead poisoning at four years old. According to her health file, this was recorded at a level of
twenty. It did not indicate whether it was a finger prick test or a venous test. Asia has no other compounding health factors other than asthma. Asia repeated the first grade and has always been considered academically low. Asia’s records show a pattern of behavior problems in school. Records also note that she has continually shown characteristics of Attention Deficit Hyper Disorder (ADHD). She was prescribed medication to curb these impulses and behaviors. To my knowledge Asia did not and does not consistently take this medication. Asia and her siblings live with their maternal grandmother. Her mother lost custody, and entered a rehabilitation clinic, due to substance abuse. Asia’s grandmother stepped up from the beginning and is there for the children as much as a woman of her age can be. I believe Asia has a different context being raised by her grandmother, who brings to the table a different frame of reference being from an older generation.

Tierra was the third student who qualified for the study. At the beginning of the study Tierra was in the sixth grade. Tierra is currently a seventh grade middle school student. She is now thirteen years old and she is of African American decent. Tierra is one of two children. At the beginning of the study both Tierra and her brother lived and attended school together. Now, Tierra has graduated from our school and currently attends secondary school in another building. Tierra is moderately outgoing, however she is not socially up to par with her peers. She is of average size for her age. Tierra was first diagnosed with lead poisoning at one year of age. Tierra’s other compounding health factors consist of epilepsy (mild form) and hearing loss (mild form). Tierra repeated first grade and has always been considered academically low. She was born premature at a birth weight of two pounds and five ounces. She sat up on her own at seven months, was
able to speak at nine months, and walked at eleven months. Tierra and her brother live with their mother. Tierra’s brother’s father also lives with them. There seems to be a nice family structure. Tierra’s mother is very active and supportive in her children’s education. She works within our school system, but not in our building.

Tierra’s first recorded lead screening was approximately one year from her birth. This was a finger prick test and she scored a F9. Tierra had one more test done that year, four tests done the following year, three tests the year after, and two tests done in more recent years. Her lead levels rapidly increased to the very high, significant range. Tierra’s lead levels peaked between the ages of two to four. They did not significantly drop until she reached the age of eight. Tierra’s lead scores for the first ten years of her life are as follows F9, F18, F15, F27, V29, V19, V13, F22, V22, V13, V8 (Appendix: J). Again, with the level for concern being 10 and above, Tierra’s tests show significant lead poisoning. Her last recorded screening was two years and six months ago.

Catie is a student who qualified as a subject for the second year of the study. Even though she was not part of the initial study and I did not have direct information about her during my data collection done the previous year, I felt because she was my student during the second year of the study and has such severe lead poisoning that it would be of interest to add data about her into my findings. At the beginning of the study Catie was a second grade student enrolled in my classroom. She was eight years old and she is of African American decent. Catie transferred to our school from a neighboring school. This happened due to differences of opinion between her mother and the school’s administration. She is currently repeating the second grade in our building. Catie is an only child and lives with her mother. Catie’s mother is very active in our building’s
Parent Teacher Organization (PTO). Catie is of good health and has no other compounding health issues or factors. Her mother, however, had concerns about her academics, primarily reading. From an early age, Catie has been receiving tutoring after school with a local tutoring program, EnCompass. She has had her vision checked and does not have any vision problems. During labor Catie’s heart rate dropped and her mother suffered from a reverse epidural (loss of feeling from the neck down). Catie has had a lead level of nineteen. This year a health report was sent to the school regarding Catie. The report disclosed that Catie had a blood lead level of a F69. When I followed up on this, due to the extremely high number, the doctor said the reading was right, however when they retested her, she was back in the previous range of nineteen. She has been enrolled in school since she attended a Pre-Kindergarten program.

Procedure of Study

After I had established my participant list and received all my permissions and consents, I formulated my methods and designs. This would be a two year longitudinal case study following three students who have lead poisoning. I had two questions. First my objective was to gain a better understanding of how students with lead poisoning function and perform when reading. Second, how students with lead poisoning view themselves as readers. From there I would work with any findings to see if deficit patterns can be identified and targeted for further research. This included an intensive study program to build strengths and correct weaknesses.

My starting point for data collection was in the girls’ official school cumulative (CUM) records and health files. The CUM records gave me access to information such as
previous report cards, yearly standardized test scores, assessments, screenings, health history, etc. Next I requested data and information from the girls’ current teachers. I questioned and noted as to the subjects functioning academically, socially, behaviorally, emotionally, and as to any other pertinent observations. Then I sent survey questionnaires home to the parents or guardians of the student participants (Appendix: E). This gave me some background information about the setting that the student subjects are coming from, how knowledgeable their parents/guardians are about lead poisoning and/or their child’s situation. During the school day I would make drop in observations for twenty to thirty minutes and collect notes about the student subject. I would try to coincide this with their reading times. During these observations I would just sit and observe the subjects, focusing on their functioning abilities as to the previously mentioned areas. Here I took notes that I could refer back to at a later time. Next, I pulled the girls from their daily routines and administered Diagnostic Reading Assessments (DRA), student reading and self-perception surveys, interviews, and reading conferences (Appendix: F,G,H,I,K). I used these to establish baselines. These were also re-administered throughout the two year study as continuing assessments. I also referred back to previous files of mine from when Kianna and Asia had been in my second grade class. I added the girls’ yearly portfolios to my data. Portfolios contain an accumulation of a student’s work from the previous school years. While conducting my study and analyzing my data I continually referred back to literature I had compiled. Each of these processes and collection methods yielded valuable information.

While investigating through the subject’s official student cumulative records, I gathered yearly New York State and U.S. National standardized test scores, annual report
card grades (especially reading), intervention notifications, behavior notifications and referrals (if applicable), attendance summaries, background information, and any other testing or screening results noted. I received one hundred percent return on my parent questionnaire surveys that were sent home. The numerous teacher interviews that I conducted, with the subject’s current and previous teachers (myself being one), provided information, trends, and coincidences noted. The periodic observations that I made on the subjects provided additional information. This was a way to collect first account data to use during compiling. The subjects’ cumulative records and health files provided quantitative data. The one-on-one interview sessions that I conducted with the subjects provided qualitative data. Audiotapes of the subjects’ survey answers, interview answers, and conferences surrounding reading were derived from these sessions. These survey, interview, and conference sessions told me a lot about self-perceptions, attitudes, interests, prior knowledge, abilities, and strategies. The girls’ yearly portfolios provided additional work samples. As a comparative base, I used New York State grade level standards and norms.

After the first year of data collection, I analyzed the data and made findings and conclusions. I was able to use this information along with pre-assessments made during the initiation of the second year of the study, to design the one month long intensive reading strategy building program. The strategy building program consisted of thirty minute tutor sessions, three days a week, for four weeks. These were one on one, targeted and focused, guided reading enrichment study sessions. During some sessions I worked with more than one student subject if their targeted skills overlapped. Student subjects were released during times that coincided with my free times. I utilized times before,
during, and after school, during lunch periods, break periods, and on personal days, in order to facilitate the logistics of this study. Luckily the participants, parents, associated teachers, and all others involved were very understanding, flexible, and helpful.

The first year of the case study and original portion of data collection was conducted in the fall of 2005. The second year and second portion of the case study, which was a revisit of collective methods conducted originally was carried out in the fall of 2006. The last part of this case study conducted in spring of 2007 consisted of a focused, intensive guided reading tutor program.

The focused, intensive guided reading tutor program was developed and implemented by myself after finding consistent deficits in reading areas that all the subject share in common. One common deficit that was immediately evident was the lack of unknown word attack strategies. During questionnaires, developmental reading assessments, conferences, and other forms of direct and indirect data collection methods, all four of the subjects could only verbalize the knowledge of one unknown word attack strategy. The only strategy that the subjects seemed to be familiar with was “sound it out”. This commonality made me question that if the subjects knew more reading strategies, they might be better readers. After comparing two years of data, and noticing some interesting findings, I felt it my duty to do something with the information. Additionally, I felt that this study could only benefit from further data. Therefore, I decided to develop this focused tutor program which targets the subjects’ weakness in the area of unknown word attack strategies.

The longitudinal case study had revealed some common deficits in reading with the subjects and I now wondered what could be done about these struggles. Due to the
lack of word attack strategies for unknown words when reading, focus for the month long intensive tutor program was placed there.

The tutor program was for Catie, Kianna, and Asia. The intensive tutor program consisted of 30 minute sessions, three days a week, for four weeks. These sessions were usually one-on-one with the exception of a few times due to conflicts or scheduling logistics. I mainly tried to meet one-on-one in order to maximize learning outcomes in the short time period I had. These intensive tutor sessions focused on the defects in reading that were noted during the two year case study. Findings from the case study were analyzed and the intensive tutor program was developed as a result. After spending two years with these subjects whose lives had been affected by lead poisoning just reporting commonalities was not sufficient for me. I wanted to try and help them more. I wanted to try and answer more relevant questions that were brought up by the case study.

**Instruments for Study**

I utilized my classroom and materials along with the support of other teachers, administrators and specialist such as the nurse, psychologist, parent liaison, and secretaries. Most of the tangible instruments included guided reading literature, Developmental Reading Assessment (DRA), surveys, conferences and conference record sheets, tape recordings, and clip board observation notes. Additional methods and tools included observations, assessments, surveys, questionnaires, conferences, and guided reading enrichment tutoring.
Chapter Four

Results

Introduction

This two year long study evolved as it progressed. It all began with some simple personal inquiries as to lead poisoning. As an educator, these curiosities led to a case study where I concentrated on three students all of whom have been affected by lead poisoning. One year later I decided that the case study would become longitudinal and that I would continue following, assessing, observing, conferencing, and developing observations. When I restarted the study the second year I realized that the oldest subject, Terra, had graduated onto seventh grade and now attended a senior high school. Luckily I was able to add another subject who met all the criteria and absorbed into the study perfectly. This kept my subject number at three for the second year. As commonalities came more evident and patterns were harder to deny, the study grew more interesting and I grew more curious. After collecting data for two years, the conclusions I formulated out the longitudinal case study only prompted new questions about lead poisoning and the students affected by it. These new questions pushed me to develop and implement an extensive, guided reading study program. Here I hoped that after the targeted tutoring sessions, pre and post assessments surrounding the guided program would bring closure some of my wonderings as an educator. I also hoped that my findings could assist other educators, professionals, parents, and students dealing with the same or similar questions.

After the first year of the case study I compiled the data, reflected, and recorded observations. At that time nothing else was done with the information. I did not inform
students or parents as to my opinions about the study, I did not inform the teachers, and nothing was done in response to my findings. Therefore nothing was done to skew anyone’s anticipations for the second year’s study.

For the second year of the case study I simply re-implemented the techniques used during the first year. During the exact same month, under the exact same circumstances (environment, setting, and guided reading groups) I executed the exact same data collection methods, assessments, interviews, surveys, questionnaires, conferences, etc. as implemented the prior year. This data collected, along with the students medical and educational records, gave me a solid foundation to build and on which to base my study and future findings and conclusions.

While collecting data during the second year of this case study some immediate changes were evident, however not much in general varied from the observations, noticing, and findings of the year prior. The subjects had grown and somewhat matured. Their abilities had somewhat improved. Unfortunately when it came to reading there was little change. As mentioned before the subject list went from Tierra, Kianna, and Asia during the first year, to Kianna, Asia, and Catie for the second year.

This case study helped to confirm some of my theories about students who have or had lead poisoning and their reading ability. I looked at reading abilities, strategies, development, performance, and perceptions. This research also uncovered some new findings for me. There was some interesting similarities found, some expected data, as well as some surprising and enlightening discoveries. Findings were occurring from the moment I received permission from the principal. I organized these findings into four subcategories. One: My findings about the subjects as children and students. Two: My
findings about the subjects as readers. Three: My findings about the subjects’ reading abilities. Four: My findings about the subjects’ reading strategies.

As soon as I narrowed my case study, established a design, and began collecting data, I uncovered interesting findings. Kianna, Asia, Tierra, and Catie were not just school #19 students or participants in a study anymore. They were now part of something bigger and deeper. They are four young ladies, who all are severely lead poisoned or were severely lead poisoned at one time, and who share some unique characteristics and similarities that are too powerful to be purely coincidental. While looking through the participants’ cumulative files, I found a number of interesting and useful things. I reviewed and compared their standardized test scores over their academic careers. These scores are ranked on a one-four scale, with three and four qualifying as passing and one and two qualify as not meeting standard. I noticed that all three girls had consistently scored at the two or under in both English Language Arts (ELA) and mathematics each year that they had taken the tests. When reviewing Catie’s scores a year later, I found that she had the same “failing” marks. Receiving these “not meeting standard” scores immediately red flag the student’s names for academic intervention. Subsequently I reviewed the yearly documentation for filing interventions and all three girls, Kianna, Asia, and Tierra, had been brought up for academic intervention by every teacher along their careers. During the second year of the study Catie was brought up to the intervention team by me, since I was her teacher. While looking at standardized test scores I looked at the fourth grade English Language Arts (ELA) test. This applied for Asia who is now in fifth grade and Tierra who is now in sixth grade. Both girls had received scores below standard. The ELA test is weighted heavily and is a determining
factor as to reading placements. Next in my investigation, through the girls’ CUM records, I looked at past report cards. While looking at their report cards from previous years, I noticed two things. The first thing I noticed was that their reading grades were consistently below standard (below average, below grade level). These grades of unsatisfactory (u) and needs improvement (n) are equivalent to F’s and D’s. I made similar findings in all three subjects’ files. The second and almost more interesting finding I made while looking at Kianna’s, Asia’s, and Tierra’s report cards was that all three girls had been retained in first grade. I found it interesting that delays were significant enough in all three girls, at that young age, to hold them back and have them repeat first grade. Similarly Catie was held back at the end of the study year that she participated in, year two. She repeated the second grade the following year. Another piece of data that I collected from the subjects’ CUM files was their attendance records. Only one subject, Asia, had a poor attendance record. I also looked at one last bit of data from their CUM records, behavioral information. This was also of little significance. Only one subject had signs of behavioral problems and distractions of this nature, and this was Asia. This lack of support kept me from reporting any further on attendance and behavior being affected by lead poisoning in students.

The next sets of findings were compiled from Kianna’s, Asia’s, Tierra’s and Catie’s health files. From these confidential files I was able to find complete documented history of the participants’ lead screenings and subsequent lead levels. I first reported the screening results in the Methods/Designs portion of this report. This was included to establish context and as part of the participants’ background. The significant similarity that I found was that all three participants had severe lead poisoning at as early as one
year of age. I also noticed that their lead levels increased to a spike level and then began to decrease again. While cross-referencing this poisoning information and its dates, against the subjects' reading scores and the dates of those assessments, it appeared that even after lead levels went down, the students' reading scores didn’t rebound. In addition to lead screenings, the health files provided me with any additional outside issues, other variables, that may sway results. In the cases of my four subjects, their other health concerns were non-significant. Kianna and Asia both have asthma, nothing that would affect my study and maybe a similarity associated with lead or just a coincidence. However, one additional interesting similarity was noted. All three girls show characteristics of Attention Deficit Disorder (ADD), and Asia and Tierra in particular express additional characteristics of associated hyperactivity (ADHD).

The next set of findings came from analyzing data collected when conducting various teacher interviews. The current and past teachers of the four participants offered information in which similarities were easy to notice. I recorded and added any connections that I had from when I taught the students. These teacher interviews yielded characteristic information about academics, behaviors, attitudes, strategies, efforts, ethics, and socialization. One similarity noted while reviewing raw interview notes was an overall consensus from a majority of Kianna’s, Asia’s, Tierra’s, and Catie’s teachers that the girls were in the lower functioning percentiles of their class each year. More general consensuses from the teachers indicated such characteristics as “distractible”, “having short attention spans”, “low independence”, “having reading deficits”, and “having processing difficulties”. There was a definite pattern in the answers I received during these teacher interviews.
The parent survey (Appendix: E) consisted of 20 short answer questions about the parents as readers, their children as readers, lead poisoning, and lead and their child. I received all the surveys back from my participants’ parents or guardians. These questionnaires ended up being some of the most useful pieces of data collected in my study. Three findings in particular surprised as well as interested me. First, the answers on the questionnaires ranged from very knowledgeable down to moderately knowledgeable. This was interesting on a couple of levels. All four parents or guardians, even the least knowledgeable, had a good base of knowledge and information surrounding my topics.

Kianna’s father expressed himself very well in his questionnaire. When asked, “Why do you feel children get lead poisoning?, he responded, “I feel that children get lead poisoning from old housing that still has lead paint in it. I think kids are more prone to lead for the same reason they get many childhood diseases. Childhood development plays a major part.” As I read through the survey responses there were many other on target answers. I was surprised that the parents and guardians of Kianna, Asia, Tierra, and Catie, children who are so severely lead poisoned or were at one time, knew so much about lead.

Second, the knowledge that the parents expressed about lead in the answers to their surveys didn’t reflect what the girls knew about lead when they were surveyed and interviewed. The parents and guardians seemed very to moderately knowledgeable on the topic and it appears as if they have not shared this information with the girls. None of the girls even knew they had lead poisoning. I expected to see less extreme differences in
knowledge on the topic. It appears to me that there is a lack of communication in all three families surrounding the issues in this study.

Third, it interested me that parents and guardians who seem educated on lead and its effects didn’t or couldn’t protect their children from getting lead poisoning. This finding contributed to the discussion of socio-economics in my conclusion. However, Kianna’s father sums up the notion when answering the question, “What children do you think get lead poisoning the most?” He replied, “I think that children that get lead poisoning the most are children that are under privileged or in poor environments. Maybe even those prone to living in old housing.”

When reviewing the yearly student portfolios of Kianna, Asia, Tierra, and Catie, not too many striking findings were made. What I did notice was more evidence that supports statements made during teacher conferences, during observations, and information compiled from other files. These student work samples also gave me a deeper insight as to my participants as students. I saw a lot of incomplete work.

The notes and information I collected while conducting classroom observations of the participants yielded the same value. After making numerous observations, mostly during reading time, and compiling the information, I found it to support the general noticings and findings of my study. I noticed such characteristics and behavior trends as distractibility, low focus, short attention span, lack of independence, lack of confidence, and appeals for help. One example of a similarity was the need, by all four girls, to have oral instruction and directions repeated.

The one-on-one sessions that I conducted with each participant became the backbone for this study. Most other information provided a background, a history, a
context, etc. These sessions allowed me to establish a framework or foundation on which to build.

These individual work periods occurred numerous times over the course of the study. During these sessions I administered Developmental Reading Assessments (DRA), administered and collected various surveys, conducted interviews, and had conferences (Appendix: F,G,H,I,K). When compiling the data from the DRA’s I saw some definite parallels between Kianna’s, Asia’s and Tierra’s results. Kianna, a beginning year fourth grader, should score a 38 (P) on her DRA. She scored a 28 (M). This is the appropriate reading level of beginning year third grader. Asia, a beginning year fifth grader, should score a 44 (S) on her DRA, she scored a 34 (O) - 38 (P). This is the appropriate reading level for a beginning year fourth grader. Tierra, a beginning year sixth grader, should score a 60 (W) on her DRA. She scored a 44 (S) - 50 (U). This is the appropriate reading level for a beginning year fifth grader.

Each girl was reading at exactly one grade level below the norms. Another striking likeness that I noticed while administering the DRA’s and compiling their data, was in the participant’s abilities, strategies, strengths and weaknesses. All four girls Kianna, Asia, Tierra, and Catie, struggled with making predictions, retelling stories, identifying main ideas and lessons, and answering comprehension questions. When making predictions they were only able to guess one event, not a series of events or a story line. When reading, they reached good accuracy rates but they spent so much time decoding and solving word problems that they lost the story meaning. Therefore when it came time to retell the main events of the story, they could identify some events but didn’t mention the significant ones that build the meaning behind the story.
confronted with comprehension questions about the story, its main idea, the problems and solutions, and the lessons being taught, Kianna, Asia, Tierra, and Catie all struggled. All four participants also seemed to use the same strategies. When challenged at a problem word, or noticing a miscue, the girls would, for the most part, first go back and try to break the word apart and sound it out. Next, if unsuccessful, they would look for a picture clue. If still unsuccessful, the girls would usually resort back to their first strategy. After multiple attempts and/or an appeal for help, if the girls were still unsuccessful they would skip it and go on. These series of events led me to believe that the participants have very limited word problem solving skills, especially considering they are fourth, fifth, and sixth grade students. Thatcher’s and Lester’s (1985) article supports these overall findings. They show that performance and verbal intelligence are more susceptible to the effects of lead and an obvious impairment of cognitive functioning are present following low level exposures.

After looking at relationships found between Kianna’s, Asia’s, Tierra’s, and Catie’s, DRA results, I turned my focus to the student surveys (Appendix: F,G,H,I,K). I also collected these multiple surveys during numerous sittings. When reviewing the surveys I noticed definite similarities between the participants’ answers. The answers to the questions yielded some insightful information. I was interested in many of the answers however chose to report only on those that matched or showed strong similarities. When asked about reading all four girls expressed positive attitudes towards it. When the subjects were asked about themselves as readers, all four girls expressed positive self-perceptions. This struck me as interesting because for students who are at the bottom of their class in reading they still maintain positive attitudes about reading and
themselves as readers. Another survey response that showed comparisons dealt with being read to. When asked if they like to be read to, all three girls offered that they do not like to be read to. This also struck me as interesting because I would think that a student who struggles in reading would rather have someone else read to them than read independently.

When asked, “What would you like to do better as a reader?” the general consensus from the girls was that they knew they needed to work on comprehension, and answering questions. Here, I did not expect the girls to be able to identify their weaknesses. When asked to finish the sentence, “The worst thing about reading is…” Asia wrote, “I think the worst thing is I do not always know the words. Sometimes I don’t understand the book.” Kianna wrote, “It’s hard when you have to sound out words.” Tierra wrote, “When you have to ask questions about the book.” To add a connection from the parent surveys, when asked, “What would you like your child to do as a reader that they are not doing now?” Kianna’s father replied, “I would like my child to learn to read faster but at the same time comprehend what they are reading and possibly read on a higher level.”

The student interviews (Appendix: F, G, H, I) that I conducted proved just as telling as the student surveys. I administered the interviews and collected information in the same manner as I did with the surveys. Likewise, I found many relationships when reviewing the interview answers and notes. The interview questions dealt mostly with the topic of lead, where as the survey questions dealt more with the topic of reading. The most remarkable finding from the interviews was that when asked, “Do you think you have lead poisoning?” all four girls, Kianna, Asia, Tierra, and Catie, answered, “no”. This
was interesting to me because as I stated before the parents and guardians were all aware that their child was affected, and they were pretty well educated on the topics themselves, so somewhere along the way communication didn’t take place for one reason or another. When asked about lead, what it is, where it comes from, and its effects, the girls did share some enlightening answers.

Kianna made such comments as, “If you eat pencils or paint off the wall you get lead poisoning,” and “it slows down their learning and they act silly.” Asia seemed to be the most knowledgeable on the topic. She made such remarks as, “Lead poisoning is something that gets into your blood,” “Like if you stick lead into your skin,” “Little kids be around paint they don’t know better, they get it in their mouth or in their blood cells”, “It messes up peoples’ brains,” “It comes from pencils, dirt, chemicals,” and “You get tested for it.” Tierra responded with very similar answers, “Lead poisoning when you get it in your blood,” “It comes from pencils, pens, walls and paint,” and “It stays in your blood and blood cells don’t operate well.” All three girls associated lead poisoning with pencils first and possibly made a later association with paint and/or dirt. All three girls also matched lead poisoning to a person’s blood.

These individual student interviews also acted as reading conferences since I was not the participants’ current teacher. I did review old notes that I made when I was two of the girls’ teacher in second grade, however conducting new sessions two and three years later provided for longitudinal evidence, and added weight to the characteristics, similarities, and observations being made in this study. During these reading conferences I made connections to what I saw while administering the DRA as well as in the information the girls were revealing about themselves. After multiple assessment and
questioning sessions, I came to the conclusion that the only reading strategy that Kianna, Asia, Tierra, and Catie, could verbalize knowing and/or using was “sounding out”. It struck me that the only word strategy these fourth, fifth, and sixth grade students could verbalize was “sounding out”. Yet they were still not proficient with using it.

The original case study was conducted in the fall of the 2005-2006 school year. The second year of the case study was conducted a year later, in the fall of the 2006-2007 school year. The findings from the first two years of the study were compiled and analyzed to formulate the intensive tutor program that would follow. The intensive tutor program was conducted in the spring of the 2006-2007 school year. During the first part of the study from 2005-2007 the participants were Tierra, Kianna, and Asia. Tierra then graduated on to seventh grade at a senior high school. For the second part of the study during 2006-2007, the participants were Kianna, Asia, and Catie.

All four subjects showed a lack of word attack strategies for unknown words when reading, and more specifically, were only able to communicate one strategy, “sound it out”. The intensive tutor program’s intent was to help in this area.

The assessments and baselines used for the two year case study gave me a reference point for the intensive tutor program. I re-administered the DRA’s as a post assessment after the tutor program along with re-interviewing the participants teachers and looking at their latest report cards. I also re-interviewed and conducted conferences with the subjects to help determine growth and the effectiveness of the program.

My findings and deductions from the month long intensive tutor program were not all that shocking to me. Like with the two part longitudinal case study, I saw many similarities. With the exception of a couple minor discrepancies, all three subjects, Catie,
Kianna, and Asia showed similar outcomes. Tierra was not used in the intensive tutor program because she was no longer at our school. She did periodically check in and these updates were noted as additional support.

During the tutor program the subjects were all taught multiple word attack strategies for unknown words when reading. Catie, Kianna, and Asia all showed some short term recall of the targeted learning; however, all three subjects had difficulties with long term memory of the taught skills.

Each week of the month long program focused on a new set of skills. At the start of a new week, prior to new learning a brief review assessment was given. This was done informally with conferencing of familiar text and skills from the week before. During these short-term memory assessments the subjects were able to recall and learn word attack strategies at a rate of about 75% or higher.

At the end of the month, a cumulative review conference was given as a post assessment. One week after the tutor program was over I revisited with the subjects and re-administered the post assessment. These two post assessments gave me a gauge as to the subjects’ long term memory in correlation to the word attack strategies taught.

Catie, Kianna, and Asia all performed with 50% or less recall ability in conjunction with long term memory.

Summary

As an educator who services students who commonly are affected by lead poisoning I felt it very enlightening to conduct this study. I became much more educated on a topic that is prevalent and important in today’s urban schools. I was able to answer
some questions that I had been sitting on ever since becoming a teacher of students
effected by lead poisoning. I was also able to get much closer to the education and
development of four students that I might not otherwise have taken the time to. Most
importantly I felt that I helped to further bring an important issue into the spotlight. The
four students who acted as subjects for this study, their parents, and my building all take
more notice and put priority on this problem.

I found, without a doubt, that the four students who I worked with during this
study, who all happened to be, or were at one time, severely lead poisoned, all function
far below grade level, especially in reading. I found that even with intensive one-on-one
guided tutor programs their development, retention, and recall are weak.
Chapter Five

Conclusions and Recommendations

Introduction

This longitudinal case study was conducted over three school years from 2005-2008. The initial part of the study was conducted with three participants Tierra, Kianna, and Asia. During the last year of the study Tierra graduated on to a new school and I therefore added a new participant to the study. During this last year the participants were Kianna, Asia, and Catie.

While working with Kianna and Asia during this study, I kept thinking how nice it was to be able to extensively visit with some former students. It was also nice to be able to work with Catie, who was a current student of mine at the time. Tierra was never a direct student of mine however I was always close to her family and taught her younger brother. I knew the girls struggled academically when I taught them, and I always wondered how they would progress. It was nice to see that they were doing okay as students, academically and socially. They were still functioning below grade level, and they were struggling, however they maintained pretty positive attitudes. When I think back to Kianna’s and Asia’s second grade Reader’s Workshop periods and I compare thoughts to my current study’s observations and findings, I still notice many of the same exact characteristics that caused me to file interventions on the girls two and three years ago.
Conclusions

From what I have observed, compiled and concluded, the four students that I studied—Tierra, Kianna, Asia, and Catie, who are all severely lead poisoned or were severely lead poisoned at one point, all have lower reading abilities and less reading strategies than the norm. These subjects also have developed and progressed as students and readers, in particular, at a slower rate than the norm.

As children and students, Kianna, Asia, Tierra, and Catie all show very similar characteristics and behaviors. As readers, the four girls also show remarkably close similarities in their abilities and strategies. It appears, after conducting this study, that Kianna, Asia, Tierra, and Catie have academic and reading development, performance, and growth delays that have been affected by something. My findings support the notion that the four girls in this study show learning characteristics and behaviors such as distractibility, short attention spans, low independence, low confidence, delayed processing, and poor retention. As readers, they are below level, have poor predicting, retelling, and comprehension skills, have made limited and timely gains, and have fewer unknown word attack strategies.

These findings are important to me as an educator because from what I saw in this study, students who have lead poisoning, or have had lead poisoning, seem to suffer from negative effects. McCabe (1991) reinforces that ignoring such serious health problems can wreak intellectual havoc on children and contribute significantly to behavioral problems. These problems not only impact my methods, practice, and instruction as an educator facilitating a population in which this is a problem, but also impacts the education of the children poisoned and surrounding others.
The problem of lead poisoning is not only an academic issue, but an economic and social issue. From my research and personal findings it appears that lead and lead poisoning prevalent in urban areas with older housing. These urban areas where older housing exists tend to be used as low-income rental properties. Unfortunately, research also shows that minorities, primarily African Americans, rent and live in these areas. Jackson (1999) states that African American students are more segregated in the schools that they attend than any other racial or ethnic group.

As a teacher who now possesses the knowledge to help make a difference, I will pass on literature and information to “at risk” students and families and advise them to advocate for themselves. McCabe (1991) tells that when lead toxicity is suspected of contributing to a student’s learning and behavioral problems, immediate medical attention is important. If “at risk” families self-advocate and landlords show responsibility, we may be able to put a dent in this problem that affects so many young children and students.

Identifying connections and findings from this study, validates that teachers, parents, students, and the community alike are affected by lead poisoning in one way or another. The good news is that lead poisoning is preventable. Through education, shared knowledge, responsibility, and funding, lead poisoning and its effects could become a problem of the past. Just like lead paint in an old house can’t just be covered up and forgotten about, neither can the issues surrounding lead poisoning and its effects.

As I sit and finish writing I continue to reflect while I begin a new school year. The harsh modern reality is once again reinforced as I am handed a list with five names
of my new students who are lead poisoned. I will use the insight gained from this study to help these new students with their special needs to achieve a greater success.
References


Appendices
Appendix: A

November 20, 2005

Dear Parent/Guardian,

Hello parent/guardian. Thank you for allowing your child to participate in this project with Mr. Heirigs. It is very much appreciated. As one more piece of the project I would like to ask you, as the parent/guardian of a child with lead poisoning, to fill out a quick survey. Just simply answer each question to the best of your ability, offering as much information as you can, or see fit. As an anticipated form of appreciation, please accept this small gift card. It's not much, but it's a token of my thanks. Please return the survey by Tuesday, November 22nd, or Wednesday, November 23rd. You can send it back in with your child. Thank you!

Once again with thanks,
Mr. Heirigs
Dear Parent/Guardian,

I ______________________ as the parent/guardian of ______________________
due give permission for participation in this project. I am aware that
_______________________ will take part in a pilot study that Mr. Heirigs is doing
as part of his graduate work. This study will look at students who have lead
poisoning and their reading abilities, strategies, confidence, etc. THIS STUDY IS
COMPLETELY CONFIDENTIAL. No real names will be used. Thank you for
your support.

Sincerely,

Mr. Heirigs

X __________________________ Date: ________________________

Relationship to student: ______________________________
Dear Parents/Guardians,

Hello parents/guardians. Thank you for allowing your child to participate in this study with Mr. Heirigs. It is very much appreciated. As one more piece of the study I would like to ask you, as the parents/guardians of a child with lead poisoning, to fill out a quick survey. Just simply answer each question to the best of your ability, offering as much information as you can, or see fit. As an anticipated form of appreciation, please accept this small gift card. It’s not much, but it’s a token of my thanks. You can send it back to school with your child. Thank you again very much!

Sincerely,
Mr. Heirigs
Dear Parents/Guardians,

Here is the permission form that we discussed. Again I appreciate your assistance with this study. Please return the bottom to me. You may send it into school with your child.

Thank you for your support,

Mr. Heirigs

I ______________________ as the parents/guardians of ___________________________
Due give permission for participation in this study. I am aware that my child will take part in a Graduate study being done by Mr. Heirigs as part of his Masters Thesis. I am aware that this study will look at students who have been affected by lead poisoning and will focus on reading abilities, strategies, confidence, self perception, etc. I am aware that no real names will be used and that this STUDY IS COMPLETELY CONFIDENTIAL.

X ______________________ Date: ______________________
Relationship to student: _____________________________________________
Appendix: E

Parent Survey

Why do you think children get lead poisoning?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Where do you think lead poisoning comes from?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

What things do you think have lead in them?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

What places do you think have lead in, or around them?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Why do you think lead effects children?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
How do you think lead affects children?

What children do you think get lead poisoning the most?

How much do you read for personal enjoyment each week?

How much do you read with your child each week?

What do you read?

Where do you like to read?

How do you feel you did in reading as a child?
How do you feel lead poisoning has affected your child's reading?

Do you like to read?

Why do you think reading is important?

What would you like your child to do as a reader that they aren't doing now?

How much does your child read at home?

Where does your child read at home?

How do you think your child feels about reading?

What does your child like to read?
Content Reading Interview

1. How much do you read in ____________?  
   What do you read? Why?

2. When you are reading in ____________ and come to  
   something you don't know, what do you do?  
   Do you ever do anything else?

3. Who is the best reader you know in ____________?  
   What makes him or her a good reader in ____________?

4. How good are you at reading your ____________ book(s)?  
   How do you know?

5. What is the hardest part about answering the questions in the book(s)  
   used in ____________?

6. If you needed to study a chapter in ____________ so  
   you could remember the information, how would you do it?

7. Have you ever tried ____________? Tell about it.

8. What do you have to do to get a good grade in ____________ class?

Appendix: G

Me as a Reader
(An Observational Guide for Young Readers)

Please make a face to show how you feel about the following sentences about reading.

If you feel this way often make: 😊
If you feel this way sometimes make: 😊
If you seldom feel this way make: 😟
If you never feel this way make: 😞

1. I like to read.
   (Reading is fun; I get books from the library.)

2. I like other people to read stories to me.
   (I take books home from school; I ask my parents to buy books and read to me.)

3. I can read by myself and when I hit a hard word I try to figure it out by saying the sounds together.

4. When I don’t know a word I sometimes just guess and put in a word that sounds all right and makes sense.

5. When I come to a period I know what to do.
   (I stop, take a breath, make my voice go down.)

6. If I could pick, I would mostly read books about . . .

Comments:

The best thing about reading is . . .

The worst thing about reading is . . .

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Appendix H: Burke Reading Interview

1. When you are reading and come to something you don't know, what do you do?
   Do you ever do anything else?

2. Who is a good reader you know?

3. What makes _____________ a good reader?

4. Do you think _____________ ever comes to something she/he doesn't know?

5. "Yes"—When _____________ does come to something she/he doesn't know, what do you think he/she does?
   "No"—Suppose _____________ comes to something she/he doesn't know. What do you think she/he would do?

6. If you knew someone was having trouble reading how would you help that person?

7. What would a/your teacher do to help that person?

8. How did you learn to read?

9. What would you like to do better as a reader?

10. Do you think you are a good reader? Why?
Appendix: I

Denver Reading Attitude Survey

Make a circle around the answer that is most true for you.

How often do you do each of the following things?

<table>
<thead>
<tr>
<th>Almost every day</th>
<th>Once or twice a week</th>
<th>Once or twice a month</th>
<th>A few times a year</th>
<th>Never or hardly ever</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
</tbody>
</table>

1. Get so interested in something you’re reading that you don’t want to stop.

2. Read the newspaper.

3. Tell a friend about a good book.

4. Read on your own outside of school.

5. Read about something because you are curious about it.

6. Read more than one book by an author you like.

7. What kind of reader do you think you are?
   A. A very good reader.
   B. A good reader.
   C. An average reader.
   D. A poor reader.
   E. A very poor reader.
The following statements are true for some people. They may or may not be true for you, or they may be true for you only part of the time. How often is each of the following sentences true for you?

<table>
<thead>
<tr>
<th></th>
<th>Almost always</th>
<th>More than half the time</th>
<th>About half the time</th>
<th>Less than half the time</th>
<th>Never or hardly ever</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Reading helps me learn about myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>I feel good about how fast I can read.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Reading helps me understand why people feel or act the way they do.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>I believe that reading will help me get ahead when I am no longer in school.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>I feel proud about what I can read.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Reading helps me see what it might be like to live in a different place or in a different way.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Being able to read well is important to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>I can understand what I read in school.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>Other people think I read well.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>I learn worthwhile things from reading books.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Denver Reading Attitude Survey by W. Alan Davis and Lynn K. Rhodes, 1991. Reprinted with permission of the authors.
## PREVENTING LEAD POISONING IN YOUNG CHILDREN

### Lead Levels, Symptoms and Recommendations

<table>
<thead>
<tr>
<th>Lead Levels</th>
<th>Possible Complications</th>
<th>CDC Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9 mcg/dl (Class I)</td>
<td>No known problem.</td>
<td>Re-test every 12 months to age six. Low risk for high does exposure. No intervention necessary.</td>
</tr>
<tr>
<td>10-14 (Class IIA)</td>
<td>Risk for mild developmental delays, even if there are no obvious symptoms.</td>
<td>Retest every 6-12. Keep children from areas undergoing renovation or where there is likely to be a high concentration of lead dust. Use lead-free water for drinking and cooking.</td>
</tr>
<tr>
<td>15-19 (Class IIIB)</td>
<td>No gross symptoms, but child at risk for mild learning problems.</td>
<td>Retest every 6-12 months. Test for iron deficiency. Consider environmental investigation and lead hazard abatement if simple changes do not reduce levels.</td>
</tr>
<tr>
<td>20-44 (Class III)</td>
<td>Usually no gross symptoms, but increased risk for intellectual impairment and hyperactivity. (1 child in 100 may have lead levels above 25)</td>
<td>Complete medical evaluation and chelation treatment may be necessary. Treat for iron deficiency. Identify and eliminate environmental sources of lead. Test every 3-4 months.</td>
</tr>
<tr>
<td>45-69 (Class IV)</td>
<td>Child may suffer from colic, anemia, hyperactivity, abdominal discomfort, constipation, or poor concentration.</td>
<td>Medical treatment is required. Environmental assessment and remediation should begin as soon as possible.</td>
</tr>
<tr>
<td>70 (Class V)</td>
<td>Severe symptoms may include seizures, coma, mental retardation, and death in severe cases.</td>
<td>IMMEDIATE in-patient medical treatment, environmental assessment and remediation should begin as soon as possible.</td>
</tr>
</tbody>
</table>

### Resources for Parents:

- *EPA hotlines: 1-800-LEAD-FYI* (for lead)
## Monitoring Reading Results

### Developmental Levels for Independent Reading K - 3

<table>
<thead>
<tr>
<th>Grade Levels</th>
<th>ECLAS (2) Levels</th>
<th>ECLAS (2) Texts</th>
<th>DRA Levels</th>
<th>Guided Reading Level</th>
<th>Reading Recovery Levels</th>
<th>W.R.A.P Card Level</th>
<th>Suggested Reading Continuum</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>0</td>
<td>Monday</td>
<td>A</td>
<td>Beginning - A</td>
<td>A</td>
<td></td>
<td>Beginning Readers</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Silly Story</td>
<td>1</td>
<td>A</td>
<td>1 - 2</td>
<td></td>
<td>Early Emergent</td>
</tr>
<tr>
<td>Grade 1</td>
<td>2</td>
<td>A Party</td>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>Upper Emergent</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>I Like Mess</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td>Upper Emergent</td>
</tr>
<tr>
<td></td>
<td>Get the Ball Slim</td>
<td>4</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 - 8</td>
<td>Fox on Wheels</td>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 2</td>
<td>5</td>
<td>Bailey Goes Camping</td>
<td>10</td>
<td>F</td>
<td>9 - 10</td>
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## Monitoring Reading Results

### Developmental Levels for Independent Reading 4 - 8

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<th>Reading Recovery Levels</th>
<th>W.R.A.P Card Level</th>
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