DIABETES IN SCHOOL:
EMPOWERING TEACHERS TO BETTER SUPPORT STUDENTS

A DISSERTATION
SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE
DOCTOR OF EDUCATION

BY
LAURA C. HACK

DISSERTATION ADVISOR: DR. MARILYNN QUICK

BALL STATE UNIVERSITY
MUNCIE, INDIANA

JULY 2016
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APPROVED BY:

_____________________________________ _____________ _______________________
Committee Chairperson                   Date

_____________________________________ _____________ _______________________
Committee Member                         Date

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Dean of Graduate School                   Date

BALL STATE UNIVERSITY
MUNCIE, INDIANA
JULY 2016
I have been blessed in so many ways. I have found that my relationships with people are most important to me. These relationships have created confidence, strength, and love. There are so many people to thank in helping me get to the place where I am now. To name them all would take more pages than I have. While I only capture a few here, there are so many others that I am grateful for.

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I was born into a family where hard work, a sense of pride, and responsibility were shared and expected. All three of these virtues were necessary to both start and complete this work. My parents are strong people to whom I am eternally grateful. Mom, I still follow your advice of “Learn all you can today. Nobody can take that away from you.” This is a strong message that I have passed on to Caleb and Samuel. And, Dad, yes, I am finally finished with this “paper.” I love you both and know that I am where I am today because of you. Joe, Mary, Mike, and Jim, as siblings, I watched every move you made and walked in your steps. Thanks for making those steps easy to see and guiding me when I needed it.

Research and writing can bring out the best and worst in a person. For this, I am thankful that my husband loves me unconditionally. Gene, you are my rock, my sense of direction, and my best friend. There are no words to convey how much you mean to me and how I could never have done this work without you. And now…it’s your turn to finish your dissertation. I’m beside you all the way – forever. Long jeep rides, Almond Joys, and diet Mt. Dews are in our future. I can’t wait.
Caleb, you’re an inspiration to me. You were the reason behind this dissertation and the reason that I found value in the work. When you were diagnosed at the age of three with diabetes, I had no idea that it would intertwine with what I did as a teacher. Look at us now. You are a young man who has never let diabetes stand in the way of your dreams, and I am able to use you as a model to help guide others. Thank you for being such a strong person – in so many ways. I am so proud of you.

Samm, I hope you see that because of what I’ve done with this work, you, too, can set your goals and achieve them. You have a strong mind and heart. I worried that spending as much time on my work as I did that you wouldn’t understand. I think the opposite is true. You saw that I needed to do this work to fulfill my mission in life. Thanks for never once complaining about my being a working mom. I can’t wait to see what God has in store for you. You make my heart sing…sometimes cringe….but still sing.

And finally, God, you know what strengths I have and what you intend for me to do with this work. Lead me. I am listening.
ABSTRACT

DISSERTATION TOPIC: Diabetes in Schools: Empowering Teachers to Better Support Students

STUDENT: Laura C. Hack

DEGREE: Doctorate of Education

COLLEGE: Teachers College

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Diabetes is one of the most common chronic health problems in the United States and is diagnosed in approximately 29.1 million Americans (American Diabetes Association, 2013). More than 23,000 children are diagnosed each year (American Diabetes Association, 2013). Managing this disease while attending school can be a daunting task for children with diabetes. Juggling class schedules, adjusting for cafeteria meals, and taking standardized tests while checking blood glucose, visiting the nurse’s office, and taking water or bathroom breaks all become part of the school life of a child with diabetes. These factors then, too, affect the teacher who supports the student with diabetes. Teachers may feel more empowered if they better understand diabetes. Building knowledge about blood glucose ranges, diet complications and/or restrictions, necessary tools to manage the disease, and medical vocabulary are all components that would enhance their knowledge and could make them better prepared to work with a student who has diabetes. This study was designed to determine if supporting a professional development opportunity about diabetes empowered teachers to better support students with diabetes.

This mixed methods study consists of quantitative data derived through pre and post-survey results. Findings of significance are sought through the surveys. Qualitative data results
are gleaned from participant interviews. Patterns and themes are reviewed from the qualitative portion of the study to determine if the PD had any implications on the participants. Findings included that the PD opportunity did provide both knowledge and confidence gains in the participants.
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CHAPTER 1

INTRODUCTION

Diabetes is one of the most common chronic health problems in the United States and is diagnosed in approximately 29.1 million Americans (American Diabetes Association, 2013). This is one out of every eleven people. Another staggering statistic is that more than 23,000 children are diagnosed each year (American Diabetes Association, 2013). Managing this disease while attending school can be a daunting task for children with diabetes. Juggling class schedules, adjusting for cafeteria meals, and taking standardized tests while checking blood glucose, visiting the nurse’s office, and taking water or bathroom breaks all become part of the school life of a child with diabetes. Diabetes mellitus, both Type 1 and Type 2, is the medical term that describes a chronic disease where there is elevated blood glucose in the blood stream (Haley, 2014). The human body responds and adjusts to this blood glucose elevation in a myriad of ways and seeks to rid itself of this additional glucose. The onset of the disease of diabetes begins the never-ending balancing act.

Diabetes is rapidly increasing world-wide. It is one of the most common chronic health problems, where one child is newly diagnosed every 30 seconds in the United States (Juvenile Diabetes Association, 2013). It is a disease that complicates all facets of life because its implications reach into every part of a human’s existence for living - eating, exercising, resting, learning, breathing, and reproducing, to name a few. All adults working with students with diabetes should have sufficient knowledge about the disease (Amillategui, 2009; Nabors, 2003).

Statement of the Problem

Diabetes in the school setting is resource intensive. Appropriate diabetes care requires knowledge about the disease, the tools/equipment to monitor blood glucose levels, the
tools/equipment to counteract hyperglycemia (“high”) or hypoglycemia (“low”), and a person at
the school level who is monitoring all of these items. A “high” would be where there is
excessive glucose in the blood, and more insulin is needed to counter-balance the sugar level. A
“low” is where there is not enough glucose in the blood, and more sugar is needed. Signs of high
or low blood sugar level may include hunger, nervousness, shakiness, perspiration, dizziness or
light-headedness, sleepiness, and confusion (American Diabetes Association, 2013). Diabetes
monitoring falls under two federal laws, the Rehabilitation Act of 1973 and the Americans with
Disabilities Act. Teachers must share the care and responsibility with the students, their
families, and the school nurse for improving the student’s health while at school. Since one-third
of a student’s day is in the educational setting, teachers need to be involved in supporting
students from the onset of their disease and then throughout a student’s educational career.
According to Smith (2012), “It is important to improve school personnel’s confidence in their
ability to assist students so they are more likely to provide assistance” (p. 450). My intention in
this study was to provide a professional development opportunity for teachers that was designed
using the Learning Forward standards and framework to enhance teachers’ knowledge, beliefs,
and practices when working with a student with diabetes. Professional development has the
greatest potential for strengthening and refining the day-to-day performance of teachers
(Learning Forward, 2015). Using this researched-based framework, teachers have the
opportunity to engage in a sound learning opportunity while developing their capacity to better
meet the needs of students.

**Purpose of the Study**

The purpose of this mixed methods study was to determine how teachers’ perceptions
evolve after participating in a professional development opportunity about diabetes and the
students with diabetes that they teach. Teachers are empowered when they are given knowledge, resources, guidance and authority to best meet the needs of all students in the classroom. Each of these components can produce a stronger sense of self-efficacy in the teacher and that may lead to a stronger sense in the child, as well. The initial pre-test scores for each construct served as the control variable. The post-test scores measured the gain in teachers’ knowledge and confidence. Interviews served to provide richer data about the effectiveness of the professional development opportunity.

**Research Questions**

The central question that guided this research was: How do teachers’ perceptions and practices evolve (as measured by pre/post-surveys and data gathered from interviews) after participating in professional development opportunities about diabetes and the management of the disease?

The sub-questions that guided this research were:

1. What constructs of teachers’ knowledge of diabetes deepen after professional development activities, as measured by pre- and post-testing?
2. What changes in teachers’ communication about diabetes with the family and school nurse occur after professional development activities, as measured by interviews?
3. How effective was the professional development process, as measured by interviews?
4. What do participants perceive to be their change in skill levels, feelings of empowerment, and beliefs about diabetes as a result of their involvement in the professional development experience?
Significance of the Study

The Indiana Department of Education, IC 20-34-5-3 (See Appendix F), has mandated Indiana Health Care plans for students with diabetes. The current process is that a doctor orders a Diabetes Management Plan and then the schools create an Individualized Health Care Plan based on the work that the health care team has done with the child and family. The quandary, though, is that there is little to no professional development for teachers who are with the students for the majority of the day. Although mandated by law that a plan be put into place, it is still difficult for the teacher to fully understand the disease and its complications and management. Generally, students are sent to the health clinic if any diabetic symptoms are presented due to lack of health care knowledge of the general education teacher.

It is estimated that by 2050 as many as 1 in 3 American adults will have diabetes, if present trends continue (American Diabetes Association, 2013). Recent awareness of this increase in diabetes stems from a rise of the classification of both Type 1 and Type 2 diabetes. Andrew (2007) stated the need for national standards is critical for students with diabetes. These standards would provide guidelines for resources, professional development, common language, and general management around diabetes education. Increasing knowledge about diabetes provides a school environment that is supportive of the whole child (Mandali, 2009).

Diabetes is labor intensive for all involved. At one Midwestern school system, a student with diabetes averages six visits to the nurse’s office per day. These visits include activities such as counting carbohydrates, calculating insulin doses, administering insulin, adjusting the insulin dose, reading blood glucose levels, and assessing complications. Nurses, as well as all other school personnel, have limited resources and time. Assessing what can be supported in the classroom by the teacher in the way of management can be a support to all involved. Since the
amount of time that a student is in the nurse’s office can take time away from learning – the essential reason that students are in school – it is critical that the learning time in the classroom is preserved and monitored. As a child leaves the classroom, there is a disruption in learning, as slight or as massive as it might be. When a student is able to attend to his/her needs in the classroom, then fewer disturbances may occur. This sets the stage for better classroom management with fewer disruptions. With increased accountability for teachers and greater needs of students, more class time focused on learning creates a climate of care, responsibility, and growth.

Teachers need to fully understand the complexities of diabetes so that they can be of support to both the student and parents as they work in a collaborative effort to meet the health and learning needs of the student. Some diabetic management pieces can be assessed and monitored by the student in the classroom, depending on their maturity and level of responsibility. If a teacher, though, is unaware of a student’s diabetes management regime, such as blood glucose ranges, meter readings, and triggers, then every piece of this management looks like an overwhelming factor that could lead to a health crisis. This isn’t the case. Being able to support the student within the classroom gives learning time back to the student by not having to leave the classroom. With needed supports, the student may also develop greater self-efficacy skills.

All adults in the classroom should have essential knowledge about the symptoms and the treatments for students who are experiencing both “highs” and “lows.” There are times when a student with diabetes needs critical medical attention far greater than what can happen in the classroom. Without a foundation of knowledge about diabetes, a teacher would not be able to recognize the symptoms that could indicate greater harm for the student. This knowledge can be
provided to the teacher through an in-service opportunity or while working with the parents, student, and nurse one-on-one to better understand the child and his management system.

Symptoms and treatments for diabetes complications range from simple to complex. While some students respond well to fast acting insulin, others may not; some students respond to excessive activities such as gym class, others may not. Some may need a morning snack; others may not. Diabetes care varies from student to student and sometimes even varies within the same student depending on different circumstances. All of life’s functions can alter the management of diabetes and cause potential complications. Such variation among students with diabetes necessitates that teachers be aware of each student and supports him/her in the best way possible. When a student’s medical needs are not recognized and supported by teachers through gaining knowledge and understanding of the disease, then the whole child is not being accepted and acknowledged. This lack of knowledge on the teacher’s part can be a barrier to the child and the learning opportunities.

Gaining knowledge about diabetes is the first step to better understanding the needs of a student who comes into a classroom with this disease. Structuring a professional development opportunity for teachers can enhance both their knowledge and skill set when working with diabetic students. It can strengthen a teacher’s practice while building a relationship with those affected. Effective PD focuses on the needs of students – and diabetes management is a need for any student who has this disease. Teachers, parents, students, and nurses can problem solve together to establish a climate of trust and care. This, then, equates to better overall health for the student.

Diabetes is all-encompassing and the student needs to manage it at all times. Teachers can support this happening in the classroom. Teachers can better understand the complexity of
diabetes, develop a plan of action around management, and apply that plan to support the student and his needs. A quality PD opportunity can assist a teacher to think, learn, reflect, grow, and act upon his new knowledge.

My background of being a parent of a child with diabetes, and also as a teacher of a student with diabetes, will have an influence on my research. From both perspectives, I realize how improved knowledge about this disease can result in overall better health for the child. I am passionate about supporting teachers to empower students while providing a sense of ease to parents when their child is in a classroom environment. Given the appropriate tools, teachers can better serve their students’ needs in the classroom and improve the overall learning environment. Teachers can then face most situations concerning diabetes with confidence and expertise to best address classroom management while positively contributing to a student’s health.

**Delimitations**

The study included one school district with teachers who matched the selection criteria established for the study. The criteria for teacher selection included those who had a student on their class roster for the 2015 school year who had either Type 1 or Type 2 diabetes. Because only one district is included in this study, the results of the study may not be fully generalizable.

The time of the study also is important to note. Data collection and interpretation occurred from the summer of 2015 until the fall of 2015. A longitudinal study could better indicate if the teachers retained the knowledge and skills over longer periods of time. Although how well information was maintained by teachers would be important to ascertain, time limitations of the study prohibited the extension the study over several years.
Definition of Terms

Medical terms have been defined by the Americans Diabetes Association (2014) and educational terms were taken from Learning Forward (2015).

*Diabetes Mellitus* - A condition characterized by hyperglycemia resulting from the body's inability to use blood glucose for energy.

*Complications* – Effects of diabetes and cause an adverse reaction to a person’s health.

*Type 1 Diabetes* - The pancreas no longer makes insulin and, therefore, blood glucose cannot enter the cells to be used for energy.

*Type 2 Diabetes* - Either the pancreas does not make enough insulin, or the body is unable to use insulin correctly.

*Hyperglycemia* - Excessive blood glucose.

*Hypoglycemia* - A condition that occurs when one's blood glucose is lower than normal, usually less than 70 mg/dL.

*A1C* - A test that measures a person's average blood glucose level over the past two to three months.

*Blood Glucose Meter* - A small, portable machine used by people with diabetes to check their blood glucose levels.

*Insulin* - A hormone that helps the body use glucose for energy.

*Pancreas* - An organ that makes insulin and enzymes for digestion.

*Management* – The routine and regiment around diabetes care.

*Professional Learning Development* – A comprehensive, sustained, and intensive approach to improving teachers’ and principals’ effectiveness.

*Active Engagement* - Interaction with the learners during the learning process, with the content, and with other students.
Empowerment – Sharing information, resources, skills, and power with others so that they can take initiative to solve problems and improve performance.

Learning Community – A group of teachers who convene regularly and frequently during the workday to engage in collaborative professional learning to strengthen their practice and increase student results.

Leadership – The recognition that universal high expectations for all students require ambitious improvements in curriculum, instruction, assessment, leadership practices, and support systems.

Resources - Staff, materials, technology, and time.

Data - Multiple sources include both quantitative and qualitative data, such as common formative and summative assessments, performance assessments, observations, work samples, performance metrics, portfolios, and self-reports.

Outcomes – Performance expectations.

Conceptual Framework - Narrows the researcher’s focus and includes the “key factors, constructs, or variables” (Roberts, 2010, p. 18).


State Laws – Rules created by the state legislature and signed by the governor that apply only to that state.

School Personnel – One who is employed by a specific school corporation.

Section 504 of the Rehabilitation Act of 1973 (504 plan) - National law that protects qualified individuals from discrimination based on their disability.

Americans with Disabilities Act – Law that prohibits discrimination against people with disabilities in employment, transportation, public accommodations, communications, and governmental activities.
Summary

Professional development for teachers of students with diabetes is a worthwhile pursuit because the opportunity to develop teachers’ knowledge can help students manage their care in a more independent way. Better care on the part of the child can assist in his/her overall well-being and take learning to a deeper level. A healthy child can be present in the classroom engaging in lessons which may promote social, emotional, and cognitive growth. If a student is worried about their personal health, or out of the classroom and in the nurse’s office for any amount of time, learning opportunities could be missed.

The number of students with diabetes is on the rise. It is highly likely that if a teacher has not yet taught a student with diabetes, he will before the end of his career. The increased number of students with diabetes, as well as the lack of professional development around the disease for teachers, could be associated with less time that the student spends in the classroom and more time that he/she spends in the health clinic.

In addition to the time spent in the health clinic and the possible need for additional education to obtain new knowledge, other factors of importance include:

- Diabetes is labor intensive for all involved;
- Adults working with students with diabetes can benefit from gaining knowledge about the symptoms and the treatments for students;
- Symptoms and treatment for diabetes can range from simple to complex; and
- Diabetes is part of the “whole child” and needs to be addressed as such.

Teachers need preparation and education to better understand each child who walks in the door of their classroom with this disease. With guidance, understanding, and knowledge of
diabetes, this can happen. Chapter 2 is designed to give a review of diabetes and the responsibilities entrusted to each stakeholder when faced with a child who has diabetes.
CHAPTER 2

LITERATURE REVIEW

Both Type 1 and Type 2 diabetes are diseases that have many barriers. Diabetes affects young, old, rich, poor, healthy, sick, males, females, Hispanics, African Americans, and White persons equally. Diabetes does not care who you are, just that you are. Diabetes is a disease that complicates all facets of life because its implications reach into every activity of life, including eating, exercising, resting, learning, breathing, and reproducing, to name a few. This disease, which is also known as juvenile diabetes, is rapidly increasing world-wide. It is one of the most common chronic health problems in children, with one child being diagnosed every 30 seconds in the United States (Juvenile Diabetes Association, 2013).

Diabetes, as it will be called for the remainder of this review, results from the body's failure to produce insulin. Diabetes management currently requires the person with diabetes to inject man-made insulin or wear an insulin pump to mimic what the pancreas would normally do – produce insulin to match the body’s need for that hormone. Similar complications and courses of treatment are found in patients with Type 2 diabetes, which is the more common form of the disease (American Diabetes Association, 2013). Throughout this literature review, both Type 1 and Type 2 diabetes will be addressed.

Diabetes in the school setting is resource intensive. Diabetes care in schools requires knowledge of the disease, tools and equipment needed to monitor blood glucose levels, tools and equipment needed to reverse a “high” or a “low,” and a person in the school setting who can monitor all of these items and processes. Special requirements concerning this disease fall under Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act, discussed in detail further in this review. Diabetes care for the student must be the shared responsibility of
the student, the family, and the school representative, usually a school nurse. These components are essential for continued positive health while at school. This care needs to happen at the onset of the disease and continue throughout a child’s life. Intensive focus needs to be addressed in the school setting since one-third of a student’s day is in that setting. How the teacher approaches the student with diabetes is critical. To feel empowered, teachers need necessary tools. Awareness, professional development opportunities, and knowledge of effective practices are initial steps to enhancing both student and staff success.

The purposes of this review are to explore the barriers that children with diabetes commonly face and to appraise how schools can best break down these barriers to maximize student learning. Due to systematic lack of knowledge and resources by school personnel, as well as disregard for state mandated health care plans to assist students with diabetes management, many schools do an inadequate job of helping students with diabetes assume greater responsibility for disease management. Lack of resources and knowledge by school officials may compound any obstacles that students with diabetes encounter as they monitor and adjust their glucose levels and proactively plan for any complications around diabetes. The current void in supporting student’s diabetes management may be a result of a lack of knowledge, training, or willingness to address the problem by schools. Bridging the gap of how to address the basic health needs for a student with diabetes is essential.

**Theoretical Framework**

Self-efficacy theory, derived from the social cognitive theory, can help explain the gulf between what is happening in diabetes management in the schools and what should be happening in the schools. Self-efficacy theory, developed by psychologist Albert Bandura, has been the theory underlying research studies, such as underrepresented females in the work place and
parental expectations for their children in school. This theory states that individuals possess a level of confidence in their ability to perform tasks successfully (Kasikci, 2011). Greater confidence in one’s ability enhances opportunity for success when faced with obstacles.

The concept of self-efficacy involves having the ability to control one’s behaviors, actions, and motivation. “Although the term ‘confidence’ is not synonymous with self-efficacy, it can be understood as a component of self-efficacy when expressed positively” (Marra & Bogue, 2006, p. 2). A person with strong self-efficacy creates and sets realistic goals, is motivated to achieve one’s goals, and feels a sense of reward when goals are met. In essence, how a person feels about himself is how that person acts in different facets of his life. Beliefs beget outcomes. Success leads to higher self-efficacy; failure can lower one’s self-efficacy. Graham and Weiner (1996) state that self-efficacy is a truer predictor of behavioral outcomes than any other motivational constructs.

According to Frank Pajares (2009), individuals who share a belief system can create a collective efficacy. Collective efficacy, where the student with diabetes, parents, teachers, and the nurse all share similar beliefs about the student and the student’s disease management, may attribute to a better outcome for the student’s diabetes health. The same could be true for a student’s growth in learning both content and skills. These additional opportunities could lead to a deeper understanding of the material being presented in the classroom. Having a collective vision and action plan may support the student and the teacher who works with him/her daily.

As a teacher works through a diabetes management routine with a student with diabetes, this sends a message of support and willingness to help. This can then lead to greater self-efficacy in the student. Teachers should realize that the actions that they display in the classroom toward the student with diabetes and how he/she approaches the complexities of
diabetes, are recognized and internalized by the student, whether intended or not. This, then, supports that idea that self-efficacy beliefs affect how much effort a student expends on an activity, how long the student persists when confronting obstacles, and how the student copes when facing obstacles (Pajares, 2009).

“Engaged teachers are motivated, display energy and effectiveness in completing tasks, and are able to deal with the complex demands that arise within the course of their workdays (Klassen, 2012, p. 319). Engaging students with diabetes may lead to a greater sense of self-efficacy, higher levels of both student and staff performance, and an overall satisfaction in job performance.

**Diabetes Complications**

Complications from diabetes occur both in the present and in the future of the person with this chronic illness. Examining these complications can help us better understand the complexity of the disease and the future issues that it may cause. These issues are not beholden to the patient alone. As many as one in three American adults will have diabetes by 2050 if present trends continue (American Diabetes Association, 2013). This realization is both shocking and eye opening. It begs the question, “Could I be the one?” A comprehensive understanding of the disease can help find solutions for better control, management, and even prevention.

Treatment, or diabetic management, for a person with diabetes is effected to mimic what their pancreas would be doing naturally – producing and injecting insulin into the body. While this may sound simple, there are many factors that complicate the process. Activity, food intake, stress level, hormonal level, and even the time of day can be factors that impact treatment. Cunningham (2006) found that because of this, people with diabetes may experience either
hypoglycemia (low blood sugar) or hyperglycemia (high blood sugar) throughout their lives. Experiencing either one of these, and not receiving proper care, can create a serious condition (Nabors, 2003). A pattern of highs and lows creates “poor control” or “poor management.” Additionally, both micro-vascular and macro-vascular complications can arise with poor control (Chaney, 2010). Unattended complications from this disease can lead to mortality – either through a crisis episode or from a chronic life-long illness. Diabetes, or the complications from diabetes, is the primary cause of death for 71,382 Americans each year (American Diabetes Association, 2013).

Some episodes of hypoglycemia and hyperglycemia reach a level of seriousness where professional medical help is needed outside the school setting. Seeking an outside resource, such as the child’s endocrinologist or medical support person, can strain the family. This strain can take the form of missed days of work for the parents or caregivers and missed days of school for the student. Wodrich, Hasan, and Parent (2011) found that students with diabetes miss twice as much school as their healthy peers and siblings. Even more worrisome is the fact that the average absolute number of school days missed each year by a student who is diabetic is 17.9 (Bloom, 2010; Parent, Wodrich, & Hasan, 2009; Wodrich et al., 2011). This is close to 10% of the total amount of school days in a year, which in some school districts would necessitate grade retention (Wodrich, 2011). Loss of learning opportunities can have a negative effect not only on the academic achievement of the child, but can also have a detrimental impact on the school and the community in the way of decreased life-long learning, earnings, and community well-being.

Complications from diabetes can happen anywhere at any time. While in the school setting, students with diabetes must be able to recognize their “highs” and/or “lows” to better treat themselves or know when to seek additional support. Complications like these can and do
affect learning. One way complications from diabetes may affect learning concerns how the student’s cognition level may be altered; another concerns how the student’s learning may be impacted when the student physically has to leave the classroom for treatment (Cunningham, 2006). McAulay (2006) found that mental tasks and attention spans deteriorate during hypoglycemic periods more so than during normal glucose levels. Empowering teachers to know the signs that a student displays prior to one of these episodes could give vital information to the parent and/or nurse as they are constantly seeking patterns in the student’s health to better meet needs. Recognizing these signs, addressing these, and monitoring them in the classroom could be another way that the teacher feels empowered to support the whole student. Having the knowledge, confidence, and communication skills to do so would be essential.

Complications from this chronic illness put a barrier on learning for the student with diabetes. Classroom “in the moment” learning time, if altered due to complications from diabetes, cannot be replicated or replaced. Thus, one way to minimize lost learning time would be for students to remain in the classroom, identify their highs and lows, and readjust these complications before they become a roadblock to their learning. When teachers are empowered, it is more likely that they can be proactive about student’s medical issues.

Diabetes is a condition that has to be managed physically, mentally, socially, and emotionally (Boden, 2012). One study around chronic health showed that children who suffer from poor health struggle in both their well-being and their academics (Joe, Joe, & Rowley, 2009). Depression can also be linked to diabetes in children with a poor quality of health (Anderson, 2012). Psychosocial issues, such as anxiety, depression, or eating disorders, are more prevalent in diabetics than in their peers (Peyrot, 2005; Reynolds, 2011). In these studies, it was found that 61-72% of diabetic providers reported that their patients had psychological
problems, and 66-74% reported that these concerns affected their diabetes care. On the other hand, Nabors (2003) suggested that if diabetes is managed correctly, it can support improved academic performance and reduce complications as the child ages. Tightly controlled diabetes management is the overarching goal for all. When students present conditions as mentioned above, learning is not at the forefront in their lives. Living with diabetes affects both the physical and mental state of a person (Joe, 2009). There has to be a balance, both physically and mentally, for self-management to begin.

Complications affect the current life of the child with diabetes, but these complications can appear daunting when looking to the future. These future ramifications present themselves in many ways. Life expectancy of people with type 1 diabetes is, on average, fifteen years less than their healthy peers (Chaney, 2012). Other studies have found a relationship between poor childhood health status and lower adult earnings and rates of employment (Case, 2005; Joe, 2009). Another correlation has been found between poor health as a child and social status as an adult. The poorer the health of an individual as a child, the less education and poorer labor market skills the individual is likely to have as an adult (Case, 2005). This, in turn, burdens the nation’s health care system. The increasing number of people with diabetes will lead to an increased burden on healthcare services (Chaney, 2012). Annually, $245 billion in healthcare expense is attributed to diabetes, which includes $176 billion in direct costs and $69 billion in indirect costs – including disability, work loss, and premature mortality (American Diabetes Association, 2013). With poor diabetes control or management, this healthcare cost is estimated to increase.

Studies have shown that the complications from diabetes are unpredictable. It is a disease that does not know the difference in race, sex, age, or status. It knows no barriers other
than constant control and monitoring. It can affect major life functions physically, mentally, and emotionally. Continued knowledge, support, and up-to-date research are the keys critical for tighter control and a healthier life for the person with diabetes. Self-efficacy, in the form of students monitoring their own care, is essential to ward off both short and long term complications.

**Federal Laws and State Guidelines**

As diabetes is on the rise, so is the attention that it is receiving at the federal and state levels. “Growing concerns regarding the physical and mental health of children and adolescents in the United States have garnered increased public health and policy attention” (Joe, 2009). The American Disability Act was enacted in 1990 (ADA, 1990) to prohibit discrimination based on disability. Diabetes, since it substantially limits life functions, falls under the category of a disability. As a federal law, the ADA provides the same protection to students with diabetes in all 50 states (America Diabetes Association, 2013). The Affordable Care Act (the health care law of 2010) includes several provisions that directly address gaps in diabetes prevention, screening, care, and treatment (CDC, 2013). This disease, and its ramifications, is not going unnoticed by lawmakers but may be poorly acknowledged in other places, such as the school setting.

An inclusionary setting is one where all students have access to learning in the general education classroom. Highly inclusive classrooms promote high levels of both student and staff engagement. Having various levels of support in the classroom is a key to this success. Educational systems, though, have not always welcomed the changes that come with accepting all students in the classroom. It was with research, practice, and policy change that forced stakeholders to examine their current practices to better meet the needs of students. As with any
student with a disability, there are classroom supports that are needed for success. Making modification and adaptations, as they are needed, creates an environment that is focused on being safe and effective. Making changes to the environment, activity, or dose of insulin might be needed. As teachers increase their knowledge about diet, complications, and management, for children with diabetes, they are better able to support the whole child.

State laws and regulations determine who in the school setting is allowed to assist a student with management of the disease. In some states, the law explicitly restricts who can provide diabetes care in the school setting, with some states restricting an individual student with diabetes from self-managing his or her own disease. In other states, the question of who can provide diabetes care is ambiguous—resulting in inconsistent care from district to district or from school to school (American Diabetes Association, 2013). This ambiguity makes the care for diabetes a path of uncertainty. Policies from state to state are diverse and are not standardized (Mandali, 2009). During an era of limited federal and state school funding, and with ultimate diabetes management being labor intensive and affecting 1 in 400 children, a disconnection exists when addressing the needs of the whole child having this chronic illness (American Diabetes Association, 2013). Funding and distribution of resources vary from town to town within a state, and district to district within a town. The state laws differ as well, again giving ambiguity to how diabetes is managed within the United States.

In Indiana, it is the school principal’s job to solicit volunteers to be trained in diabetes care and to administer insulin and glucagon. Students may carry their own supplies, self-administer medication, and self-manage their diabetes anywhere and at any time necessary. A diabetes management and treatment plan for each student with diabetes must be developed by the
school’s licensed health care practitioner responsible for the child’s diabetes management in conjunction with the student's parent or legal guardian (American Diabetes Association, 2013).

The constant in legislation pertaining to persons with diabetes that is applicable nationwide, is the federal law Section 504 of the Rehabilitation Act of 1973. Section 504 requires that each student with diabetes has a 504 plan, which gives school’s a framework around a medical condition (American Diabetes Association, 2013). A 504 plan spells out specifically what a student needs in order to be on the same level playing field as their peers without a disability or disease. A 504 plan could include such elements as allowing the child to carry a diabetic testing kit at all times, permitting frequent visits to the restroom, or providing additional time for testing when a student feels “low.” Many school personnel, though, may not be aware that diabetes falls under the Rehabilitation Act, so they do not follow the guidelines it mandates. The 504 plan can provide needed supports for the child to be successful at school. The 504 plan is created by the support team members and should be reviewed annually for any changes that need to happen to fully support the child. Many Indiana schools are now following a diabetes management plan (DMMP) which is an order by a physician. This plan is then taken to the school nurse who generates an individualized health plan for the student. The DMMP, similar in theory to a 504 plan, is created collaboratively by the parents, the student, and other support personnel for the child. Again, the DMMP is crafted at the district level and may vary from state to state.

Andrew (2007) stated that the need for national standards of medical care in diabetes is critical for students with this disease. His research revealed that most school provide insufficient training for school personnel; less than half of all school systems have nurses on-site daily; and 50% of students with diabetes have reported that they had to be excluded from school activities due to their disease. Section 504 mandates that the playing field be leveled for students with
diabetes; a set of national standards for diabetic care would give children with diabetes an equal chance to learn, grow, and prepare for their future.

The task of managing diabetes is multifaceted and complex. Support is necessary at the school level for students to be exposed to healthy life styles and identify crisis management when needed. As students gain self-management skills, or self-efficacy, the strain on the caregivers decreases and personal empowerment of the student with diabetes increases. It is a positive situation for all.

The Role of the Parent

With the growth in numbers of children with Type 1 and Type 2 diabetes comes a corresponding rise in the number of parents responsible for children with this chronic disease. Being the parent of a child with a chronic illness can be overwhelming, frustrating, emotional, and defeating. Kelo (2011) found that there is a change in the family dynamics when faced with this illness. Families must now face the chronic sorrow that originates with chronic illness in a child. Chronic sorrow has been defined as pervasive sadness that is permanent, periodic, and potentially progressive in nature (Olshansky, 1962). These feelings of sorrow must be addressed or the family, especially the primary health care provider in the family, may experience increased risk for other health complications, both mental and physical.

Merkel (2012) found that parents often feel a sense of isolation when they find out that their child has diabetes. This feeling of loss stems from the fact that the parents have lost a healthy child and are now faced with the knowledge that their child’s illness will have long-term, life-changing effects. With only 0.26% of the population of children under the age of 20 with a diagnosis of diabetes, little support is available unless intentionally sought out by the families (American Diabetes Association, 2013). These unrevealed emotions come with a cost. Parents
and families have lost the sense of a “normal” child and the activities that come with that sense of being “normal” (Lowes, Lyne, & Gregory, 2004). Parents who fully accept and somewhat conquer their emotions and feeling about the ramifications and consequences of the disease realize that their lives need not be controlled by it. This regains some sense of normalcy that existed prior to the diagnosis of Type 1 diabetes (Lowes et al., 2004).

At stated by Bowes, Lowes, Warner, and Gregory (2009), there is often little to no emotional support provided by health care officials at the onset of diagnosis. In some cases, the sorrow of the illness does not present itself early on, leaving the parents with unaddressed feelings that may surface over time. This leaves parents and families taking on a new emotional, physical, and financial role demands at a critical time of supporting their newly-diagnosed child. Parents may not be able to sufficiently assimilate their current emotional state knowing that their child is the one in most need of support at this time. Numerous researchers have suggested that there may not be an end to the grief process for some parents whose children have diabetes (Bowes et al., 2009; Lowes et al., 2004). Since the disease is life long, or chronic, so, too, are the feelings.

Parents are expected to be the primary care givers for their children either with or without a chronic illness in tow. This is especially true for a child that has diabetes. The level of management and ease of managing the disease by the parents is determined by their knowledge and emotional connection with both the child and the disease. Dempsey’s work (2004) shared that parents feel that their parenting capability is directly related to how well they procure supports and resources for their child with a disability. The goal for healthy management is to be empowered by knowledge about diabetes and how to keep the child healthy – both physically and emotionally. Empowerment is defined as “a process by which families access knowledge,
skills, and resources that enable them to gain positive control over their own lives as well as improve the quality of their life-styles” (Singh, 1995, p. 13). The knowledge, positive emotions, and the demonstration of relevant behaviors are all important factors to empowerment (Dempsey, 2004). Eventually, the role of the parent will evolve from caregiver to becoming a supporter of the child as he learns to manage his own disease. This brings about an increased sense of self-efficacy. The child feels successful about his diabetes management and his full engagement with the regimen becomes evident as life-long healthy habits are sustained.

According to Frey (2006), the first years after a diagnosis are critical in terms of establishing patterns in diabetes management. Diabetes management entails monitoring food intake, assessing and giving insulin to match food intake, addressing stress levels, and establishing an overall emotional well-being about the disease. These are all complex issues and necessitate a mature level of knowledge and skill. Depending on the developmental and emotional level of the child, these activities are usually entrusted to the parents until a child reaches that same level of comfort and skill with their disease, making self-management easier for all involved.

The health management of a child with diabetes does not stop when they walk out the door of their home in the morning to go to school or community activities. The disease follows along and is just as much a part of the child as his hair and eye color. In contrast to a short term illness which may affect a portion of the school day, diabetes management must be considered at every juncture of a school day – every day. This includes the bus ride to and from school, recess activities, lunch room regimes, test taking, and any after-school activities in which the child might be involved. In each of these activities, the child must assess and balance his needs regarding insulin, food, stress, and climate. When each part of the whole is not working within
the system, a child’s coming off-balance can provoke the making of a full-blown crisis. All facets of diabetes need to be monitored and managed both in and out of school and frequently become a serious concern and worry for the parents (Nabors, 2005). Sixty-one percent of parents realize that their child with diabetes needs help from an adult at school to manage their illness (Nabors, 2005). For some, support comes from a nurse, a teacher, a friend, or a designated employee. Both parents and children have reported feeling that the greatest support from school comes from the teachers and friends of the student with diabetes (Amillategui, 2009).

When a child returns home at the end of a school day, the parents again assume the primary caregiver role, designated to monitor both the child and the illness. It is critical that communication about the child’s day is given to the parent by the person in charge of the student’s health at school so that parents can adjust and monitor. Since the parent has not seen the child or witnessed his health behaviors for the majority of the day, there could be a pattern emerging that needs addressed. Without communication from the school, the parents will not have the knowledge necessary for making adjustments and warding off long-term complications associated with poor disease management. Communication needs to be both ways – to and from school. Without knowledge, skill, and understanding of diabetes, appropriate communication can be difficult for school personnel who may not have prior medical knowledge around diabetes. School personnel must know about any changes that are made, or that need to be made, to ensure the child’s safety.

There is never an end to being a parent. The struggles and concerns that parents face continue from their child’s birth until death. The emotions and guilt around a child with diabetes only amplifies these emotions. Answers do not come easy, but with effective communication,
knowledge, and care, there is a better chance to ensure healthy living for the child, both in and out of school. As the child progresses in self-monitoring of his disease, a shift in responsibility for communication, management, and knowledge brings the child a deeper sense of personal control and a better opportunity for lifelong health.

**The Role of School Personnel**

Teachers in the school setting see children six hours a day on average. During that time, they are responsible for their students’ well-being – physically, emotionally, socially, and academically. While some may suggest that the academic aspect of well-being should overrule the others in a school setting, it is imperative that all aspects are addressed for a child’s total growth. It is during the formative school years that many skills, including self-care, are established and maintained (Kelo, 2011). Until these skills are mastered, the adults in the child’s life are a guiding force. Since a large portion of the child’s day is spent at school, this raises the question of who is responsible for diabetes management at school and what does that management look like for the staff.

Given current statistics and trends, to say that diabetes will not affect a district, school, or classroom would be uninformed and misleading. Increasing knowledge about diabetes can provide a school environment that is supportive of the whole child. Supplying information to the key supporters of the child is critical. In some situations, school personnel are not aware that diabetes falls under the federal American with Disabilities Act and do not understand the implications of the mandate (Mandali, 2009). Lack of this knowledge, as well as incomplete knowledge about diabetes, can prove to be unhealthy.

Some teachers may still view diabetes as only a medical problem even after they know and witness the effects that diabetes has on a child’s cognitive and behavioral ability.
Teachers experience a range of fears and worries when children with diabetes are in their care (Boden, 2012). Since proper diabetes management may involve injecting medicine, testing blood levels, and handling other health matters, many teachers are apprehensive to assume responsibility for such a labor-intensive disease. When teachers were presented information that a student with diabetes would be in their class, their initial feelings matched those experienced by parents when their child was first diagnosed. Both parents and teachers felt nervous, panicked, terrified, fearful, and scared. These concerns, in addition to the child’s feelings of anxiety, could change the dynamics of the classroom. These fears stemmed from both inexperience and misunderstandings about diabetes communicated through second-hand knowledge (Boden, 2012).

All adults working with students with diabetes should have sufficient knowledge about the disease (Amillategui, 2009; Nabors, 2003). As found by Butler (2004), school personnel must become part of the village when caring for these students. Being able to support the child through various diabetic regimens is a must. Knowing the signs of both hypoglycemia and hyperglycemia is crucial (Mandali, 2009; Nabors, 2003). One study found that only 40% of teachers were able to infer that a child’s problems with attention, handwriting, and mental functioning were related to a chronic illness (Cunningham, 2006). Even though there may be apprehension around the disease, the day-to-day disease management in the school should be shared with parents as well as any other school personnel responsible for the student’s health care plan.

Another key player in the life of a student with diabetes is the school nurse. Caring for a student with diabetes by the school nurse is a multifaceted task. Tasks can include finger sticks, carbohydrate counting, insulin administration, and educating the student about self-care skills.
(Peery, 2012). A nurse can monitor critical information as well as intervene when a crisis happens. The nurse may also be the creator of the child’s individualized health care plan, as directed by some state laws.

With diabetes being so labor intensive, manpower needed to support the student, both during the day and at after-school activities, can be inadequate. Wodrich (2011) found that few states met the mandate requiring a student to nursing ratio of 1:750 as suggested by the National School Nurses’ Association. Indiana currently has a ratio of one nurse to every 960 students (National School Nurses Association, 2010).

Some schools either share a nurse or have no nurse available. This lack of knowledgeable support can be a critical barrier for the student with diabetes. When nursing shortages exist, the necessary amount of knowledge and skill about the disease must be given to additional personnel inside the school who may not have the capacity to see beyond the disease to find other patterns or complications that link diabetes with other health concerns. This poses yet another obstacle for the child with diabetes during the school day.

In summary, school staff members educated about disease management are critical to the health of a student with a chronic illness. It is clear that all parties involved need communication, knowledge, skill, and care to make a healthy environment for all. It is possible to break down the walls of a “we can’t do it” attitude and create an environment where all parties are learning together about diabetes. This collaborative effort creates new norms that support the student in either beginning or continuing self-managing skills.

The Role of the Student

The child is the one piece that ties all of the other necessary components of diabetes management together, i.e. parent involvement, staff communication, health care plans,
complications, management, and knowledge. The child’s taking an active role is imperative to his long term health. Studies show that children want to feel normal and accepted as well as treated in the same way as their friends (Kadohiro, 2012; Kelo, 2011.) Having diabetes can make you different. How a child responds to his diabetes can make a difference in his overall health. In 2008, Lehmkuhl’s study showed that if a child believed that having diabetes was not fair or if the child was sad about the disease, their HbA1C was higher. HbA1C is a test that monitors blood glucose levels over a two to three month period (American Diabetes Association, 2013). Higher HbA1C readings can result in diabetic-related complications. Moore (2013) found that in adolescents, if diabetes prevented one’s participation in certain activities, the child may experience anger, anxiety, or depression. Another study found that 66% of children with diabetes feel embarrassed about checking their blood glucose levels at school or injecting medicine (Andrew, Shubrook, & Schwartz, 2007). These two management musts are not ones that can be eliminated from a child’s day, and sometimes they must be done up to four times a day. With this in mind, there is a great chance that these activities would not go unnoticed by their peers, hence, drawing attention to already stressful management techniques.

Research has shown that as children move toward adulthood, so do their developmental and maturity levels. This increase gives way to greater responsibilities for their own care (Chaney, 2012; Kelo, 2011). In the beginning stages after the diagnosis, the level of support that is necessary is tremendous. The child experiences fear regarding how to identify lows, how to do finger sticks, or even concerning what the disease means. However, over time, students find that they can take steps toward self-care; and many are doing so at a younger age. There are still situations, though, where students are not ready to give up the support of their team in managing the disease. Thirty percent of adolescents still have a difficult time following their diabetic
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regimen (Nabors, 2003). This is attributed to the fact that diabetes is multi-faceted and is not a disease that can be easily managed or understood without support from others. Marden (2012) relayed that students need numeracy skills to successfully manage their own diabetes. This includes knowledge of fractions, ratios, percentages, and proportions, as well as an ability to interpret data when looking at both food labels and insulin amounts. These are advanced mathematical skills that a child must be ready for at a cognitive level.

Helping a student develop a strong sense of self-efficacy is essential, but should not be required from the student at the time of diagnosis. As noted by Kelo et al. (2011), lifelong self-care is begun at school age but should be developed gradually as children learn to think logically. A child’s sense of being overwhelmed can match or expound that of the parent and family. As knowledge, skill, and understanding of the disease create a foundation for the child, a slow shift in responsibility for management care can and should happen. All of the members on the team can model and teach management of the disease. Without this team support, the student may have a more difficult time taking the first step toward independence and self-management of the disease. As referenced by Pierson (2013) in a video podcast, team members should “never discount the value of human connection and the importance of the words and thoughts you allow to surround yourself. Both are the beginning to everything.”

Effective Strategies for Diabetes Management in School

Diabetes is a disease that does not have a stopping point. Complications are ever-present and likely to produce life-long negative conditions. Barriers exist in the school setting, either knowingly or unknowingly, that can make diabetes management more difficult. An example of this would be the timing of lunch for students. This simple task of assigning lunch periods for the students of the school could be a barrier that makes diabetes management more complicated
for the student with diabetes. This would be an unintentional barrier, and one that can be addressed and realigned, assuming the school has the knowledge and the training around the disease to acknowledge this potential barrier for the student with diabetes.

Analysis and review of best practices around diabetes management can set the foundation and provide a starting point for what can be effective for students, the family and the school. In 2005, Nabors stated that there are six categories of effective strategies in the school setting which can help students better understand and manage their disease: knowledge, supply availability, flexibility, support during crisis, reminders, and support from others. Examination of each of these categories is essential to ensure the student can successfully acquire self-management skills. These skills are necessary for coping and managing the conditions around a chronic illness, like diabetes (Merkel, 2012).

Increasing school personnel’s overall knowledge about diabetes provides a more supportive school environment (Mandali, 2009). Because diabetes is multi-faceted, it takes time to learn about its components. Knowledge should include simple basics that can best support the child both in the way of self-management and impending crisis situations. Self-management is the ultimate goal, but until the child reaches that developmental point, support from others is essential. Knowledge is the first step. There are many resources available to help with the imparting of this knowledge, but it takes a team approach and leadership to make this happen. Individualized and flexible care plans created by the team can ensure that the needs of the whole child are met. Guaranteeing that students with diabetes receive necessary health care while in the school setting is a prime goal. Additional time, both in and out of the classroom, may be needed to support the child’s health and learning; more frequent restroom breaks, additional
snack times, blood glucose monitoring in the classroom, and more time for learning opportunities are all items that can be addressed in the plan of action.

Preparing for an initial 504 meeting will help promote and encourage the knowledge and skills needed to best help the child. To learn more about the child, questions to ask at this meeting might encompass the following:

- What preconceived notions do I already hold about diabetes and this student?
- What knowledge and skills do I need to know to help this student with self-management?
- Who is responsible for what diabetes management tasks?
- How will communication happen between home and school?
- How can we use new evidence and patterns to improve the student’s taking more responsibility of the disease and its management for a healthier lifestyle in all situations?
- How will a diabetes crisis be addressed, communicated, and assessed?

As stated by Kelo et al. (2011), self-care has three goals: normality, being able to cope, and independence. To promote students’ taking more responsibility of their own diabetes, allowing students to use their testing devices and to take necessary breaks for eating or drinking is another step in successful self-management (Nabors 2005). Having the necessary supplies is critical in any management situation. Permitting students to have their diabetes testing kits within reach throughout the day gives them independence and power over the disease. Until the student reaches the cognitive ability to understand what the numbers represent on the blood glucose meter, they will need support from school personnel to help guide them to the “next steps” of their management regiment. It is also important for the child to have at their ready
disposal either foods or drinks with high sugar content, so that no matter where they are in the school they can make adjustments when they feel “low.”

Having flexibility in the school day is important for the student with diabetes. Management can consist of testing blood sugar levels when needed, taking additional breaks, redoing tests/learning assessments if non-optimal health conditions are present, and constructing knowledge about when additional support is necessary.

If a teacher observes that a student is lethargic or is not displaying normal patterns for that child, it is critical that the teacher both informs the child and continues to be attentive to the situation (Nabors, 2005). These steps can help the child realize that he is being supported in his diabetes management as well as give the child signs to watch for when feeling a “low.”

Finally, a team that supports all of the key people in the life of the child is necessary (Markowitz, 2012). Team members should include the child with diabetes, his family members, his health care providers, the school nurse, the child’s teacher(s) and friend(s), and a member of the school leadership team. Lehmkuhl (2008) found that support from a student’s friends is essential, especially for adolescents. Meetings and collaboration among these diverse professionals and lay persons once a year can help to identify barriers at school and provide ways to overcome these barriers (Cunningham, 2006; Nabors, 2005). This support team can create an action plan that encompasses how to build knowledge, flexibility, and support, as well as how to handle crisis situations that surround the child.

There is no research to support the assumption that children with diabetes will monitor their own disease without knowledge and support. Children want to be treated as “normal” and will go to great lengths to make sure that they look this way to their peers. Further, there is little evidence to support the idea that rewarding or punishing children with diabetes will help them
self-manage at a higher or faster rate. Creating an environment where the student feels supported concerning the diagnosis promotes and encourages self-management.

Dr. Marzano (2011) specifically pinpoints the importance of relationships between students and teachers in his work titled “Art and Science of Teaching.” When a relationship is strong, strategies tried in the classroom are effective. This relationship mainly focuses on the interactions between the student and the teacher and can be displayed in four ways: showing interest in the student’s life, advocating for the student, never giving up on the student, and acting friendly.

Showing an interest in the student’s diabetes and management is the first step in building a relationship. Sitting down and discussing all components of their plan is critical. Active listening, deeper and clarifying questioning, and focused attention are necessary. It is important to also inquire about the student’s day to day routine, not just about their diabetes management. Not every interaction with the student needs to revolve around diabetes. Knowing when and what to ask about diabetes will become natural when both parties are working together to better understand diabetes and support a healthy lifestyle for the student.

Wanting a student to better manage their diabetes is one way to advocate for them. Letting the student manage their diabetes in the classroom by eating snacks, as needed, also shows care and support. When students know that they can be open and honest with a teacher about their feelings and concerns about diabetes, a sense of “I care and want to help” is promoted.

Students with diabetes will have good days, bad days, good moments, and bad moments. It can be an emotional ride for all involved. Having the teacher realize the complexity of the disease and its ever-changing dynamics is another piece where a relationship can be built. The
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teacher may need to work individually with the student when they return from a “low” or a doctor’s visit. Being cognizant of the highs and lows and sending the message that continued support will happen as needed is essential. Let the student know that others, too, have times where things are not smooth; but as a part of the team, all can work together to show support.

Teachers need to find the times in the school day, where the student with diabetes isn’t in crisis with their diabetes or isn’t managing their diabetes, to promote the feeling of being “normal.” Finding these times and building on the relationship deepens it. When a teacher is constantly looking for and pointing out diabetes, this becomes another barrier in the student/teacher relationship. While the care is there, the timing is not. All students need support; but students with diabetes, who want to fit in with others who do not have the same sense of urgency about their health, especially so.

My opinion and experience convince me that technology will be the most likely way to improve diabetes management, both in and out of school. A child, family, and school have a better ability to record data, patterns, and highs and lows with the aid of the latest apps, databases, and programming. Technology can also support families who might be struggling with every day challenges of management. This can happen by sharing and learning from each other through social networking (Merkel, 2012). The Children with Diabetes website attracts 28,000 visits a day from 155 different countries every month (Aanstoot, 2009). This website can provide a very strong support system that can happen inside the home, at the computer, anonymously. This emotional support can be accessed 24 hours a day, seven days a week with no need for an appointment or judgment. Support, ideas, strategies, emotional let downs, research findings, and celebrations are just a few clicks away for people who are going through similar struggles. With nearly 10% of the entire United States population having diabetes,
connected relationships, whether face-to-face or through social media opportunities, are critical to better support those with this life-altering disease.

In summary, effective diabetes practices need to be communicated and practiced by all who have a relationship with the student. Having continuous educational programming for both the child and the adults providing care is crucial (Amillategui, 2009). In 2009, Mandali found that education and support made a difference to students with diabetes and fostered better self-esteem around themselves and this chronic disease that they must manage every day. This support comes in the shape of 504 plans, training for professional staff, and liaising between health care providers, staff, and the home. Creating a positive school atmosphere that supports the whole child, disease and all, is what makes the words *a free education for all* ring true (National Center for Learning Disabilities, 2013).

**Importance of Professional Development**

Once teachers leave the structured setting of a college preparatory program, the opportunities for them to learn is either at their discretion or at the discretion of the school district in which they teach. Teachers of all experience ranges have challenges that they face each day and each year. New legislation, procedures, curriculum, technology, and students all pose challenges that make one year different from the next. School systems can make a difference in the lives of teachers and students when effective professional development opportunities are designed to meet the challenges that teachers face. How, when, and what to focus on in a PD session is determined by what skills need to be obtained. Every teacher is at a different level of knowledge and skill, making the creation of such an opportunity complex. Thus, an established framework can be supportive in meeting the needs of a group of people striving to learn together.
Many careers provide an opportunity for continued learning to enhance knowledge and skill level. Professionals seek ways to better their craft and improve their performance. One way to do this is through effective professional development opportunities. Teachers are expected to implement best educational practices to help students learn. The same “best practice” expectation should be available to teachers who encounter students with barriers in their lives, like diabetes. It is essential that a research-based framework be used to best meet the needs of the teacher, student, parent, and district. This ensures that dollars spent go toward professional development of teachers that is best suited to meet the desired outcome.

“Professional development is the strategy schools and school districts use to ensure that educators continue to strengthen their practice throughout their career” (Mizell, 2010, p. 1). Knowing how important it is for teachers to feel engaged, district leaders must provide opportunities for teachers to come together and problem-solve, communicate, learn, and grow. This collaborative effort can vary in form, but the essential pieces are that the focus is dedicated to why the teachers are coming together, and the necessary time is devoted to make it happen. When teachers sense this determined effort, there is a better chance for learning and growth to happen. DuFour (2014) posed that effective professional development is ongoing, collective, job embedded, results-oriented, and driven by professional learning communities.

In 2011, Indiana legislation removed professional development funding that was designed to support teachers through professional training and opportunities (Smith, 2013). This sent the message that these days were not important to improve staff, and ultimately students. What this removal of dedicated professional development days from the school calendar did was put additional stress on the local school systems to provide PD to teachers with limited dollars or support. The challenges faced by teachers were as great then as they are now. Local districts
must find funds, a framework, and an implementation guide with their own time and dollars. “The General Assembly’s failure to fund Professional Development simply means that local districts must fund it from their General Fund, which is already inadequate. No district can update curriculum and operations without Professional Development for teachers” (Smith, 2013, p. 7). It is easy to understand why PD gets pushed to the side in some districts. According to Allen Odden and Lawrence Picus (2011), schools can still increase their effectiveness even with a tighter budget. It takes balance, vision, alignment of resources, and dedication. Designing a framework with these components in mind is essential to the betterment of all stakeholders.

Professional development can be either formal or informal in format. While most PD opportunities take on the formal format of a conference or learning workshop, there are other informal formats that can happen within the school day, where teachers converse about a concern, learn from a walk-through, or engage in a book discussion. Each format has merit and can be successful when designed such that teachers can enhance their knowledge and skill set. Success of a PD opportunity can be measured by the actions that stemmed from the new knowledge. Professional development is not effective unless it causes teachers to improve their practice. Improving teachers as they support students managing diabetes is one way to support both teacher effectiveness and positive student health.

Leadership understanding the power of PD is critical in a systemic change for classrooms, schools, and districts. Michael Fullan (2001) suggests that the leaders who are most effective in change efforts take a slow systemic approach. This approach lets staff that allows staff to absorb details, listen attentively, and make informed decisions. Every voice is heard, every staff member can be a change agent. When teachers know that they are a piece of the bigger picture in both a student’s life and the systemic piece of the school, change in practices
can happen. Fullan suggests that it is a complex change, but a change for the better. “It is only when the majority of teachers become moral change agents that we can cultivate the powerful cultures required to work with communities and other agencies in making a difference in the learning life chances of students” (Fullan, 2011, p. 232). Focusing on second order changes when working with teachers and students with diabetes is essential for both to learn these aforementioned life lessons.

Quality PD can then produce efficacy in teachers. The relationship between what a teacher’s thoughts and emotions are and their behavior has been recognized by researcher Weinstein in his work on teacher efficacy in 2002. Asking 3 critical questions to help frame a teacher’s perception, interpretations, and practices are:

- “How am I interpreting this event?”
- “Will this interpretation lead to a positive outcome?”
- “If not, what is a more useful interpretation?”

Being able to ask yourself these questions, as a teacher, opens you mind to better understanding students, their world, and the new knowledge that you are gaining from this event. Being effective, though, just doesn’t happen by chance. It takes knowledge, practice, and reflection to better understand diabetes. Teachers do have the option of controlling and reframing what is happening in a classroom when working with a student with diabetes. Having the knowledge, confidence, and tools to do so will only enhance the relationship with the student and strengthen the teacher’s sense of efficacy in the classroom making their knowledge both wider and deeper.

**Standards for Effective Professional Development**

The respected professional organization called Learning Forward, previously called the National Staff Development Council, serves to build the capacity of leaders to establish and sustain highly effective professional learning. Because this study required effective professional development, the standards for professional development from Learning Forward and how each
standard should be integrated into a carefully planned professional development experience for teachers have been embedded into this study. These standards can be very helpful as leaders develop ongoing PD opportunities for teachers.

**Breaking the Barriers – A Collective Responsibility**

Current efforts on the part of many have increased diabetes awareness at the school level. As Butler and Lawlor (2004) stated, there is no one-size-fits-all model to supporting students with diabetes. Parents have been taught to communicate their needs from a family’s point of view; students have been taught to attend classes and not use their diabetes as an excuse; law makers have responded with tighter laws to stop disability discrimination; educators have accepted their role as a monitor of diabetes. Unfortunately, this has not happened across the nation. There is still more work to be done. The questions addressed should not only concern who does what with diabetes and when, but also should explore how, by working together, the student, family, and school can create a climate that promotes self-regulation and positive health habits in all students. All questions should revolve around healthy choices, healthy modeling, and a healthy lifestyle – for students with or without chronic health conditions.

In our schools today, we need to consider systematizing the process of diabetes management for students while, at the same time, humanizing the experience. Promoting positive healthy relationships that foster learning for all is a must. The future of our children, with and without a chronic illness like diabetes, is counting on it.

**Summary**

Diabetes impacts all facets of daily living, including time spent in the classroom. In the past, diabetes was perceived as an illness that should be monitored only by the school nurse. But today, while addressing the individualized needs of the whole child, teachers are being
empowered to help students. Federal laws, parental support, and increased diabetes awareness make communicating and managing the disease essential to building self-efficacy in the student.

Knowledge, beliefs, and practices are formulated based on a person’s understanding of the “why, what, and how” of an issue. Diabetes is no different. Enhancing a teacher’s attitudes and values can lead to better diabetes management by the student. This, in turn, can lead to a healthier life-style opportunity for the child. Chapter 3 of this dissertation outlines the research design methods used in this study.
CHAPTER 3
RESEARCH METHODOLOGY

This chapter presents the research methods used in this study and the rationale of each. It is organized to state the purpose of the study and then state the research question. The research design, population sample, instrumentation, data analysis, and limitations sections follow. This mixed methods research design employed in this study provided numerical data that gave breadth to the research while providing in-depth knowledge drawn from the interview questions. This study incorporated both qualitative and quantitative methods to examine teachers’ perceptions and practices when encountering a student with diabetes in their classrooms.

Purpose of the Study

The purpose of this mixed methods study is to determine how teachers’ perceptions evolve after participating in a professional development opportunity about diabetes and the students they teach. Teachers are empowered when they are given knowledge, resources, guidance and authority to best meet the needs of all students in the classroom. Each of these components can produce a stronger sense of self-efficacy in the teacher and that may lead to a stronger sense in the child, as well. The initial pre-test scores for each construct served as the control variable. The post-test scores measured the gain in teachers’ knowledge and confidence. Interviews served to provide richer data about the effectiveness of the professional development opportunity.

Research Questions

The central question that guided this research was: How do teachers’ perceptions and practices evolve (as measured by pre/post-surveys and data gathered from interviews) after
participating in professional development opportunities about diabetes and the management of
the disease?

The sub-questions that guided this research were:

1. What constructs of teachers’ knowledge of diabetes deepen after professional
development activities, as measured by pre- and post-testing?

2. What changes in teachers’ communication about diabetes with the family and school
nurse occur after professional development activities, as measured by interviews?

3. How effective was the professional development process, as measured by interviews?

4. What do participants perceive to be their change in skill levels, feelings of
empowerment, and beliefs about diabetes as a result of their involvement in the
professional development experience?

Research Design

The use of a mixed methods approach tells a more complete story. Mixed methods
research, described by Creswell (2015), is “an emerging research approach in the social and
health sciences that involves combining both statistical trends and stories to study human and
social problems” (p. 20). A mixed method design is best suited for describing in detail the
complexity of emotions and stories around teachers and their feelings and experiences when
working with a student with a chronic illness, like diabetes. The statistical data gathered was
used to predict, explain, and understand more about teachers and their level of knowledge and
comfort with diabetes and the management of the disease. Limiting this study to either
qualitative or quantitative methods would not have gleaning the data critical to eliciting research
patterns and discovering information that generated greater understanding, and ultimately,
movement to action. “The core assumption is that when an investigator combines both statistical
trends and stories, that combination provides a better understanding of the problem than either trends or stories alone” Creswell (p. 83).

Quantitative Design

Quantitative design strives to objectively review statistics and numbers. “Researchers use a quantitative study to provide an explanation or prediction about the relationship among variables in the study” (Creswell, p. 139). There is control and precision with the tools for measurement while searching for relationships between variables. Quantitative research is described by Hoy (2010) as “a reflective inquiry and scientific approach to understanding” (p. 19). Information gathered is analyzed for general patterns and explanations.

“Objectivity is the goal of all science” (Hoy, 2010, p. 4). Objectivity necessitated that the procedures, measures, and controls used throughout the study were clear. Survey responses were one such way of achieving this goal of objectivity with the quantitative data. The survey questions asked were meant to learn about teachers and their comfort level when either a student with Type 1 or Type 2 diabetes was enrolled in their class. Survey question responses were analyzed to determine how the participants changed over the course of time as a result of the new knowledge that they gained from the professional development opportunity. The data presented came from the pre- and post-test scores on the survey questions.

The initial pre-test scores for each construct served as the control variable. Demographic data shared by the participating teachers also enabled richer analysis when constructing meaning from the data. Independent control variables included gender, years of teaching experience, age, and experience with diabetes. Confidentiality was ensured by asking participants to cite both their mother’s maiden name and high school to match the pre- and post-survey results. An example of a type of survey question with Likert-type scale responses was, “I can adopt the
necessary strategies to support children with diabetes.” The post-test scores measured the gain in teachers’ knowledge and confidence. A complete list of survey questions can be found in Appendix B.

**Qualitative Design**

Qualitative research focuses on the way people make sense of their experiences and the world in which they live. Qualitative research studies are conducted by connecting and engaging with participants and relating their experiences through words. Researcher Michael Patton compared a qualitative study to a documentary film (Patton, 2002). According to Creswell and Plano (2007), qualitative studies help “researchers understand processes, especially those that emerge over time, provide detailed information about setting or context, and emphasize the voices of participants through quotes” (p. 4). Richly detailed, descriptive observations gathered during the professional development opportunity were one form of qualitative data collected. Open-ended ethnographic interviews captured the participants’ experiences and perspectives. Data gathered from the interviews were used to identify themes, or patterns, in the research. Knowledge, attitudes, practices, and values were reviewed. From all of the qualitative data gathered (observation and interview data), themes emerged and were refined to construct follow-up questions that were addressed and defined during the two follow-up meetings with the teachers. The stories and voices derived from this qualitative portion of the study supplement the quantitative data findings and add clarity to the teachers’ perceptions, thus providing a deeper understanding that could not have been gained through quantitative data only.

Fieldwork, such as conducting interviews, is a critical piece to a qualitative design (Patton, 1980). Weiss (1994) stated that through interviews, we are able to learn so much about people, their lives, their experiences, and their perceptions. The depth of interview questions,
plus the open-ended response format, enables the researcher to more fully understand the participant. This generates more depth than allowed for by a forced-response survey. Interview questions for this study were created to show openness, sensitivity, respect, awareness, and responsiveness to both teachers and students. The data collected from these interviews required analysis and interpretation. An example of an interview question was: “What responsibilities do you have as a classroom teacher to support a student with diabetes?” The participants’ responses provided the opportunity for the researcher to better understand the knowledge, values, and experiences of the professional educator while showing empathy without judgment. The interview protocol and questions, in their entirety, can be found in Appendix C.

**Setting and Population Sample**

This research study was open to certified teachers who had a student(s) with either Type 1 or Type 2 diabetes in their classrooms. These teachers in the study were certified and currently teaching in a general educational setting in a central Indiana school district during the academic year of 2015-16. This study was conducted in Bartholomew Consolidated School Corporation, located in south central Indiana. The district houses 11,486 students and 694 teachers (Indiana Department of Education, 2013). There are eleven elementary schools, two middle schools, three high schools, and one early childhood center. Health services in these schools are coordinated by one registered nurse health professional, who manages a school nurse in each building. Designated personnel must be identified to assist with diabetes management in case the nurse is unavailable. There are an estimated 60 students in the district diagnosed with diabetes.

Once the study was approved, with the permission of the school’s superintendent, I sent out a mass email to all teachers in the district asking for participation in this study. This opened
up the opportunity to both those that had a student who was diagnosed with diabetes in their classroom as well as those that had a general interest in learning more about the topic. Participation was strictly voluntary.

Demographic information including gender, years of teaching experience, age, and experience with diabetes was collected from participating teachers. Confidentiality was guaranteed by asking participants to cite both their mother’s maiden name and high school. This information was used to match the pre- and post-test results.

**Professional Development Content and Process**

To better understand the content of diabetes education, I met with several professionals in the field to better understand the gap of where schools currently are with diabetes knowledge and confidence and where the they could be to best ensure quality management. These meetings set the foundation for what learning constructs were considered essential to addressing the research question. The diabetes educational learning targets were created using information from the American Association of Diabetes Educators (AADE, 2014) and the AADE7 Self-Care Behaviors. The conversation with these professionals led to a two-prong approach and design: content and process. The content prong was centered on what concepts and skills teachers need to know about diabetes. The second prong, the process of the professional development (PD), was designed with teacher efficacy and best practices in mind.

**Content.** After extensive review with the medical professionals, there were four constructs of content material designed to increase diabetes knowledge and teacher comfort level. These four constructs were: (1) diabetes general knowledge, (2) diet and complications, (3) management, and (4) communication with parents and health providers. Each construct was outlined with additional subsets that were addressed during each portion of the PD.
The constructs were as follows:

**Construct 1 – Diabetes General Knowledge**
What is diabetes?
What causes diabetes?
Who gets diabetes?
What is the difference between “good” and “poor” control?
What is Glycosylated hemoglobin or A1C?

**Construct 2 – Diet and Complications**
What is a normal range of a blood sugar reading?
What is used to monitor blood glucose levels?
What is the treatment for a “high” or “low”?
What are the symptoms of diabetic ketoacidosis?
What are carbohydrates?
How do carbohydrates affect your blood glucose levels?
Why is it important to maintain a balanced carbohydrate meal?
How do you find out how many carbohydrates are in foods?

**Construct 3 – Management**
Where can students manage their diabetes?
What is considered a visit to the nurse?
What do testing supplies look like?
What can fix a “high” or a “low”?
Where is the best place on the body to take a glucose reading?

**Construct 4 – Communication**
What communication is needed to and from school?
Is a 504 plan necessary?
What is my responsibility as a teacher?

**Process.** After the learning constructs were established, the best way to deliver the material to the participants was examined. Teacher effectiveness is important to student success (DuFour, 2013). With the demands that today’s teachers face, professional learning that is effective and timely is critical to support students and their success – both in and out of the classroom. Learning Forward, formally National Staff Development Council, has developed a respected list of standards for professional development that support teachers in both learning and teaching. These standards were helpful resources consulted during planning to ensure a
quality design for this professional learning opportunity. These standards have been embedded into this PD program. The questions that drove the process and planning were:

“Who?” – Who are the stakeholders affected by diabetes?

“What?” – What does diabetes management look like in our schools?

“Why?” – Why is it important that a teacher take an active role in better understanding diabetes and its effects on students?

Learning Forward recommends six steps for developing professional learning opportunities. The six steps are: study, understand, dream, plan, do, and review. These six steps were incorporated into all facets of the design. Knowledge obtained from the participants during the pre- and post-surveys was used to better meet their needs as well as drive future actions for the networking sessions. The strategic design outlines the process of the research intervention (see Appendix A).

The goal of this PD was to improve practices in a local school district and increase both knowledge and confidence in teachers when in charge of students with Type 1 or Type 2 diabetes while at school. The professional development process, in general, was also evaluated to learn if the process and structure could be improved for any future developments.

Instruments, Data Collection, and Analysis

Conducting a mixed-methods approach enabled different approaches to gathering rich data. Mixed methods research is an approach to inquiry that combines both forms of research designs (Creswell, 2009). Both quantitative and qualitative data were used to compare the data gathered from both methods. “Mixed methods research resides in the middle because it incorporates elements of both qualitative and quantitative approaches” (Creswell, 2009, p. 3). This information, once analyzed, supported the themes that emerged from the research and then
merged together to complete one study. A mixed method approach uses both approaches in tandem to strengthen the overall study design (Creswell & Plano Clark, 2007). Conducting the study in this manner combined the “what” with the “why” to provide depth. Since the interviews would be taken from the survey results, this was considered a QUAL-quan model as described by Gay and Airasian (2003), where the qualitative portion weighed heavier than the quantitative portion of the research design. Survey questions, alone, could not gather the rich data that could give a descriptive, resourceful action outcome to a complex research question.

**Quantitative Study**

**Instrument.** Earl Babbie’s *Steps for Conducting a Survey* (1973) were examined and used to create the survey design for this study. “A survey is a method of collecting data in a consistent way” (Babbie, 1973, p. 47). In this approach, the following are used to outline the process: design and goals, determination of collection method, collection of data, analysis, reporting, and follow up. This form of research was useful to determine the characteristics of teachers whose commonality was having a student with diabetes in their classroom. “Researchers seek facts and causes of human behavior and want to know a lot about a few variables so differences can be identified” (Roberts, 2010, p. 142).

Knowledge and confidence questions were administered, with permission (See Appendix C), from the self-efficacy research conducted with school personnel and students with diabetes (Smith, 2012). This questionnaire contained both multiple choice and true/false questions. The intent was to measure the teacher’s level of knowledge and confidence when supporting a student who has diabetes in the classroom. It was designed to connect with the participants and their perceptions about diabetes in the following four categories: general knowledge, complications, management, and communication. Twenty questions were used to
ascertain the general knowledge information (see Appendix B). Smith’s work set the foundation for quality research work in better defining self-efficacy in teachers.

In addition, Smith’s survey already provided reliability and validity information which allowed me to use this information without further field testing. Following Smith,

_Priori value of alpha = .05 was set for statistical significance. Frequencies and percentages were calculated from the demographic information provided. Means, standard deviations, and change in knowledge were calculated using the pre- and post-test overall knowledge. A paired t-test was also used. Chi-square analyses were conducted to identify differences between demographic variables and overall knowledge, item-specific knowledge, and item-specific confidence._

(2012, p. 451)

Additionally, each participant was given a confidence questionnaire (see Appendix B) which measured the teacher’s confidence in caring for students with diabetes. Nine questions were answered using a 7-point Likert scale scoring method, with self-confidence scores ranging from 1 to 7 (with 1 representing no self-confidence and 7 representing strong confidence). The matrix scored items were summed up for a total score, with the highest possible score being 63. These same questions were administered as a post-survey at the end of the research time period.

_Data collection._ Permission was granted by the Bartholomew Consolidated School Corporation (BCSC) superintendent to email all teachers in the district to volunteer to attend a professional development opportunity about diabetes. Once participants agreed to attend, permission was also sought and obtained to be a part of this study. Data collected from the survey administration was kept confidential.

The first recruitment correspondence went out to participants in July, 2015. Two additional emails were sent as follow-up reminders. Introductory information and a consent
form were presented in the same email. Once participants agreed to be involved in this study, a second email was sent verifying their commitment and informing them of the date, time, and place of the PD. A reminder email was sent the week prior to the PD in an attempt to increase attendance.

The BCSC Administration building, located at 1200 Central Avenue in Columbus, Indiana, hosted the PD. This location served as a secure and local site with which participants were familiar. The room was large enough for both small and large group activities; it also provided a place for videos to be shown. School computers were used by participants to take the surveys. Since participants were already BCSC staff members, they could log in and take the survey delivered through their BCSC email. The software program, itsLearning, was used to house all of the educational materials needed for learning. This program is very familiar with the teachers so access and availability to it was seamless. These materials were uploaded and contained in the program so that teachers could have continual access to the learning materials at a later date.

Information such as gender, years of teaching experience, age, and experience with diabetes when teaching was self-reported. Confidentiality was achieved by asking participants to cite both their mother’s maiden name and high school. This information was used to match the pre- and post-test results.

“If the purpose of the project is to see if change is occurring over time, then the longitudinal method would be the more appropriate design” (Babbie, 1973, p. 53). This study’s questions were administered to all teacher participants at the beginning of the PD in the summer of 2015. Respondents were assured that their identity would not be released in this dissertation work. Teachers were asked to complete the survey and return it prior to the start of the PD.
Approval was also obtained from the superintendent to administer the surveys and analyze results. These results were tabulated and examined to capture what each BCSC staff member initially perceived as critical in the way of general knowledge, complications, management, and communication. After the pre-survey, the four constructs of the professional development opportunity were taught. A post-survey was administered at the conclusion of the third session. Both pre- and post-surveys were designed and tabulated using the Ball State software program, Qualtrics. This secure software program created the surveys and then generated reports from those survey results. This prepared the data for analysis under the supervision of my dissertation chair, Dr. Marilynn Quick. Data was housed on a school-owned, password-protected computer, and after three years, all data will be destroyed. Participants will be informed via email when the research is complete. Results of the study will be made available to any participant upon request.

**Analysis.** The intent in using survey research was to gather information using a specific plan that included detailed questions and then compare items to determine if there were changes in the respondents’ knowledge or confidence levels. The numerical data collected through the survey allowed for manipulation of the variables while controlling the research setting. This quantitative research design gave the foundation to then determine which of the participants and their responses could be examined and then used for interviews. This strategy permitted a richer, more comprehensive understanding of the teachers’ changes in knowledge and perceptions and the complexity that diabetes adds to the relationship between the teacher and student.

Statistical analyses were conducted using IBM software for Windows (Statistic’s Version 23). Both descriptive and inferential statistics were used. The purpose of the descriptive statistics was to summarize the data in a meaningful way. Descriptive statistics were used to
describe the subgroups: gender, years of teaching experience, age of participants, and experience with diabetes when teaching. This data provided information for the overall statistical analysis.

Inferential statistics were conducted to infer meaning from a population while strengthening the relationship between the independent and dependent variables (Albrecht, 2006). I made generalizations about the participants using a sampling technique. It was critical that my sampling population represented the total population. The inferential alignment was noted through the change in overall knowledge between pre-and post-tests and was assessed using a paired t-test. Chi-square analyses were conducted to identify relationships between demographic variables, item-specific knowledge, and item-specific confidence. The overall difference between demographics were analyzed through ANOVA.

**Qualitative Study**

**Instrument.** Qualitative data was collected for this study by interviewing 10 certified teachers who granted their permission to be interviewed during the initial PD (see Appendix C). A focused recruitment effort was used and stratified criteria determined which participants were asked for an interview. The criteria were participant’s age, experience with diabetes, and years of teaching experience. Contact information was obtained by asking participants to share this information on the survey at the first PD. An email was sent to each selected participant informing them of the date and time of the scheduled interview. To provide consistency for the participants, the interviews were conducted in the same building used for the PD. A reminder was sent to selected participants two days prior to the interview.

A series of semi-structured open-ended interview questions was created to help ensure that all participants were asked similar information in a similar format (See Appendix C). Such a structured interview format improved the ethical integrity of this portion of the qualitative study.
and provided an organizational framework to support novice-level interviewing technique. Probing questions were asked, when applicable. Weiss (1994) stated that interviews can be deep and insightful if the correct questions are asked by the researcher. It was vital to the mixed methods research design to understand the shared experiences through the eyes of the teachers.

**Data collection.** Each participant scheduled a 45-minute face-to-face semi-structured interview within a two-week period after the second networking session. The goal was to gain better insight into the teachers’ level of comfort as well as their beliefs and their values surrounding diabetes and diabetes management. Audio recorded each interview was audio-recorded and transcribed into narratives. Recording the interviews ensured consistency with the questioning and the protocol. It also enabled the capture of the entire interview without fear of missing a piece due to distraction. The interviews took place in the fall of 2015 and were conducted at the Bartholomew Consolidated School Administration building. Ease of location and security was why this building was selected.

The eleven open-ended questions were informal and carried out in a conversational style based on the pre-survey answers. Each question was asked so as not to lead the teachers to certain answers. The interviews ranged from 30-60 minutes in length, depending on how each participant answered the questions. The final question gave the participants the opportunity to share any additional information that they desired to convey. The interviews ended with the researcher thanking the participants and asking if they could be contacted if additional questions arose. Each interview was transcribed from the digital recording.

**Analysis.** As noted by Corbin in his book *Basics of Qualitative Research* (2008), coding requires a brainstorming approach that opens the analyst to all possibilities and potentials. The qualitative portion of this research was based mainly on interview data and relied on open coding
and concept identification. The steps in the coding process are critical to the design and success of the research. To start, each interview was read from beginning to end without any preconceived notions or ideas. This first reading was done to better understand the teachers’ experiences, knowledge, and beliefs with diabetes. This “reading only” initial step forced an “open mind to the possibilities,” as Corbin suggested.

After the initial interview, all of the data was collected and divided into manageable pieces, which were the natural breaks of the next question. Each section was analyzed in depth to lead to rich descriptions of the work. Next, all of the pieces were analyzed for themes or main ideas. Each theme was given a conceptual name that represented the central idea. Thinking and creating words around each theme became the thrust of the analytic research. Each theme was labeled with what was considered to be the main idea of that section and was then assigned a code name and number. This process is defined as open-coding. Axial coding was also conducted to find and relate the themes using both inductive and deductive reasoning. Both of these terms have been described by Strauss and Corbin (2007) in their writings on qualitative analysis and research.

Detailed memos, which included the researcher’s thought processes, comparisons, questions, and brainstorming ideas, were written and transcribed and became a part of the coding process. These codes built upon each other, became linked to other themes, which then became larger themes. Data collection and data analysis merged together, as defined by Miles & Huberman (1994), to validate my research. The codes related to both the interview questions and the survey constructs.

It was important that the findings were validated by another professional to reduce the risk of bias. Another doctoral researcher, Dea Young, coded the information from five of the
interviews to establish inter-coder reliability. A veteran researcher then reviewed the initial coding and provided expert input about the coding process. All coders used the research questions as a conceptual framework in finding common themes while analyzing the data.

All interviews and transcripts were analyzed under the framework of grounded theory. Grounded theory is an approach that allows important concepts to emerge out of the data (Strauss & Corbin, 2008). Bogdan and Biklen (2006) described qualitative data analysis as a systematic process of sifting and arranging all information obtained from interview transcripts, field notes, and other material collected to increase your understanding of the data to enable the presentation of what has been discovered. In a grounded theory approach, the researcher analyzes the data to develop a theoretical interpretation of what is acquired through observation (Kvale & Brickmann, 2008).

Limitations of the Study

Learning about diabetes is complicated. While not every teacher who had a student with diabetes participated in the professional development opportunity, the sampling of teachers who did participate provided a solid representation. Even though the response rate was high at seventy percent, the number used for analysis was twenty three which does make it hard to produce robust tests. Since participants volunteered to be in this study, they understood the expectations of the professional development and involvement in the study. Future research could be designed to check for improved understanding where teachers were exposed to the professional development but were not under an agreement to participate in the study.

Diabetes management of students is typically handled by the school health official. Asking teachers to assist with a medical task could lead to error or risk. If an interaction was handled inappropriately, extreme consequences could occur. Asking teachers to take on this role
encouraged risk taking, time, and energy. This required a change in school culture along with an increased level of ease around a medical condition - something that typically does not fall in the scope of a teacher’s operation.

Diabetes presents differently for each student; hence, understanding diabetes and the management of the disease is different for each student. While this training focused on general tips, each student’s particular management plan will need time and effort allocated to best meet the student’s needs. While a teacher may meet the needs of a student with diabetes this year, the next year the teacher could encounter a different student with a different disease management requirement. Ongoing professional development and a willingness to learn are crucial for the success of both the teacher and the student who are matched for the school year.

Summary

In summary, to address the research questions, a mixed method study was conducted where professional development was designed with the intent to improve teachers’ perceptions about students with diabetes, knowledge of diabetes, and diabetes management. A mixed method study was the best option for this type of research so that rich information could be gathered and analyzed using both surveys and interviews. Teachers were given the opportunity to share their insights about students with diabetes both before and after the professional development learning opportunity, and data was collected at each of these points. Chapter Four of this study provides detailed results of the data obtained from this mixed-methods study.
CHAPTER 4

RESULTS

This case study was conducted regarding teachers’ knowledge and confidence about diabetes and the management of the disease when faced with a student who has this disease. A mixed-methods research design was utilized to provide a rich study that would support teachers when faced with a student who has diabetes in their classroom. This design is best suited for describing in detail the complexity of emotions and stories around teachers and their feelings and experiences when working with a student with a chronic illness like diabetes. The statistical data gathered was used to predict, explain, and understand more about teachers and their level of knowledge and comfort with diabetes and the management of the disease.

My hope for this study was to support the idea that professional development (PD) opportunities around diabetes are significant in enhancing both knowledge and confidence in teachers. The four constructs about diabetes explored in this study were (a) knowledge, (b) diet and complications, (c) management, and (d) communication.

This chapter presents demographic data for the teachers who participated in the PD as well as the results for each research question in terms of descriptive statistics followed by inferential statistics. The information shared indicates the areas in the PD that were found both significant and not significant in enhancing both teacher knowledge and confidence.

Purpose of the Study

The purpose of this mixed methods study was to determine how teachers’ perceptions evolve after participating in a professional development opportunity about diabetes and the students with diabetes that they teach. Teachers are empowered when they are given knowledge, resources, guidance and authority to best meet the needs of all students in the classroom. Each
of these components can produce a stronger sense of self-efficacy in the teacher and that may lead to a stronger sense in the child, as well. The initial pre-test scores for each construct served as the control variable. The post-test scores measured the gain in teachers’ knowledge and confidence. Interviews served to provide richer data about the effectiveness of the professional development opportunity.

**Research Questions**

The central question that guided this research was: How do teachers’ perceptions and practices evolve (as measured by pre/post-surveys and data gathered from interviews) after participating in professional development opportunities about diabetes and the management of the disease?

The sub-questions that guided this research were:

1. What constructs of teachers’ knowledge of diabetes deepen after professional development activities, as measured by pre- and post-testing?

2. What changes in teachers’ communication about diabetes with the family and school nurse occur after professional development activities, as measured by interviews?

3. How effective was the professional development process, as measured by interviews?

4. What do participants perceive to be their change in skill levels, feelings of empowerment, and beliefs about diabetes as a result of their involvement in the professional development experience?

**Quantitative Data Analysis**

Quantitative design strives to objectively review statistics and numbers. “Researchers use a quantitative study to provide an explanation or prediction about the relationship among variables in the study” (Creswell, p. 139). There is control and precision with the tools for
measurement while searching for relationships between variables. Quantitative research is described by Hoy (2010) as “a reflective inquiry and scientific approach to understanding” (p. 19). Information gathered is analyzed for general patterns and explanations.

**Participant Demographics**

**Descriptive statistics.** The invitation to attend the professional development opportunity went to all 11,319 teachers in Bartholomew Consolidated School Corporation. Thirty-three teachers responded and participated. Not all who participated took both the pre- and the post-surveys. Twenty-three teachers completed both the pre- and post-surveys for a 70% participation rate of those participating. Only these 23 participant scores were used for analysis.

Demographic data for the teachers participating in the study are presented in Table 1. The demographic data used for analysis included gender, age, teaching experience, and experience with diabetes. Teachers were asked to self-report both their age and years of experience in the demographic portion of the survey. Data were then grouped, and those groupings are noted in Table 4.1.

Table 4.1

**Teacher Demographics**

<table>
<thead>
<tr>
<th>Demographic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
<td>26</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
<td>74</td>
</tr>
<tr>
<td>% of Total</td>
<td>23</td>
<td>100</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-40 years</td>
<td>8</td>
<td>35</td>
</tr>
<tr>
<td>41-49 years</td>
<td>9</td>
<td>39</td>
</tr>
<tr>
<td>50+ years</td>
<td>6</td>
<td>26</td>
</tr>
<tr>
<td>% of Total</td>
<td>23</td>
<td>100</td>
</tr>
</tbody>
</table>

Experience with Diabetes
As noted in Table 4.1, more females participated than males. There is a larger population of teachers below the age of 50, as well as a larger percentage of participants with teaching experience less than 20 years. Finally, this sample indicates that there are more teachers who have no or little experience with diabetes than those that do have some or a lot of experience.

Table 4.2

**Participant Survey Item Responses by Construct**

<table>
<thead>
<tr>
<th>Sub-scale</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Knowledge Score</td>
<td>.574</td>
<td>.2580</td>
<td>.139</td>
</tr>
<tr>
<td>Post Knowledge Score</td>
<td>.713</td>
<td>.24736</td>
<td></td>
</tr>
<tr>
<td>Pre Diet/Complications Score</td>
<td>.4783</td>
<td>.20661</td>
<td>.1434</td>
</tr>
<tr>
<td>Post Diet/Complications Score</td>
<td>.6217</td>
<td>.22148</td>
<td></td>
</tr>
<tr>
<td>Pre Management Score</td>
<td>.6609</td>
<td>.23691</td>
<td>.113</td>
</tr>
<tr>
<td>Post Management Score</td>
<td>.7739</td>
<td>.16298</td>
<td></td>
</tr>
<tr>
<td>Pre Communication Score</td>
<td>.6957</td>
<td>.20775</td>
<td>.1456</td>
</tr>
<tr>
<td>Post Communication Score</td>
<td>.8413</td>
<td>.18132</td>
<td></td>
</tr>
<tr>
<td>Pre Total Score</td>
<td>.6022</td>
<td>.17804</td>
<td>.1359</td>
</tr>
<tr>
<td>Post Total Score</td>
<td>.7381</td>
<td>.15441</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Valid subjects (n=23).

The survey used for this study was based on the design in Dr. Cory Smith’s work, “Evaluation of the Impact of a Diabetes Education Curriculum for School Personnel on Disease Knowledge and Confidence in Caring for Students.” The survey constructs, also labeled as subscales on the
survey instrument included (a) knowledge, (b) diet and complications, (c) management, and (d) communication.

Table 4.2 presents the means, standard deviations, and the pre/post-test differences among the participants based on the five aforementioned constructs. Participants demonstrated more confidence and overall diabetes knowledge for each construct after the PD. There was improvement in all four of the constructs from the pre-test to the post-test survey results as noted in Table 4.3. However, I did not know if there were statistical differences between these two groups until I ran further inferential testing.

Table 4.3

Construct Change (Pretest N = 33; Posttest N=23)

<table>
<thead>
<tr>
<th>Item</th>
<th>Pretest Correct Answer N (%)</th>
<th>Posttest Correct Answer N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>101 (61.2%)</td>
<td>115 (74.9%)</td>
</tr>
<tr>
<td>Diet and Complications</td>
<td>86 (52.1%)</td>
<td>74 (64.3%)</td>
</tr>
<tr>
<td>Management</td>
<td>107 (64.8%)</td>
<td>94 (81.7%)</td>
</tr>
<tr>
<td>Communication</td>
<td>121 (73.3%)</td>
<td>100 (86.9%)</td>
</tr>
</tbody>
</table>

Inferential statistics. A total of 33 school personnel participated in the PD. Means and standards deviations were calculated for each construct in the pre- and post-test. Since the data were linked by identifiers, item-specific changes in confidence and knowledge between the pre- and posttests were assessed using a paired t-test as identified in Table 4.4. Only teachers who took both pre- and post-surveys were analyzed for this portion of the research.

Table 4.4

Construct Change

<table>
<thead>
<tr>
<th>Construct</th>
<th>Pretest Mean ±SD</th>
<th>Posttest Mean ±SD</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>.574 ± .258</td>
<td>.713 ± .247</td>
<td>-22.549***</td>
</tr>
<tr>
<td>Diet/Complications</td>
<td>.478 ± .206</td>
<td>.621 ± .221</td>
<td>-13.669***</td>
</tr>
<tr>
<td>Component</td>
<td>Pre-test Mean ± SD</td>
<td>Post-test Mean ± SD</td>
<td>t-value</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Management</td>
<td>.660 ± .236</td>
<td>.773 ± .162</td>
<td>-.901</td>
</tr>
<tr>
<td>Communication</td>
<td>.695 ± .207</td>
<td>.841 ± .181</td>
<td>1.091</td>
</tr>
<tr>
<td>Confidence</td>
<td>32.43 ± 17.648</td>
<td>43.35 ± 15.126</td>
<td>7.957***</td>
</tr>
<tr>
<td>Overall Score</td>
<td>.602 ± .178</td>
<td>.738 ± .154</td>
<td>-3.542**</td>
</tr>
</tbody>
</table>

Note. Excludes participants who did not complete both pre-test and post-test. *p < .05, **p < .01, ***p < .001.

There was a significant difference in knowledge $t(21) = -22.549$, $p = .000$; diet and complications $t(22) = -13.669$, $p = .000$; confidence $t(22) = 7.957$, $p = .000$; and the overall score $t(22) = -3.542$, $p = 000$. The scores in every case were higher in the post-test compared to the pre-test. This indicates that the respondents gained both knowledge and confidence on the material presented in the PD, including the follow up resources that were provided. There was no significant difference noted in management and communication constructs from those taking the survey. This may be a result of informing participants that every student’s diabetes management system is different. To give one set of specific guidelines or rules about diabetes and management would be too simplistic. Communicating to parents about students in the classroom is ongoing and necessary. Participants scored high in the Communication construct on the pre-test and improved their scores after the PD; however, a statistically significant difference was not found.

To have a better understanding and a deeper analysis, a one-way nonparametric ANOVA, namely Kruskal-Wallis, was used. Chi-squared analyses were conducted to identify differences between demographic variables and overall knowledge and confidence. There were no significant differences found between those participants who had teaching experience and those who did not. There was also no significant difference found between those who had prior experience with diabetes and those who did not.
Qualitative Data Analysis

Qualitative research focuses on the way people make sense of their experiences and the world in which they live. Qualitative research studies are conducted by connecting and engaging with participants and relating their experiences through words. Researcher Michael Patton compared a qualitative study to a documentary film (Patton, 2002). Qualitative studies help “researchers understand processes, especially those that emerge over time, provide detailed information about setting or context, and emphasize the voices of participants through quotes” (Creswell & Plano, 2007, p. 4). Richly detailed, descriptive observations gathered during the professional development opportunity were one form of qualitative data collected. Open-ended ethnographic interviews captured the participants’ experiences and perspectives. Data gathered from the interviews were used to identify themes, or patterns, in my research.

The Interview Sample

Participants for the interview sample were selected from those that had attended the PD opportunity as well as those who had taken the survey. Teachers were asked on the permission form if they would be willing to be interviewed by providing contact information. All of the 34 participants were willing to be interviewed. From the 34 participants, 10 were selected and contacted for an interview. It was important to me that I had both men and women and a variance in teaching experience as interviewees, so participants were chosen with those criteria in mind. All 10 were contacted by email to re-determine their willingness to participate. Nine of the 10 responded with an affirmative email. One participant did not respond, so I selected another person with similar demographics to interview. A time was scheduled with each participant at a time and place that would be convenient for each one. All chose to be interviewed in their own school, in their own classroom or conference area. The length of the
interviews varied among the participants, with interviews lasting from 15 minutes to 45 minutes. Each interview was audio-recorded and then transcribed into narratives, with each participant agreeing that I could contact them further, if clarity was needed.

**Qualitative Analysis by Concepts from Interview Questions**

My first phase of the open coding process was to read the interview transcripts to familiarize myself with the participants’ thoughts. This open coding system (Creswell, 2003) allowed me to first read with no specific focus in mind. I then developed codes from the thoughts and ideas that were shared with me relating to diabetes and the management of the disease. This initial code was broad in design and was related to the comments made. I took detailed notes next to each code as to my thoughts about implications to my research. Table 4.5 presents examples of the wide-range of statements and the matching codes that were ascertained from my initial coding. In Table 4.6, I started to review frequent categories. I looked at initial quotes to seek patterns that could lead to deeper understanding and analysis.

Table 4.5

*Coded Comments Relating to Interview Questions Asked*

<table>
<thead>
<tr>
<th>Concept</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship with the nurse and his/her role with student</td>
<td>NUR</td>
</tr>
<tr>
<td>Participants’ knowledge about diabetes</td>
<td>KNW</td>
</tr>
<tr>
<td>What participants found most helpful about the PD</td>
<td>MOST</td>
</tr>
<tr>
<td>What participants would changes about the PD</td>
<td>CHG</td>
</tr>
<tr>
<td>Communication participants had with parents and students</td>
<td>COM</td>
</tr>
<tr>
<td>Warning signs to look for in a student with diabetes</td>
<td>WRN</td>
</tr>
<tr>
<td>Complications that come from diabetes</td>
<td>COM</td>
</tr>
<tr>
<td>Food as either a positive or a negative</td>
<td>PD</td>
</tr>
<tr>
<td>Students being in charge of their own management</td>
<td>STD</td>
</tr>
<tr>
<td>Participants’ support of students with diabetes</td>
<td>TCH</td>
</tr>
<tr>
<td>Participants’ confidence when working with a student with diabetes</td>
<td>CON</td>
</tr>
</tbody>
</table>
Table 4.6

Comments Supporting Most Common Concepts and Coding of Data from Interview Questions

<table>
<thead>
<tr>
<th>Coded Categories</th>
<th>Participant Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse (NUR)</td>
<td>“I would send them to the nurse if there was a problem.”</td>
</tr>
<tr>
<td></td>
<td>“work one on one with the nurse to see if we have a plan”</td>
</tr>
<tr>
<td></td>
<td>“Knowing that the nurse has to count carbs each day.”</td>
</tr>
<tr>
<td></td>
<td>“My first steps, of course, are to initiate a plan with the nurse.”</td>
</tr>
<tr>
<td></td>
<td>“So my next step would be to walk across to the nurse’s office and let Sonya take it from there.”</td>
</tr>
<tr>
<td></td>
<td>“I have sent them to the nurse when they are feeling bad.”</td>
</tr>
<tr>
<td>Confidence Level (CON)</td>
<td>“I think my comfort levels are better than they would have been.”</td>
</tr>
<tr>
<td></td>
<td>“As far as my comfort levels with students, not a lot.”</td>
</tr>
<tr>
<td></td>
<td>“I still think I would be a little bit nervous about it.”</td>
</tr>
<tr>
<td></td>
<td>“I wouldn’t be alarmed by it.”</td>
</tr>
<tr>
<td></td>
<td>“I know enough but not enough.”</td>
</tr>
<tr>
<td></td>
<td>“So, I guess a little bit more confidence in just speaking with the nurse about it.”</td>
</tr>
<tr>
<td>Knowledge (KNW)</td>
<td>“So, I needed to know something, you know, at least the baseline of, you know, what’s going on.”</td>
</tr>
<tr>
<td></td>
<td>“My only source of information prior to this was the nurse. And so, I had a little – other than that, I would had no idea like how to deal with that. And to just have the knowledge that, you know, they’re going to be okay if you can, you know, help them at the time right then.”</td>
</tr>
<tr>
<td></td>
<td>“I also understand how terrifically confusing and frustrating this disease can be.”</td>
</tr>
<tr>
<td></td>
<td>“It’s serious and it impacts so much at this really – that fully - is detrimental to not know that information.”</td>
</tr>
<tr>
<td></td>
<td>“But it’s a whole learning process for everyone.”</td>
</tr>
<tr>
<td></td>
<td>“And I never really I guess grasp that concept of it’s not something that stops.”</td>
</tr>
</tbody>
</table>

Data from the participants began to emerge as patterns. The comments made by the participants regarding the nurse, their confidence level, and knowledge about diabetes are linked together. If their knowledge and confidence were low, then they relied more on the nurse as the person to be in charge of the student and his/her diabetes. In the school system in which these participants taught, there is a nurse in each building. It may be both the easiest and a perceived
procedure to send a student to the nurse for all medical needs. During research, I could find no policy or procedure that suggests such action.

Several themes emerged from what the participants said about their new knowledge and confidence levels. All valued the nurse’s role as a part of the student’s diabetic plan, all knew the seriousness of the disease, and all realized that uncontrolled diabetes is detrimental to all facets of a student’s life. The influence that a teacher has on the life of a child is critical. Being a part of a team that works together with the parents, the nurse, and the student were all positives.

**Qualitative Analysis by Axial Coding**

During phase 2, and as a transition to axial coding, I reread the transcribed interviews. I specifically reviewed the data for groupings or patterns that could be have been related. Table 4.7 shows this information. By narrowing down my initial coding of multiple codes, I grouped codes into six categories that could provide richer analysis. By looking for concepts from the interviews that were also a part of the quantitative survey, it allowed for triangulation in the mixed-methods research. The concepts that were found most often were (a) management, (b) professional development, (c) communication, (d) knowledge, (e) confidence, and (f) teacher responsibility.

**Table 4.7**

<table>
<thead>
<tr>
<th>Coded comments from survey constructs</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concepts for survey constructs</td>
<td></td>
</tr>
<tr>
<td>Student management of diabetes</td>
<td>MNG</td>
</tr>
<tr>
<td>Professional development opportunity</td>
<td>PD</td>
</tr>
<tr>
<td>Teacher communication with diabetes team</td>
<td>COM</td>
</tr>
<tr>
<td>Teacher knowledge of diabetes</td>
<td>KNW</td>
</tr>
<tr>
<td>Teacher confidence in skill and knowledge of diabetes management</td>
<td>CON</td>
</tr>
</tbody>
</table>
As indicated in Table 4.8, all teachers believe that they should have a role in helping the student take more control of their plan for managing the disease. The relationship that the teacher builds with the student and the parents is another essential part to a successful diabetes plan at school. From the above comments, teachers are skilled at asking questions to help the student, parents, and nurse have a better understanding of the student’s life while in their classroom. Since a learning day consists of asking students a multitude of questions, it was reasonable that teachers would be very comfortable asking students questions about their diabetes.
In phase 3, I completed the axial coding process. Axial coding finds and relates themes using both inductive and deductive reasoning (Criswell, 2003). As I conducted this coding, the final themes emerged and are noted in Table 4.9. They included (a) teacher efficacy, (b) professional development, and (c) student management of their diabetes. Tables 4.10, 4.11, and 4.12 show the axial coding and the concepts in each.

Table 4.9

*Coded comments from interviews*

<table>
<thead>
<tr>
<th>Concepts for interview constructs</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher efficacy</td>
<td>TEF</td>
</tr>
<tr>
<td>Professional development opportunity</td>
<td>PD</td>
</tr>
<tr>
<td>Student management of diabetes</td>
<td>MNG</td>
</tr>
</tbody>
</table>

Table 4.10

Axial Coding Emerging Themes: Teacher Efficacy

<table>
<thead>
<tr>
<th>Theme</th>
<th>Participant Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role of the teacher</td>
<td>“I feel like they needed an advocate.”</td>
</tr>
<tr>
<td></td>
<td>“I always tell my students my number one priority is to make sure that they’re safe at school. So, their safety as also their health and any kind of issues that they might have in the classroom.”</td>
</tr>
<tr>
<td></td>
<td>“I guess it might even be less because I second guess myself as to whether I’m remembering the right thing.”</td>
</tr>
<tr>
<td></td>
<td>“It’s still a student that I’m responsible for, health-wise, mentally, emotionally, academically. So, it’s just one piece of this kid that I may not be able to control. But I have to help them feel like they’re in control of their situation.”</td>
</tr>
<tr>
<td></td>
<td>“I know enough but not enough.”</td>
</tr>
<tr>
<td></td>
<td>“I never really I guess grasp that concept of it’s not something that stops.”</td>
</tr>
<tr>
<td></td>
<td>“I would say I have every responsibility in the world that would – to make sure that she is safe and taking care from the time she walks in my door to the time she leaves my door to make sure that her day goes smooth. And that her needs are met no matter what they are, whether medical, physical or mental, whatever those needs are.”</td>
</tr>
<tr>
<td></td>
<td>“I could probably wing it enough to act like I”</td>
</tr>
</tbody>
</table>
“I still think I would be a little nervous about it.”

“I think I have changed. In my knowledge, I’ve definitely – I have a better understanding of it.”

“It’s a whole learning process for everyone.”

“It’s serious and it impacts so much at this really – that fully - is detrimental to not know that information.”

“I’m watching for, you know, looking for those pronounced signs or indicators. I think it’s made me more responsible as I mature as well, you know, and I think about the longevity and how peculiar this disease is and how it changes overtime.”

know what I’m doing so that they would feel comfortable enough. And then I myself would probably run back and find out all the information I needed to find to make sure I was comfortable enough with it.”

All teachers felt responsible for the students in their classrooms. They felt that safety and health were important factors to a school day and realized that diabetes was just a part of the whole child.

Teachers’ level of confidence was not evident in their answers to interview questions. Some were hesitant with their responses, and all had to ponder before responding to the question, “What is your comfort level now with diabetes?” All still would rely on the nurse in the building when faced with a student who needed support with a management plan or action.

Table 4.11
Axial Coding Emerging Themes: Professional Development

<table>
<thead>
<tr>
<th>Theme</th>
<th>Participant Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD Opportunity</td>
<td>“I think that was good information. And I almost wish there was”</td>
</tr>
<tr>
<td></td>
<td>“I think there’s a lot of information that you get from that by listening to”</td>
</tr>
<tr>
<td></td>
<td>“I would say just individual stations that we went around, I like”</td>
</tr>
</tbody>
</table>
more of it just because the – and in terms of like scenario, assessing scenario type thing.”

“I really liked the round robin thing that we did. And sometimes like I wanted to stay at more spots than what we were.”

“I learn through dialog and discussion and interaction verbally. And that was terrific and meaningful I think being with other folks that are dealing with this in different ways.”

other professional people talk about how they observe situations."

“I really did like that you had some parents with some experiences and people with personal experiences that were willing to share.”

“I like the diverse group of people that – the different angles in looking at the information.”

“I think the opportunity to go and then talk with professionals that the – professional development had lined up was terrifically insightful as well.”

that they were individualized about, you know, the communication and all the different stations that we did, the small groups.”

“I think that the opportunity was nice because I got to speak with someone who lives with diabetes, someone who treats, you know, the nurse, a parent of a child. So, for me that was good.”

The initial large group gathering during the professional development opportunity allowed for sharing of information and offered the groundwork of the “why” they were there.

The small group break-out sessions provided more in depth opportunities for sharing, insight, and reflection. Teachers, being independent learners, appeared to benefit from various paths of learning. This was provided during the PD opportunity where they could rotate from station to station and follow up with presenters at the end of the session.

Teachers also bring life experiences to their learning. This was evident in many of the comments made about the experience. Knowing that they were walking away with applicable
materials and tools to use was another benefit. This internal drive to learn more about themselves, their students, or a family member made learning more relevant and meaningful.

Table 4.12

Axial Coding Emerging Themes: Student Management of Diabetes

<table>
<thead>
<tr>
<th>Theme</th>
<th>Participant Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>“They (students) know when they know when they’re getting low, if they know when they’re getting high like can they self-regulate.”</td>
</tr>
<tr>
<td></td>
<td>“Can we just do it in the room? Call the numbers to you so the child doesn’t constantly out of the room?”</td>
</tr>
<tr>
<td></td>
<td>“I think that’s awesome. I think anything we can do to teach kids how to manage what they will need to build their life is what we should be doing.”</td>
</tr>
<tr>
<td></td>
<td>“I mean like she had her pouch when - with her everywhere we went.”</td>
</tr>
<tr>
<td></td>
<td>“Students carrying their own supplies.”</td>
</tr>
</tbody>
</table>

As teachers gained efficacy about diabetes, the students seemed to benefit from this newfound knowledge. They may be more willing to manage their own diabetes and start, or continue, toward the path of quality health.

Summary

The analysis from my quantitative work posed questions that guided my qualitative research. Ten interviews were conducted, transcribed, and coded through one round of open coding and two rounds of axial coding. The assigned codes helped establish themes and patterns about diabetes. This research analysis attempted to answer my research question that asks, “How do teachers’ perceptions and practices evolve after participating in professional development opportunities about diabetes and the management of the disease?”
The quantitative and qualitative data suggest that perceptions and practices have changed. Chapter 5 will draw conclusions about the results, relate the results to the literature, and suggest action for future opportunities.
CHAPTER 5
CONCLUSIONS

A summary of the study is presented in Chapter 5. Findings related to the literature review, conclusions from the data presented in Chapter 4, and recommendations for further research will also be discussed.

Purpose of the Study

The purpose of this mixed methods study is to determine how teachers’ perceptions evolve after participating in a professional development opportunity about diabetes and the students they teach. Teachers are empowered when they are given knowledge, resources, guidance and authority to best meet the needs of all students in the classroom. Each of these components can produce a stronger sense of self-efficacy in the teacher, and that may lead to a stronger sense in the child, as well. The initial pre-test scores for each construct served as the control variable. The post-test scores measured the gain in teachers’ knowledge and confidence. Interviews provided richer data about the effectiveness of the professional development opportunity.

Research Questions

The central question that guided this research was: How do teachers’ perceptions and practices evolve (as measured by pre/post-surveys and data gathered from interviews) after participating in professional development opportunities about diabetes and the management of the disease?

The sub-questions that guided this research were:

1. What constructs of teachers’ knowledge of diabetes deepen after professional development activities, as measured by pre- and post-testing?
2. What changes in teachers’ communication about diabetes with the family and school nurse occur after professional development activities, as measured by interviews?

3. How effective was the professional development process, as measured by interviews?

4. What do participants perceive to be their change in skill levels, feelings of empowerment, and beliefs about diabetes as a result of their involvement in the professional development experience?

**Review of Research Methods**

My research was divided into two parts: surveys and interviews. The surveys, comprised of 26 questions, were used for quantitative analysis to define four constructs: knowledge, diet/complications, management, and communication. A professional development (PD) opportunity was created and implemented around those constructs. Another component, confidence, was also measured using a Likert Scale. The pre-test scores served as the baseline or control variable. Statistical differences were either verified or not verified for each of the constructs based on the comparison of pre-test and post-test results.

The second part of my research was qualitative in which I gathered and analyzed data through interviews. The interviews were transcribed and reviewed for patterns and concepts. Each interview was then coded through open and axial coding.

**Findings**

To begin, I am going to list the major findings from my research. Then, discussion of my findings regarding the four constructs of knowledge change, diet/complications, management, and communication will be presented. This will be followed by how these relate to the literature. The importance of professional development and surprising findings will also be presented.
Review of Major Findings

The major findings reported in Chapter 4 were as follows:

- Teachers feel very much responsible for the students in their care during the school day.
- Teachers feel empowered when they gain new knowledge and skills around a topic of interest.
- Teachers rely on the nurse for health conditions of any student in the classroom.
- Teachers feel comfortable talking with parents and students about health concerns, but there was not a significant difference in pre and post survey scores related to communication.
- Teachers use questioning as a tool to enhance knowledge when communicating.
- Teachers who gained general knowledge about diabetes also increased their overall confidence level when working with a student with diabetes.
- Teachers realize that diabetes is a life-long illness that affects every aspect of a child’s life.
- Teachers appreciate knowing more about their students, their health concerns, and management.
- Teachers think a PD opportunity is a good way to share information about students and it should be required for any staff members who interact with a student with diabetes.
- Teachers understand that a student is ultimately in control of his/her health; however, the teacher can be a key contributor in making that an easier task for the student.
- A diabetes management plan is specific to each student and varies with each student who has the disease. Finding a student's comfort level, confidence level, and skill level about diabetes is critical for healthy child development -- socially, emotionally, and physically.
Findings Specific to the Literature

My first research question was, “How do teachers’ perceptions and practices evolve after participating in professional development opportunities about diabetes and the management of the disease?” The following narratives depict the findings and tie to my literature review.

Knowledge change. The first construct had five questions that contributed to this portion of the survey. There was significant difference in knowledge as determined by the pre-and post-test surveys, $t(21) = -22.549, p = .000$. As participants better understand diabetes and the factors of the disease, they become more knowledgeable about students and their health. Since diabetes incidence is on the rise, there are more people who are affected by it; and hence, it is becoming more common to have a family member who has the disease. This sparks an interest, both in and out of the classroom, to better understand what diabetes is and how to best control the effects of the disease on the human body.

Increasing school personnel’s overall knowledge about diabetes provides a more supportive school environment (Mandali, 2009). Because diabetes is multi-faceted, it takes time to learn about its components. Knowledge should include simple basics that can best support the child, both in the way of self-management and impending crisis situations. Self-management is the ultimate goal, but until the child reaches that developmental point, support from others is essential. Knowledge is the first step. There are many resources available to help with the imparting of this knowledge, but it takes a team approach and leadership to make this happen.

It is during the formative school years that many skills, including self-care, are established and maintained (Kelso, 2011). Students who have the support of personnel in their school may obtain these diabetic self-care regimens sooner than others. This leads to an overall healthier child. Participants in my study had the overwhelming sense that students are entrusted
to their care. The child with diabetes is no different. Their diabetes regimen is critical to the success of the child, both in and out of school. Teachers want their students to be successful; they want students to feel accepted; they want their students to have healthy lives that will lead them to healthy adulthoods. They know that the practices and modeling that happen inside a classroom can transfer outside the classroom. This study supports the statement that “knowledge precedes competency.”

**Diet/complications.** The second construct in this study explored diet and complications. There was a significant difference between pre- and post-test scores, \( r(22) = -13.669, p = .000 \).

The complications that come with diabetes are staggering for the child, the family, and possibly the community. As many as one in three American adults will have diabetes by 2050 if present trends continue (American Diabetes Association, 2013). Participants in this study either knew or knew of a family member, friend, or student who had diabetes. There were personal connections and prior knowledge that fueled an interest in this voluntary learning opportunity. One participant had diabetes himself. Knowing that physical activity, food intake, stress level, hormonal level, and even the time of day can be factors that impact treatment are critical to better understanding the child with diabetes. Not receiving proper care can create a serious condition (Nabors, 2003). Diabetes, or the complications from diabetes, is the primary cause of death for 71,382 Americans each year (American Diabetes Association, 2013). Seeing the warning signs and being able to support the child with their diabetes management could prohibit certain complications, both in the child today and later in his/her life.

Students with diabetes miss twice as much school as their healthy peers and siblings (Wodrich, Hasan, & Parent, 2011). Even more worrisome is the fact that the average absolute number of school days missed each year by a student who is diabetic is 17.9 (Bloom, 2010;
Parent, Wodrich, & Hasan, 2009; Wodrich et al., 2011). Participants in this study know that students need to be in the classrooms to maximize learning opportunities. Each opportunity lost due to illness is time that both the educator and student have to recapture. Helping the student make up missed learning opportunities is the job of a teacher, so minimizing the time out of class gives the teacher more time to focus on instruction obligations.

Diabetes can affect major life functions physically, mentally, and emotionally.
Continued knowledge, support, and up-to-date research are the keys critical for tighter control and a healthier life for the person with diabetes. Better understanding by teachers of what affects a child’s diabetes through diet is needed to minimize complications and promote a healthy lifestyle.

Management. Diabetes is a condition that has to be managed in four realms -- physical, mental, social, and emotional (Boden, 2012). There is no research to support the assumption that children with diabetes will monitor their own disease without knowledge and support. Not effectively managing any one of the four realms could lead to other conditions that set the student even farther apart from his/her peers. Teachers know how important it is for children to have strong relationships. Relationships can help students feel engaged in their work. The more a student is engaged, the higher the student’s rate of success.

Teachers incorporate strategies that enable all students to feel welcome in their classroom. Teachers in this district promote Positive Behavior Instructional Support (PBIS) as a framework when working on the culture of their schools and classrooms. This was evident in the responses which supported an inclusive classroom that looks at the needs of all of the students. Effective diabetes management strives to minimize the possible barriers throughout a child’s life and seeks ways to reduce those barriers before they become complications. None of the
participants referenced negative consequences for poor control or management of diabetes. This complements previous research and literature that states students do not self-manage at a higher or faster rate when there are consequences. Creating an environment where the student feels supported concerning the diagnosis promotes and encourages self-management (Cunningham, 2006; Nabors, 2005).

One question during the interview process specifically inquired about the responsibilities of the classroom teacher to support the student with diabetes. Participants saw the relevance of making sure that a child feels like a part of the class and were willing to support the child and his/her diabetes needs both during and after the school day. Living with diabetes affects both the physical and mental state of a person (Joe, 2009). There has to be a balance, both physically and mentally, for self-management to begin. Acquiring self-management skills are necessary for coping and managing the conditions around a chronic illness, like diabetes (Merkel, 2012). Teachers play such a vital role in a child’s life. If a teacher has the knowledge, confidence, and passion to help a student, then the student will be more likely to manage his/her own disease. The management of the disease may lead to higher self-efficacy and a healthier life.

**Communication.** Communication is the cornerstone of what educators do. Being able to dig deeper into a problem is a skill that needs to come naturally to teachers. Until the child reaches a developmental point where he/she is fully responsible for learning, communication with other stakeholders is essential. Participants in this study saw the value of communicating with parents and had means to do so on a regular basis. Teachers know to ask questions, seek answers, ask additional questions and then dig deeper to better understand the whole child and to understand what can, and will, enhance student success.
All adults working with students with diabetes should have sufficient knowledge about the disease (Amillategui, 2009; Nabors, 2003). Taking this knowledge and then articulating it to others is a key component for the success of the child. As found by Butler (2004), school personnel must become part of the village when caring for these students. Communicating the needs of the student helps the teacher feel a part of this village and move the student towards self-efficacy.

**Power of the Professional Development Opportunity**

Being an agent of change is complex (Fullan, 2011). Knowing how to support teachers through a change is critical as a leader. Through my research, I found that teachers, while adult learners in this PD, are not the same type of learners as children. Adults bring many more of their own experiences, their own practices, and their own knowledge about subjects to the table. Change can be difficult. Prior negative experiences with diabetes, their own personal experience with diabetes, or just an uncertainty about diabetes can all be barriers to learning more about this disease and how it affects students in their classroom. I learned that even though teachers can be different as adult learners, they still are willing to learn; to what level may vary, but there is still a desire to learn. Capturing that love of learning can enhance any PD opportunity. It is usually the “why,” or the essence, of why teachers became teachers. Leaders need to recognize the variability that teachers bring to any opportunity and address as such.

Teachers are problem solvers. They know how to ask questions to deepen their own knowledge and then reflect on that new knowledge to support others. It is a part of the art of teaching. During the PD, teachers were engaged in the work of understanding diabetes and how it not only affected the students in the classroom, but also the climate of their classroom. Knowing how to respond during any crisis situation can elicit a sense of ease or panic to those
students in a teacher’s care. The classroom teacher’s knowledge and confidence in what she is teaching, modeling, and producing creates a climate of care and trust. Sharing with teachers the problems that diabetes can cause in both students and their classrooms can be a “problem” that both the teacher and the student can solve together – sending a message of collaboration. This learning can also support self-efficacy in other students, as well. Supporting all students to be purposeful, motivated, resourceful, knowledgeable, and strategic in their daily living and learning is a goal for all teachers. The existence of diabetes should not alter this goal for either teachers or students. Professional development opportunities for teachers need to be credible and have relevance to either their teaching or their personal lives. This opportunity offered both since it was open to all teachers in the district and not limited to only those who had a student with diabetes in the classroom.

Teachers need leaders to help guide and support their work. As a leader, one needs to listen and provide teachers the opportunity to engage in authentic work that matters to improving learning for students. Using new knowledge and new skills can help staff deepen their craft and improve practices to better support the whole child. In this sense, leaders are researchers that provide strategic opportunities that support life-long learning – for one and all.

**Surprises**

There were two surprises that were brought to my attention as I completed my research. The first one was that the participants’ communication with parents did not show a significant difference between the pre- and the post-test data. I had believed that the communication with parents would significantly be different due to the fact that the goal of the PD was to increase both knowledge and confidence. With an increase in both of these areas, my assumption was that there would also be an increase in communication. However, the results proved me
incorrect. Perhaps there was already a comfort with each participant talking and discussing openly with their stakeholders about all aspects of a child’s life in the classroom, thus proving it more difficult to obtain a significant difference statistically. Perhaps, too, the teacher still lacks a confidence in specific medical terms and comprehension that might be needed to support evidence about what is happening with the student and his/her diabetes. Diabetes is complex. This complexity might be a barrier for teachers to fully feeling confident when discussing such matters with a medical professional, as in a nurse, or with the parents, who are also well-versed in diabetes. The management of diabetes involves science and math, adding and subtracting when calculating carbohydrates in food and energy spent through daily living, and balancing other facets of a person’s life. Educators operate in more of the emotional and social aspects of their students’ lives rather than the medical. These considerations could explain the unexpected result.

The second surprise to me was my impressions of the interpreted confidence of participants during their interview. Although there was a significant difference in the pre- and post-test scores, this confidence did not transpire to my impressions during the interview. I thought that as I interviewed participants about their confidence level I would sense more of an empowerment and willingness to “act” in situations with children and their diabetes. Most of the participants still would rely on the nurse. I thought that the PD, and the various components of the PD, would provide teachers with the willingness to act on their own accord before seeking support from the nurse. This, to me, was disappointing and surprising. Perhaps having a nurse as a respondent and support in each building makes it safer, in the eyes of the teacher, for all involved. This still promotes the hands-off approach to diabetes that I was trying to eliminate.
Perhaps, too, additional PD focusing on the needs of the teacher when working with students with diabetes would increase the participants’ confidence as displayed in both their post-survey results and one-to-one interviews. To further and deepen this future research, I could have asked the teachers two additional questions: “Why did you decide to participate in the PD opportunity?” and “What would you need from this opportunity for you to feel more confident and successful when working with a student with diabetes?” These two questions could guild me, as the facilitator, to better meet the needs of the participants. The focus on these two key elements is supported by literature from Learning Forward’s prerequisite two that states teachers must receive PD that is relevant and useful (Learning Forward, 2011). Teachers are more likely to be engaged in the work if the facilitator finds out WHY this new learning is relevant to them and HOW it will be useful. Knowing the answers to these questions could better support the teacher and the increase the effectiveness of the PD while at the same time increasing teachers’ confidence and knowledge to better meet the needs of the student with diabetes. These two questions could have deepened my research and my depth of knowledge in this topic.

Conclusions

The conclusion section of my dissertation will include implications for action. In this section, I am able to share what should be done differently because of my research. This, then, is followed by recommendations for future research. I share ways that my study could be improved upon and how future studies could be enhanced to improve the field of education.

Implications for Action

Teachers are important people in the life of a student. If a child has diabetes, this disease follows them everywhere the child goes – including school. Teachers need to know about
diabetes, its complications, and its warning signs. Having a PD opportunity about diabetes increased teachers’ knowledge and confidence when supporting a student with diabetes. Since it is federally mandated through a 504 plan that a student’s illness not interfere with his education (ADA, 1990), teachers need information about diabetes to fully understand the student and any of the warning signs and complications that might occur. Teachers also need to have confidence when working with such students. Lack of confidence could cause the student to be in an unsafe situation when managing her own health in the classroom.

District leaders need to continue to provide opportunities for teachers to deepen their knowledge about all children. Teachers need this support from the district leaders to know that it is valued that they take the responsibility to learn about each child and to build a necessary relationship. Teachers need the resources to meet the needs of every child when they come into the classroom – health issues and all. Teachers cannot do this automatically if they are expected to always send the student to the nurse for all issues. School leaders can provide stability, resources, experienced educators, and a vision of how to educate all children to be healthy citizens of our communities.

At the district level, having a policy that mandates an informational session with each teacher who comes in contact with a student with diabetes is critical. This session should occur before the school year begins and should have a focused framework of questions, tools, and supports to help guide the parents, student, nurse, and teacher. Additional meetings should be set once every quarter of the school year as a check in knowing that the student’s needs of diabetes management can change and need to be addressed as such. Time and additional support for the teacher to learn WITH the student is essential. Having this mandated at the local school level can be a positive place to start.
Developing an individualized framework for students with diabetes would be a benefit to all who are in contact with this student throughout the day. This framework could be used during the management plan and also during the PD to enhance the knowledge and confidence of all involved. Adding simulations that the teachers could actually walk through with the nurse or in the PD would be another benefit. This, coupled with the framework, could enrich the knowledge of the teacher and give tangible support to start the year off with a student.

Continued PD about diabetes is necessary on a yearly basis. New students move into the district with diabetes, teachers retire, and new faculty take their place. There is no way to capture learning about diabetes one time and then be finished. The format presented during my research seems to be effective. This method, though, may not be sustainable when considering teachers’ time or the district’s budget. One way to counteract this would be to use technology to support the PD framework. This digital piece could be stored on the district’s learning management system and viewed, and reviewed, at the convenience of the teacher. There would still need to be a forum for questions, monitored by the district’s Director of Nursing, so that a one-to-one interaction can occur. Leaders need to analyze this method of information dissemination to determine if this pathway is one that is best for learning in the district.

Next, each school should have a full-time nurse in each building to help support all students but especially those students who have labor intensive management plans, like diabetes. These same nurses could also be a support for the teachers who have a student with diabetes in the classroom. Educating the teacher, along with the student, would be a component of their efforts to best meets the needs of all. Legislators need to add additional dollars to the general fund marked specifically for this purpose. The health of our children should be something that lawmakers take seriously and that taxpayers should support. Leaders should take the initiative to
note this when given the opportunity to speak to legislators and make this part of a continued positive effort.

Finally, I learned aspects about a PD opportunity that I can transfer to other opportunities that are held in a school or district. I must first know that there is a commitment to change, or a willingness to change, by the participants. Teachers know that they need to learn and grow with their students. Doing so, they seek out ways to learn. Districts have a responsibility to offer opportunities to make this happen. Providing the time, subject matter, and quality content all contribute to teachers being willing to engage and learn. Facilitators need to make the material relevant and useful in all PD opportunities so that teachers see the relevance and are willing to learn and grow. Secondly, I must help teachers be ready to change. I find it very optimistic that teachers were willing to learn something new about a medical condition when it has been typically a nurse’s job to work with students with diabetes with their management plan. Next, I need to help teachers know that they are not alone in this profession. Teachers learn from each other, gain knowledge from each other, and grow with each other. Colleagues are our best resources. Reaching out to people who are in the district and can share their personal stories or best practices sends a strong message to our teachers – we value you and want your knowledge and experience to lead others. Finally, all teachers learn at different rates and at different times and with different methods – just like students in the classroom. There can be no one size fits all model when doing a PD. Using the Learning Forward standards gives the basis for effective PD, but there still has to be the autonomy that the facilitator brings to the group once they understand the why, what, and how of the participants in the learning opportunity.

Throughout my research, it was clear that teachers feel responsible for the whole child. A quote from a teacher indicates her commitment to this happening, “I would say I have every
responsibility in the world to make sure that the child is safe and taking care from the time she walks in my door to the time she leaves my door - to make sure that her day goes smooth(ly) and that her needs are met no matter what they are, whether medical, physical or mental, whatever those needs are.” As we talk about curriculum, pedagogy, and instruction, we can effect change. If we can do this in an area like diabetes, where most teachers do not feel a strong level of comfort, think what could happen if we provide these same learning opportunities to increase their understanding of curriculum, instruction, interventions, assessments, and creating a positive learning environment. The outcomes could be forever reaching.

**Recommendations for Further Research**

The participants in my study offered me insight into the life of a teacher when faced with a student with diabetes. My findings from the surveys and interviews offered varying perspectives about the mandates that teachers face and then the added complexity of diabetes. From this data, my recommendations for future research are addressed.

Diabetes is a labor intensive disease. A suggestion for a quantitative study design would be to calculate how much time teachers spend with a student with diabetes on their management and/or “catch up” when they return to the classroom. This interaction could be taking away from instructional time in the classroom with all students. Knowing this information could provide documentation for having a nurse in each building not only to support students with diabetes, but also to support other students with chronic illnesses. The nurse could be proactive with the student and help with the management plan so that the child builds self-efficacy and does not need to be out of the classroom as much to manage due to crisis.

Having a larger sample size in the study would be another recommendation. More data could produce richer findings than found with my sample size of 23 participants. Since all
participants came from the same district, there was neither ethnic diversity in my study, nor diversity in practices and policies from district to district.

Another recommendation would be to conduct this research in a larger district, multiple districts, or a special education cooperative. Using one of the aforementioned could support more generalizable findings. Additional patterns and themes may also emerge from a larger study. Since my participant number was smaller, deriving broad generalities was more difficult. However, even with a small n, there were significant differences in teachers’ level of knowledge before and after the PD intervention.

Lastly, I would determine if the resources distributed to the participants were worthwhile to enhance their knowledge or practice when working with a student with diabetes. Knowing what resources are beneficial can support others as they develop and or enhance PD in the future. Having the right hands-on materials to support both the teachers and the students could be tools that initiate a conversation to support the student and the management of the disease.

**Summary**

Diabetes is becoming more prevalent in children, and thus, in our schools. This dissertation provided insight about diabetes in the classroom and the teachers who are responsible for students. The purpose of this chapter was to summarize the study, present the findings, and suggest future actions that could be taken. In this study, I used both quantitative and qualitative data to determine if teachers’ perceptions and practices evolved after participating in a professional development opportunity about diabetes. The teachers’ reflections and survey results provided views into their classrooms as well as their level of confidence when they have students with diabetes. My goal was to describe how leaders can deepen the knowledge level of teachers about diabetes and build confidence when faced with a student who has this disease.
The benefits of empowering teachers is that overall classroom disruption decreases as students become more efficacious, thereby reducing the time that a child with diabetes will be out of the learning environment. This is what I would consider a positive learning environment for all involved – a knowledgeable teacher who is willing to adapt, grow, and support the whole healthy child while he/she is able to adapt, grow, and learn as well.

I value what teachers do every day. I know the hard work it takes to build relationships, model positive behaviors, and prepare lessons that are both engaging and content rich. I value the fact that teachers want to learn. They do this through research, conversations, collaboration, and drive. I value the fact that our society desperately needs teachers to expand their knowledge and skills to give all students the opportunity to grow in an environment where the whole child thrives. Schools are the place to make change happen. Working together with all stakeholders creates the environment for this to happen. We owe it to all students to learn as much as we can while they are in our care to give them every opportunity to succeed.
REFERENCES


APPENDICES
## APPENDIX A – STRATEGIC DESIGN FOR RESEARCH

<table>
<thead>
<tr>
<th>Description</th>
<th>Professional Development Opportunity</th>
<th>Networking Session #1</th>
<th>Networking Session #2</th>
<th>Interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time</strong></td>
<td>Two weeks prior to the start of school</td>
<td>Two weeks after the professional development opportunity</td>
<td>Three weeks after the first networking Session</td>
<td>Two weeks after the final networking session</td>
</tr>
<tr>
<td><strong>Goal</strong></td>
<td>Improve knowledge and confidence in teachers who support student(s) in their class with diabetes</td>
<td>Improve knowledge and confidence in teachers who support student(s) in their class with diabetes</td>
<td>Improve knowledge and confidence in teachers who support student(s) in their class with diabetes</td>
<td>Better understand the teachers’ level of comfort, their beliefs and their values around students with diabetes</td>
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<tr>
<td><strong>Professional Standard Addressed</strong></td>
<td>Learning Communities; Leadership; Resources; Data; Learning Design; Implementation</td>
<td>Learning Communities; Leadership; Resources; Data; Learning Design</td>
<td>Learning Communities; Leadership; Resources; Data; Learning Design</td>
<td>Learning Communities; Leadership; Resources; Data; Learning Design; Outcomes</td>
</tr>
<tr>
<td><strong>Format</strong></td>
<td>Pre-Survey administered 24 questions its learning</td>
<td>Email check in with Google Hangout as an option</td>
<td>Email check in with Google Hangout as an option</td>
<td>General open-ended questions taken from observations, pre and post survey data</td>
</tr>
<tr>
<td></td>
<td>Timing 8:00 - Noon</td>
<td>Teachers schedule a 45 minute interview within the next two week time period</td>
<td>Post-Survey administered 24 questions</td>
<td></td>
</tr>
<tr>
<td><strong>Appendix Location</strong></td>
<td>Appendix B</td>
<td>Appendix B</td>
<td>Appendix C</td>
<td></td>
</tr>
<tr>
<td><strong>Leadership</strong></td>
<td>Jolene Smith Kelli Thompson Laura Hack</td>
<td>Laura Hack</td>
<td>Laura Hack</td>
<td>Laura Hack</td>
</tr>
<tr>
<td><strong>Materials Needed</strong></td>
<td>Diabetes Information</td>
<td>Google Hangout Capability</td>
<td>Google Hangout Capability</td>
<td>Interview Questions</td>
</tr>
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<td>---------------------</td>
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<tr>
<td></td>
<td>Pre-Test Questionnaire</td>
<td>Teacher emails</td>
<td>Teacher emails</td>
<td>Tape Recorder</td>
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<tr>
<td></td>
<td>Sign in Sheet</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Large Multi-purpose Room</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B – QUANTITATIVE ITEMS
Q1.
The following two questions will be used only as a means to match both your pre and post-results. This will help ensure the confidentiality of this survey.

Mother's maiden name

Q2. Your high school

Q3. Gender
  ○ Male
  ○ Female

Q4. What is your age?

Q5. How many years of teaching experience do you have?

Q6. Experience working with a student with diabetes
  ○
Q7. Which is the best method for testing blood glucose?
- Urine testing
- Blood testing
- Saliva testing
- All are equally good

Q8. Glycosylated hemoglobin, or hemoglobin A1c, is a test that is a measure of your average blood glucose level for the past:
- 3 days
- 2 weeks
- 3 months
- 1 year

Q9. What effect does unsweetened fruit juice have on blood glucose?
- Lowers it
- Raises it
- Has no effect

Q10. For a person in good control, what effect does exercise have on blood glucose?
- Lowers it
- Raises it
- Has no effect
Q11. Signs of diabetic ketoacidosis, or DKA, include:

- Shakiness
- Sweating
- Vomiting
- Low blood glucose

Q12. If you take your morning insulin but skip breakfast your blood glucose level will usually:

- Increase
- Decrease
- Remain the same

Q13. After treating hypoglycemia, how long should you wait before rechecking the blood glucose:

- 15 seconds
- 1 minute
- 15 minutes
- 1 hour

Q14. Which one of the following will most likely cause a decrease in blood glucose?

- Heavy exercise
- Infection
- Overeating
- Not taking your insulin

Q15. Which of the following foods will not likely affect blood glucose?

- Rice
- Fruit
- Broccoli
- Corn
Q16. How many grams of carbohydrates are equal to 1 serving of carbohydrates?
- 10
- 15
- 20
- 25

Q17. Being sick, having an infection, or experiencing stress is likely to cause
- An increase in blood glucose
- A decrease in blood glucose
- No change in blood glucose

Q18. Which of the following blood sugar readings is not within the desired range for a student?
- 166 mg/dL
- 263 mg/dL
- 92 mg/dL
- All are outside the desired range

Q19. What is the best site to use when testing blood glucose?
- Fingertips
- Arm
- Thigh
- Stomach

Q20. Insulin is produced and released by the
- Stomach
- Kidneys
- Pancreas
- The body does not make insulin. It is obtained through your diet.
Q21. Which of the following is not associated with uncontrolled diabetes?

- Kidney problems
- Nerve problems
- Eye problems
- Lung problems

Q22. When making snack and meal choices, someone with diabetes should be most aware of what part of a nutrition label?

- Sugars
- Total carbohydrates
- Total fat
- Protein

Q23. Insulin pumps use only fast acting insulin

- True
- False

Q24. Having very high blood glucose has no effect on someone's ability to think clearly.

- True
- False

Q25. A glucagon injection will decrease high blood glucose in less than 10 minutes.

- True
- False

Q26. Students with diabetes may feel isolated from their peers due to their disease.

- True
Q27. As of today, please mark your level of confidence with diabetes.

I am confident in my understanding of diabetes.

- False

I am confident in my ability to properly care for a child with diabetes in my classroom.

I am confident in my ability to properly obtain a blood sugar reading using a blood sugar meter.

I am confident in my ability to assess a blood sugar reading.

I am confident in my ability to treat a child with diabetes who has a low blood sugar.

I am confident in my ability to treat a child with diabetes who has a high blood sugar.

I am confident in my ability to properly care for a child with diabetes in my classroom in an emergency situation (identify a blood sugar).

I am confident in my knowledge of diabetes.
I am confident in my knowledge of how diabetes affects a child in my classroom.
APPENDIX C – QUALITATIVE ITEMS

Interview Protocol and Questions

Interview Protocol:

“Thank you for meeting with me today to talk about your experiences with diabetes and students in your classroom. As you answer the following questions, please respond openly and honestly. My goal is to learn about your general knowledge of diabetes and your level of comfort when working with a student who has diabetes. The information that is collected from this interview is being recorded so that I can review your answers. It will be used in my dissertation work. You and your answers will remain confidential. If I ask a question that you would prefer not to answer for any reason, let me know, and we will move on to the next question. Before we begin, do you have any questions?”

Questions:

Tell me a little bit about yourself.

1. What was your level of comfort with diabetes before the professional development opportunity?
2. What is your comfort level now with diabetes?
3. Would you be able to speak productively to a parent or health care provider information about a child and their needs about diabetes? If so, how would you do this?
4. Describe a time where you fostered self-efficacy, or empowerment, in a child in your classroom that has diabetes?
5. A child with diabetes comes to you and says she doesn’t feel well. You can see that she is shaking, sweaty, and pale. What are your next steps?
6. What responsibilities do you have as a classroom teacher to support a student with diabetes?
7. Because of this training, have you changed in any way?
8. Did your beliefs about working with a child with diabetes change after this professional development opportunity?
9. What aspects of the professional development opportunity did you most value?
   a. What made that valuable for you?
10. What would you change about the professional development opportunity?

“Thank you for your time today. I do appreciate it. Do you have anything else you would like to add? Do I have your permission to follow up with you if I have additional questions? Again, thank you.”
### APPENDIX D – CORRESPONDANCE OF SURVEY AND INTERVIEW ITEMS TO RESEARCH QUESTIONS

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Corresponding Survey / Interview Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>What constructs of teachers’ <strong>knowledge</strong> of diabetes deepens during pre and post testing after professional development activities?</td>
<td><strong>Survey item:</strong> 8, 10, 14, 20, 23</td>
</tr>
<tr>
<td>What changes in teachers’ knowledge of <strong>diet and complication</strong> during pre and post testing after professional development activities?</td>
<td><strong>Survey item:</strong> 9, 11, 15, 16, 21</td>
</tr>
<tr>
<td>What changes in teachers’ knowledge of diabetes <strong>management</strong> during pre and post testing after professional development activities?</td>
<td><strong>Survey item:</strong> 7, 12, 13, 19, 25</td>
</tr>
<tr>
<td>What changes in teachers’ <strong>communication</strong> about diabetes with the family and school nurse during pre and post testing after professional development activities?</td>
<td><strong>Survey item:</strong> 17, 18, 22, 24, 26</td>
</tr>
<tr>
<td></td>
<td><strong>Interview Question:</strong> 3</td>
</tr>
<tr>
<td>What was the success level of the professional development process?</td>
<td><strong>Interview Question:</strong> 9, 10</td>
</tr>
<tr>
<td>What do participants perceive to be their change in skill levels, beliefs, and confidence because of their involvement in this professional development experience?</td>
<td><strong>Survey Question:</strong> 27 with 9 subset questions</td>
</tr>
<tr>
<td></td>
<td><strong>Interview Question:</strong> 2, 4, 5, 6, 7, 8</td>
</tr>
</tbody>
</table>
APPENDIX E

Laura Hack - Re: Research Permission

From: Cory Smith <ctsmith.purdue@gmail.com>
To: Laura Hack <hackl@bcs.k12.in.us>
Date: 5/12/2015 12:17 PM
Subject: Re: Research Permission

Hi Laura,
You are welcome to use the survey questions from that publication. Best of luck on your research!
Sincerely,
Cory
--
Cory Smith, PharmD, CDE
Clinical Pharmacist
Floyd Memorial Hospital
E: cory.smith@fmhhs.com
E: ctsmith.purdue@gmail.com

On Sat, May 9, 2015 at 10:31 AM, Laura Hack <hackl@bcs.k12.in.us> wrote:

Dear Professor Smith,

I am currently a doctoral student at Ball State University. I am in the process of researching the question: "How do teachersâ€™ perceptions and practices evolve through pre/post surveys and interviews after participating in professional development opportunities about diabetes and the management of the disease?"

During my work, I found your research article on diabetes education. I am asking your permission to use the survey questions taken from this work in 2012. I would cite your work and give full credit to your study.

Thank you for this consideration and communication to let me know if it is possible to use your survey questions within my own study.

Laura Hack
Ball State University Student
Muncie, Indiana
APPENDIX F

Indiana Code 20-34-5

IC 20-34-5
Chapter 5. Care of Students With Diabetes

IC 20-34-5-1
"Diabetes management and treatment plan"
Sec. 1. As used in this chapter, "diabetes management and treatment plan" means a plan prepared under section 12 of this chapter.
As added by P.L.166-2007, SEC.2.

IC 20-34-5-2
"Health care services"
Sec. 2. As used in this chapter, "health care services" has the meaning set forth in IC 27-8-11-1.
As added by P.L.166-2007, SEC.2.

IC 20-34-5-3
"Individualized health plan"
Sec. 3. As used in this chapter, "individualized health plan" means a coordinated plan of care designed to meet the unique health care needs of a student with diabetes in a school setting.
As added by P.L.166-2007, SEC.2.

IC 20-34-5-4
"Licensed health care practitioner"
Sec. 4. As used in this chapter, "licensed health care practitioner" means an individual who:
(1) is licensed to provide health care services; and
(2) has prescriptive authority;
under IC 25.
As added by P.L.166-2007, SEC.2.

IC 20-34-5-5
"Physician"
Sec. 5. As used in this chapter, "physician" refers to an individual who is licensed under IC 25-22.5.
As added by P.L.166-2007, SEC.2.

IC 20-34-5-6
"Registered nurse"
Sec. 6. As used in this chapter, "registered nurse" refers to an individual who is licensed as a registered nurse under IC 25-23.
As added by P.L.166-2007, SEC.2.

IC 20-34-5-7
"School"
Sec. 7. As used in this chapter, "school" refers to a public school, including a charter school.
As added by P.L.166-2007, SEC.2.

IC 20-34-5-8
"School employee"
Sec. 8. As used in this chapter, "school employee" means an individual employed by:
(1) a public school, including a charter school, or an accredited
nonpublic school;
(2) a local health department working with a school under this chapter; or
(3) another entity with which a school has contracted to perform the duties required under this chapter.
As added by P.L.166-2007, SEC.2.

IC 20-34-5-9
"School nurse"
Sec. 9. As used in this chapter, "school nurse" refers to an individual who:
(1) is employed by a school;
(2) is licensed as a registered nurse under IC 25-23; and
(3) meets the requirements set forth in 515 IAC 8-1-47.
As added by P.L.166-2007, SEC.2.

IC 20-34-5-10
"Student"
Sec. 10. As used in this chapter, "student" refers to a student with diabetes.
As added by P.L.166-2007, SEC.2.

IC 20-34-5-11
"Volunteer health aide"
Sec. 11. As used in this chapter, "volunteer health aide" means a school employee who:
(1) is not licensed or authorized to provide health care services under IC 25;
(2) volunteers to act in the capacity of a volunteer health aide; and
(3) has successfully completed the training described in section 15 of this chapter.

IC 20-34-5-12
Requirements of plan
Sec. 12. (a) A diabetes management and treatment plan must be prepared and implemented for a student with diabetes for use during school hours or at a school related activity. The plan must be developed by:
(1) the licensed health care practitioner responsible for the student's diabetes treatment; and
(2) the student's parent or legal guardian.
(b) A diabetes management and treatment plan must:
(1) identify the health care services or procedures the student should receive at school;
(2) evaluate the student's:
(A) ability to manage; and
(B) level of understanding of;
the student's diabetes; and
(3) be signed by the student's parent or legal guardian and the licensed health care practitioner responsible for the student's diabetes treatment.
(c) The parent or legal guardian of a student with diabetes shall
submit a copy of the student's diabetes management and treatment plan to the school nurse. The plan must be submitted to and be reviewed by the school nurse:
(1) before or at the beginning of a school year;
(2) at the time the student enrolls, if the student is enrolled in school after the beginning of the school year; or
(3) as soon as practicable following a diagnosis of diabetes for the student.
As added by P.L.166-2007, SEC.2.
IC 20-34-5-13
Development of plan
Sec. 13. (a) An individualized health plan must be developed for each student with diabetes while the student is at school or participating in a school activity. The school's nurse shall develop a student's individualized health plan in collaboration with:
(1) to the extent practicable, the licensed health care practitioner responsible for the student's diabetes treatment;
(2) the school principal;
(3) the student's parent or legal guardian; and
(4) one (1) or more of the student's teachers.
(b) A student's individualized health plan must incorporate the components of the student's diabetes management and treatment plan.
As added by P.L.166-2007, SEC.2.
IC 20-34-5-14
Use of volunteer health aides
Sec. 14. (a) At each school in which a student with diabetes is enrolled, the school principal, after consultation with the school nurse, shall:
(1) seek school employees to serve as volunteer health aides; and
(2) make efforts to ensure that the school has an adequate number of volunteer health aides to care for students.
(b) A volunteer health aide, while providing health care services, serves under the supervision and authorization of the principal and the school nurse in accordance with the requirements that apply to the school nurse under IC 25-23.
(c) A volunteer health aide must have access to the school nurse, in person or by telephone, during the hours that the volunteer health aide serves as a volunteer health aide.
(d) A school employee may not be subject to any disciplinary action for refusing to serve as a volunteer health aide. The school shall inform school employees that participation as a volunteer health aide is voluntary. A school employee who volunteers as a volunteer health aide may elect to perform only those functions that the school employee:
(1) chooses to perform; and
(2) is trained to perform in the training program described in section 15 of this chapter.
As added by P.L.166-2007, SEC.2.
IC 20-34-5-15
Diabetes training program
Sec. 15. (a) The department may cooperate with the state department of health in the development of a diabetes training program for school nurses. The department, with the assistance of physicians or registered nurses who are qualified in the area of diabetes training, shall provide annual diabetes training programs to school nurses. The training must include technological advances, current standards of practice for diabetes management and training, and instruction in the following:
(1) Developing individualized health plans for students with diabetes that follow the orders of a licensed health care practitioner.
(2) Recognizing and treating the symptoms of hypoglycemia and hyperglycemia.
(3) Understanding the current standards of practice and the proper action to take if the blood glucose levels of a student are outside the target ranges indicated on the student's diabetes management and treatment plan.
(4) Performing tests to check glucose and ketone levels, and recording the results.
(5) Properly administering glucagon, insulin, or other emergency treatments prescribed by the licensed health care practitioner, and recording the results.
(6) Recognizing complications that require emergency medical assistance.
(7) Understanding recommended schedules and food intake for meals and snacks for a student, the effect of physical activity on blood glucose levels, and the proper action to be taken if a student's schedule referred to in this subdivision is disrupted.
(b) The department may cooperate with the state department of health in the development of a diabetes training program for volunteer health aides. The department, with the assistance of physicians and registered nurses who are qualified in the area of diabetes training, shall provide a diabetes training program for volunteer health aides which includes the most current standards of practice and technology for diabetes treatment. The training must include the following:
(1) Implementing the orders of a licensed health care practitioner.
(2) Recognizing and treating the symptoms of hypoglycemia and hyperglycemia consistent with the orders of the licensed health care practitioner.
(3) Performing tests to check glucose and ketone levels, and recording the results.
(4) Properly administering glucagon, insulin, or other emergency treatments as prescribed, and recording the results.
(5) Recognizing complications that require emergency medical assistance.
(6) Understanding:
(A) recommended schedules and food intake for meals and snacks;
(B) the effect of physical activity on blood glucose levels; and
(C) the proper action to be taken if a student's schedule is disrupted.

c) The school nurse shall coordinate:
(1) the training of school employees acting as volunteer health aides, using the training program developed under subsection (b); and
(2) the record keeping and monitoring of a volunteer health aide acting under this chapter.

d) Training for volunteer health aides must be provided by a health care professional with expertise in the care of individuals with diabetes or by a school nurse. The training must be provided before the beginning of the school year or as soon as practicable following:
(1) the enrollment; or
(2) the diagnosis;
of a student with diabetes at a school that previously had no students with diabetes.

e) The school nurse or principal shall maintain a copy of the training program and the records of training completed by school employees.

As added by P.L.166-2007, SEC.2.

IC 20-34-5-16
Tasks; school nurses and volunteer health aides
Sec. 16. (a) The school nurse shall perform the tasks necessary to assist a student in carrying out the student's individualized health plan.

(b) When necessary, a volunteer health aide may perform the tasks necessary to assist a student in carrying out the student's individualized health plan, in compliance with the training guidelines provided under section 15 of this chapter.

c) A volunteer health aide may act under this section only if the parent or legal guardian of the student signs an agreement that:
(1) authorizes a volunteer health aide to assist the student; and
(2) states that the parent or legal guardian understands that, as provided under IC 34-30-14, a volunteer health aide is not liable for civil damages for assisting in the student's care.

d) A volunteer health aide who assists a student under this section:
(1) is not considered to be engaging in the practice of nursing; and
(2) is exempt from applicable statutes and rules that restrict activities that may be performed by an individual who is not an individual licensed or authorized under IC 25 to provide health care services.

e) A school corporation may not restrict the assignment of a student to a particular school on the sole basis of whether the school has volunteer health aides.

As added by P.L.166-2007, SEC.2.

IC 20-34-5-17
Authorized diabetes management and treatment activities
Sec. 17. (a) As provided in a student's individualized health plan, a school shall, except in an emergency, allow the student to attend to the management and care of the student's diabetes if the student has been evaluated and determined to be capable of doing so as reflected in the student's individual health plan and the student's diabetes management and treatment plan, including the following activities:
(1) Performing blood glucose level checks.
(2) Administering insulin through the insulin delivery system the student uses.
(3) Treating hypoglycemia and hyperglycemia.
(4) Possessing on the student's person at any time the supplies or equipment necessary to monitor and care for the student's diabetes.
(5) Otherwise attending to the management and care of the student's diabetes in the classroom, in any area of the school or school grounds, or at any school related activity.
(b) The school nurse shall, in accordance with the requirements that apply to the school nurse under IC 25-23, establish a procedure through which a student described in subsection (a) is cared for in an emergency.

As added by P.L.166-2007, SEC.2.

IC 20-34-5-18

Information sheet requirement
Sec. 18. A school shall provide the individual who is responsible for providing transportation for or supervising a student with diabetes during an off-campus school related activity an information sheet that:
(1) identifies the student with diabetes;
(2) identifies potential emergencies that may occur as a result of the diabetes and appropriate responses to an emergency; and
(3) provides the telephone number of a contact in case an emergency occurs.

As added by P.L.166-2007, SEC.2.