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Instructional Strategies To Promote Engagement For Students Of Poverty In A Mathematics Classroom

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INSTRUCTIONAL STRATEGIES TO PROMOTE ENGAGEMENT

FOR STUDENTS OF POVERTY IN A MATHEMATICS CLASSROOM

by

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To my husband, thank you for supporting me during this long journey and for allowing me to turn our kitchen table into an office space.

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To my mom, thank you for instilling in me the value of education.

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CHAPTER ONE

Introduction

Overview

Have you ever given a test after teaching the material for three weeks and every student fails? This happened to me very recently in two of my ninth-grade Intermediate Algebra classes. This particular test was the first test of the year and I thought I had done a sufficient job of teaching the material, providing multiple examples, assigning appropriate homework and picking engaging activities for my students. Obviously, I was sadly mistaken. This experience helped me narrow my research question for my capstone: What instructional strategies can I employ with my high school students of poverty to better engage them in learning mathematics?

In this chapter I will highlight my high school math experience, my journey as a high school math teacher, share the current statistics on math achievement for Minnesota high school students and how the data relates to the students I work with.

My High School Math Experience

I have been a high school math teacher for five years. I always knew I wanted to be a teacher. However, I did not always know that I wanted to teach math until my high school years. Until high school, math had meant a teacher standing at the board modeling a skill that I was to eventually replicate. I remember my math classes were not especially fun but also not much of a challenge. Sometime towards the end of eighth grade, we were required to register for high school courses. My high school had two routes to fulfill the mathematic requirements needed for graduation. There was the traditional route and the Integrated Mathematics Program (IMP). I chose the IMP route

because it sounded like the easier route. We were told IMP had a lot of group work. As an eighth grader, group work sounded better than individual work, especially in a math classroom. The traditional route was described as teacher-directed like my previous math classes. The IMP program seemed more hands-on and more meaningful. In fact, it was both of those things and a lot more.

In high school I went through all four IMP courses, though only the first three were required. In one school year, we worked on several units that incorporated algebra, geometry, probability and statistics. Each year, the units increased in rigor. I remember my math classes being some of my favorite classes in my high school career. I hardly ever remember my teacher standing at the board, teaching a formula or a process to follow. Everyday we worked in groups on a problem to solve. We were never told how to solve it, but needed to come up with ways to solve the problem by ourselves.

For example, in IMP 1, there was a unit titled, "The Pit and the Pendulum." This unit was based on the story by Edgar Allen Poe. It was our job to determine if the man in the story had enough time to escape the pendulum. Rather than my teacher listing the formulas we needed to determine if the man was to escape the pendulum, we designed experiments with strings and washers and made conjectures about our results. I remember a lot of writing in those classes, not necessarily limited to numbers and variables. We needed to write about what we saw in our experiments, and in a sense, develop our own formulas. I remember at the end of this unit, we went out to the football bleachers and with a 30 foot pendulum, the same size as what was in the unit problem, we tested our answer.

Because our work revolved around units, I never needed to ask, "Why are we learning this?" Other units included were "Do Bees Build it Best?," "Pennant Fever," and "Orchard." "Do Bees Build it Best?" was a unit in IMP 2. The unit was about bees and how they use honeycombs to store their honey. During this unit we analyzed if a bee's honeycomb is the best design to maximize storage space for honey. In IMP 3, "Pennant Fever" and "Orchard" were some of our units. "Pennant Fever" looked at two baseball teams in the World Series and the likelihood of the team in the lead ultimately winning. "Orchard" determined how long it would take before trees in a circular orchard grew so large that someone could not see out. I knew why I was doing what I was doing because I knew the unit question. Our work was aimed to help solve the unit question. This style of teaching worked for me and I was excited at the prospect of teaching it myself. I soon discovered IMP was no longer being taught in schools, possibly for valid reasons.

Over Time, Things Change

When I became a licensed teacher, I was saddened to learn that many districts no longer used IMP to teach mathematics. I blamed this on the No Child Left Behind (NCLB) Act, passed in 2001 which increased the focus on high-stakes standardized testing. Even though I strongly believed IMP was the reason I fell in love with mathematics, I can understand why districts would leave this curriculum behind. IMP is not a curriculum that stresses memorization of formulas and preparing students for standardized testing. Instead, IMP stresses problem solving skills and cooperative group work.

For instance, my senior year of high school I enrolled in Advanced Placement Calculus AB. Because IMP was the non-traditional route for mathematics, it was not common for a student in this track to go on to take Calculus. I remember my Calculus teacher spoke with my previous teacher to see if they recommended my choice. I also remember the first day of class the teacher handed out a quiz of various topics we should know before the class started. One of the problems had to do with writing the equation of a line from two points. I had no idea how to solve the problem because my IMP classes did not focus on memorization of formulas. We, of course, had learned about linear functions but not in the sense of formulas. The numbers we worked with came from a story and had meaning within that story; they were not random numbers given to solve a single problem. This example is exactly why IMP is not, in my opinion, good for standardized testing and why I believe many districts no longer use the curriculum. I anticipated I could integrate pieces of the IMP curriculum into my own classroom but that was easier said than done.

My Teaching Experience

I told myself that I wanted to incorporate in my teaching some of the ideas I had discovered while being a student in the IMP classroom. My first year of teaching was at an Alternative Learning Center (ALC) in a large district in a suburb of Minneapolis. This ALC was a high school of about 120 students. The majority of the students were in their senior year or fifth-year seniors. I was offered the job the week before school started and did not have much time to plan and organize my classes. I was the only math teacher in the building. Without much support, I felt forced to teach in the same way the other, more established, teachers taught their classes.

The next school year I found myself at a charter school in Minneapolis serving inner-city students. Opened in 1997, my school serves approximately 250 high school students. According to the Minnesota Department of Education, my school's demographics are about 80% African American, 9% White, 6% Hispanic, 4% American Indian, 1% Asian, 26% in Special Education and 96% Free and Reduced Lunch (MN Department of Education, 2012). Our students mainly live in Minneapolis and the surrounding cities.

Our typical student has attended at least one other high school in their career and transfers to our school for a variety of reasons, some of which include truancy, credit-recovery, students asked to leave for poor behavior and students who choose to enroll in one of our career-orientated academies. These academies interest many students who do not have similar programs at their home high school.

My first year, I taught Algebra 1 to ninth graders and GRAD math to twelfth graders. GRAD math is a remediation class for twelfth graders who did not pass the Minnesota Comprehensive Assessment (MCA) their eleventh grade year. Even though I had my IMP experience in the back of my mind, I found myself teaching like my own pre-high school teachers. I stood at the board, my students wrote down what I said and wrote on the board, and then they took a test on the material. It was obvious to me that the students who followed and were engaged in what I taught on the board did well on the tests. The problem was that many students did not write the examples down and did not pay attention. Some students made it through the year just fine, while others failed.

My next two years were spent as a Title 1 math teacher at the same school. This was a new position created to help eleventh graders perform better on the MCA. I spent

those two years working one-on-one with students and co-teaching with another math teacher. My memories of IMP and my high school math success were now pushed farther back in my mind. I focused strictly on raising test scores.

Now in my fifth year of teaching, I have found myself back in the classroom. My ninth graders have all failed their first test and I am wondering where I went wrong in my teaching. The first place I started in this search for answers was my students. I know you can not stereotype students by the categories they may fit into but there are some general characteristics of my students that are important to note, the majority of them are living in poverty and a large portion of them are African-American. There is important research about these two groups that must be acknowledged.

The Achievement Gap, Poverty, and My Students

It is known that Minnesota has some of the highest American College Testing (ACT) scores and math achievement scores as measured by the National Assessment for Education Progress (NAEP). Minnesota also has one of the highest achievement gaps between students of color and in poverty and those who are labeled "white" and middle class. I work with both of these subgroups. NAEP test scores show that both African American students and students of poverty are several years behind in math when compared to White students and wealthier students in the same grade level (Banovetz, N, 2011). Because I have such a high number of students who qualify for free and reduced lunch, I know it is very likely there are many educational gaps in my students' math education.

Currently, in order to graduate high school, a student must complete and pass one year's worth of Algebra 2. Not being successful in mathematics during high school will

lead to more students not graduating high school. My school graduates approximately 20-30% of its seniors in four years. Many students are failing one or more classes and very few of our students go on to college.

Frequently, I have students ask me "Why are we learning this?" and "When will I ever use this?" I believe these questions are asked because students are not connecting to the material being taught. They are not seeing how mathematics is used outside of a textbook. They see mathematics as formulas, procedures and as an abstract concept that could never apply to them and their world. They think if they can just memorize the formulas and procedures for every type of problem, rather than gain a conceptual understanding for how mathematics works, they will be a successful student.

As a math teacher with this knowledge, it is my job to make sure I do not let my students fall further behind in mathematics. I need to find ways to engage them in their learning and, in fact, accelerate their learning. This need has led me to my research question for my Capstone Project.

Conclusion

Reflecting on my ninth graders first test, I am reminded of those days in high school when I first started to love learning mathematics. I was engaged in my learning and was an active participant in the classroom. I do not believe my math teachers needed to think about how to reach all of their students. My high school was majority White and middle-class. Now, I am teaching students who are different than me. Almost all of my students are living in poverty and a large number of them are African-American. I know many of them are years behind in mathematics. Through this reflection, I am left wondering how I can support my students to be more engaged in mathematics, and

therefore, potentially increase their learning. My capstone research question is: What instructional practices can I employ with my high school students of poverty to better engage them in learning mathematics? In Chapter Two, I will share research on how living in poverty affects students in the classroom, effective instructional strategies teachers can use with students of color and students from poverty and the reasons students need to learn high-level mathematics. In Chapter Three, I will describe the project I created to help answer my research question. In Chapter Four I will reflect on my Capstone Project and my journey of its completion

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CHAPTER TWO

Literature Review

Overview

In order to better serve my students, I need to find research that will help me be more effective teacher. I will organize my research into three main sections to answer my research question: What instructional strategies can I employ with my high school students of poverty to better engage them in learning mathematics?

The first section will describe students from low-income families.   Because every student receives free lunch and breakfast, I know that most, if not all, come from low-income families. Although every student is different and no one piece of research will tell me everything there is to know about a specific student, students from poverty share similar characteristics that will be important to be aware of in the classroom. This section will discuss what qualifies as low-income and what challenges these students face in the classroom, including being physically and mentally prepared for learning and the quality of previous teachers and learning experiences.

The next section of this chapter will discuss information teachers should know when teaching students from low-income families. "Traditional" teaching methods where the teacher stands at the board lecturing while students sit quietly taking notes is not the best teaching methods for students of poverty; one may argue it is not the best method for any student but for this purpose the research will focus specifically on effective teaching methods for students from poverty and African-American students. This section will include qualities of effective teachers, culturally-relevant teaching and a

few teaching strategies that have been shown to be effective with students from low-income families and African-American students.

The final section of this chapter explains why students should learn high-level mathematics. It may be easy to conclude that if a student is not successful in a particular subject in school then maybe that student should not take that course. This is the wrong conclusion to make. In today's ever-changing world, everyone needs to know a certain level of mathematics and as teachers, we need to find ways to make higher-level mathematics accessible to all learners.

<div align="center">**Barriers for Low-Income Students**</div>

The students I have in my classes have many things in common. First of all, many of them come from low-income families. Secondly, they are majority African-American living mostly in Minneapolis. Although I do not know the income levels of my specific students' families, I do know that, as a school, we are majority free-lunch qualified. These two characteristics alone present many barriers for the students I teach. Other possible barriers my students may have is their basic needs not being met, gaps in their learning and poor teachers from their past educational experience. This section of the literature review will describe low-income students, how living in poverty affects a persons' Hierarchy of Needs as defined by psychologist Abraham Maslow and the quality of teachers typically employed in low-income schools.

Low-Income Students

According to the National Center for Children in Poverty (2013), a low-income family is defined as a family whose income level is less than twice the federal poverty level. In 2011, this meant a family of four with income level below $44,700 was

described as being low-income. In the state of Minnesota, about 33% of the children in the state live in low-income families. The breakdown by ethnicity is more startling: 23% of white children, 72% of black children, 63% of Hispanic children, 44% of Asian children and 69% of American Indian children are living in low-income homes (National Center for Children in Poverty, 2013).

Burney and Beilke (2008) argue that although race, ethnicity, language, setting, beliefs and behaviors impact achievement, poverty has the greatest impact on a students' academic achievement. Growing up in a low-income home can have significant effects on a child's education. Some of the effects seen in classrooms are students who are below grade-level in math and reading, have low vocabulary, inability to complete homework at home, low parental involvement in schooling and many other deficiencies.

Basic Needs

One of the biggest barriers for students of poverty is the fact that they come to school not ready to learn. They are not ready to learn because their basic needs have not yet been met.

Abraham Maslow, a well known psychologist, describes five basic needs that every human strives to meet. These five needs are physiological, safety, love and belonging, self-esteem and self-actualization. Maslow described these basic needs as a hierarchy with physiological at the bottom and each level needing to be met before a person could move on to the next (Woolfolk, 2008). For many students, the first level of physiological needs is not being met when they arrive at school.

Physiological. The most basic things a person needs to survive are food, shelter and clothing. Many students come to school without these most basic necessities.

"When students experience poor nutrition and diminished health practices, it's harder for them to listen, concentrate, and learn" (Jensen, 2013, p. 25). If you were to walk through a cafeteria of a high-poverty school you would see students eating junk food for breakfast every morning. There is no nutritional value in what they are eating and it is no wonder they are irritable and unengaged during class. One of the ways schools can help ease this deficiency is by providing free breakfast and lunch to all students everyday. Schools also have social workers who can organize food and clothing drives throughout the year for the students. Individual teachers can make sure to keep nutritious snacks available to their students if students miss a meal or need additional food to eat during the day.

Another aspect of physiological needs is a life without distress. "Although small amounts of stress are healthy, acute and chronic stress – known as distress – is toxic" (Jensen, 2013, p. 26). Students from low-income families experience more stress than those from more medium-level incomes. Stress can negatively affect the brain's development and can affect immune systems, attention control, impairs working memory and academic success (Jensen, 2013). Teachers can help alleviate some of their students' stress by creating positive, caring learning environments. In the classroom students should be able to forget about the outside world and focus their attention on participation and class work.

Safety. The next level in Maslow's hierarchy is safety. This need includes stability, security, protection and freedom from fear and anxiety (Elton, 1996). This level is difficult to achieve because my students often come from homes and neighborhoods that are not safe. Here is a scenario of one way the need for safety manifests itself in schools: a teacher notices a particular to student who is not engaged in the lesson,

obviously distracted and looking around at everything except the teacher. To the uninformed teacher, this may look like the classic case of a student with attention-deficit disorder (ADD) or attention-deficit-hyperactivity disorder (ADHD), and the teacher assumes the student in not interested in their learning. A closer look may reveal that this student's need for safety has not been met and therefore, the student must be aware of his or her surroundings at all times in order to survive. Once a child knows they are safe in school, the next levels to attain are love and belonging, self-esteem and self-actualization.

Love and Belonging. Humans constantly want to feel accepted by those around them. Children who come from low-income families do not always get the attention they need from their parents. "Economic hardships influence how parents interact with the children, and as the hardships intensify, parents tend to become less nurturing and more inconsistent with discipline and punishment (Prince & Howard, 2002, p. 30). Teachers should know that many of the parents of my students work multiple jobs, work nights because it pays better or are away from home for other reasons. Because of this, the students are often home alone or, more likely, home with younger sibling and are there acting as the parent.

If children do not get the love and attention they need at home, it is unlikely they will have a sense of belonging in school (Prince & Howard, 2002). This level impacts teachers directly because they need to create a loving and caring environment for their students. They need to make sure their classroom is positive and is a space where those in it feel cared for and safe. Without a positive connection to school and teachers, it can be difficult for children to do well academically.

Self-Esteem. The highest levels of Maslow's hierarchy are self-esteem and self-actualization. "The more competent a person perceives himself to be at any activity, the greater the intrinsic motivation will be for that activity" (Prince & Howard, 2002, p. 30). The self-esteem of children is affected when they do poorly in school and have failing grades year after year. If this pattern continues, at some point they will be hesitant to try any activity that appears to be a challenge. Teachers should see the importance of setting up students for success as often as they can. Furthermore, it is important to build on those successes so a student will have the perseverance to try again if they do not succeed the first time.

Self-Actualization. The final level is self-actualization. This is the level when a person realizes what they can be and do with their life. The problem with this level for children who grow up in poverty is that they may not see the value of education. For some, they see adults around them who are successful but gained that success without having to get an education (Prince & Howard, 2002). There are students that come from families who are involved in gang and criminal activity. For these students, it is crucial for teachers to show them that, through education, they do not need to follow in the footsteps of those around them. They need to see there are other ways to reach success than those which endanger danger their lives.

Another aspect of self-actualization is the notion of hope. "One reason many students seem unmotivated is because of lack of hope and optimism" (Jensen, 2013, p. 26). There are times when teachers can see lack of hope in a student. They seem disengaged, they look sluggish and haggard, and a teacher may get the sense that they do not think they will ever do well in life. If a student, or anyone for that matter, does not

see that there is a better life for them down the road, it is not unreasonable to assume that they would disengage in school and their learning. It is important for students at this stage to see positive role-models which whom they can identify. They need to see that education is worthwhile and need quality teachers to help push them.

Teacher Quality

Far too often, the students who need the high-quality teachers do not get them. Students from low-income families are more likely to be taught by teachers who are not licensed, not licensed in the correct field, or inexperienced (Haycock & Crawford, 2008). The more qualified, veteran teachers teach the higher-level courses and thereby teach the higher-level students. The new and inexperienced teachers typically teach the lower-level and tougher students.

Having a low-quality teacher can have very negative effects on a students' education. Walker and Chappell (1997) discuss low-quality teachers in urban schools and state, "teachers in those classes are more directive, breaking each task down into smaller pieces, walk the students through step-by-step, and so leaving students little opportunity to exercise higher-order thinking skills" (p. 202). A major problem with low-quality teachers is they do not have high expectations of their students. They think they are doing what is best for their students but are actually hindering their learning.

Losing teachers is also an issue, especially for low-income students who attend urban schools where it is typically harder to hire more qualified teachers. Teachers leave because they were not prepared to teach in that type of setting, they were otherwise unqualified or their variances to teach have expired. This creates a problem for the students because schools may be forced to hire more inexperienced teachers or substitute

teachers to fill the position quickly (Ladson-Billings, 2007). In schools with high-teacher turnover, it greatly impacts the students; it takes time for the students to trust and respect the new staff and for the new staff to fit into our school. When this happens over and over, year after year, it is hard to create structure and consistency within the school building.

Teacher quality matters when it comes to teaching students who come from low-income families and/or students of color. According to Ronald Ferguson (1991), after analyzing hundreds of schools in Texas, he found that after controlling for family income level, teacher quality was the biggest factor in test scores among African-American and White students (as cited in Darling-Hammond, 2007). This relates directly to teaching because it says that teachers are the next important factor in whether or not their students learn. Teachers need to make sure they are doing everything they can to make sure their students are successful.

Students from low-income families need quality teachers that will accelerate their learning in order to help them catch up to their peers. In a Los Angeles study by Gordon, Kane & Staiger (2006), students taught by high-quality teachers, on average, gained five percentage points compared to students without high-quality teachers. In that same study, those students who were taught by the lowest quality of teachers lost, on average, five percentage points (as cited in Haycock & Crawford, 2008). This study points out the importance of quality teachers, not just for students coming from low-income families, but for all students. The consequence of having a low-quality teacher is actually losing ground when it comes to learning.

Summary

There are certain characteristics for students who come from poverty that teachers should know. It is important to remember that every student is unique and will not possess every characteristic or act a certain way simply because the research says they should. Growing up in poverty has been shown to have the greatest impact on a child's education (Burney & Beilke 2008). Because of their living conditions, many children come to school unprepared to learn because their basic needs of food, shelter, clothing, safety and love have not been met. Their basic needs must be met first before they are to be successful in the classroom. Students from poverty are more likely to have poor teachers in their past educational career. Because of this, they also more likely to have educational gaps in their learning; gaps which may cause difficulties in learning more advanced material later in their education. These students are likely to fall further behind academically from their peers unless their teachers can help them succeed. This information is important to the research question because it shows that teachers need to see their students as more than just a student; they are people who have feelings, personal struggles and have a past. All of which affects their performance in the classroom on a day-to-day basis. Next, the research on how teachers can effectively teach students from poverty will be shared.

Teaching Students from Low-Income Families

According to Pascopella (2006), teachers make the biggest difference for students living in poverty. Rubel and Chu (2011) found that teachers in low-income schools frequently have low expectations of their students and as a result focus their teaching only on memorization and repetition. Knapp, Shields and Turnbull (1995) describe high-

poverty classrooms as having a curriculum that starts off with easy, low-level skills and gradually moves to the more high-level skills although these are rarely reached, teacher-controlled and having a tracking system in place for students that is oftentimes difficult to change. This section of the literature review will discuss the qualities effective teachers should possess, the importance of reaching out to families and the community, how culturally-relevant teaching can increase engagement among diverse students and other teaching strategies that have been found to be effective with students from poverty.

Qualities of Effective Teachers

There are several qualities teachers should have when working with students who come from low-income homes. Most importantly, teachers need to have high expectations for all students. They must be stubborn in their belief that all students can learn, connect lessons to their students' lives, and build relationships with the students, their family and the community (Holt & Garcia, 2005). Parrett and Budge (2012) give seven qualities of successful teachers that is a mnemonic for the word TEACHER: Teach in a thinking way, Engage students and emphasize effort, Accurately assess and advocate, Create community, High expectations and be bearers of hope, Educate the whole child and Regard relationships as paramount to learning (p. 167). Teachers must get to know their students and find out what motivates them in order to engage them in their learning. Additionally, teachers must also provide the supports needed for all students to be successful. These supports include homework help, after-school programs, frequent check-ins on progress, opportunity to correct work and college tours (Burney & Beilke, 2008).

An experienced teacher has learned the power of building relationships with their students and the effects it has in the classroom. These teachers know students need to feel cared for and need a sense of belonging in the classroom. This also needs to be extended to the families and the community.

Reaching Out to Families and Communities

Paul Gorski (2013) states that as educators, we need to make sure we are providing opportunities for parents who may be working multiple jobs, do not have access to child care, do not have available time off or do not have transportation. Parents can help teachers do their job more successfully but need access to teachers and the school. Some of the ways schools can provide access for parents to attend parent-teachers conferences is to send home bus tokens, hold conferences in a public space located in the neighborhood where a lot of our parents live and provide dinner for the families.

Other ways to build relationships with families is to involve families in the education of their children. Cuthrell, Stapleton & Ledford (2010) suggested that teachers should provide families with strategies on how to help their children at home with homework, improving communication between parent and teacher and involving the community and its resources to help the family with outside social supports. It is important to set up the lines of communication early-on with parents. There have been times when the first time teachers contact parents is when they are having an issue with their child. This should not be the first conversation with a parent. In many cases, these are the only types of conversations parents have had with teachers over the course of their child's education. Parents need to hear of the positive things their child does as well.

It is important to build relationships with the community because it is the community that can provide resources families oftentimes need. The community can provide services for "community health, cultural, recreational, social support, and other programs or services" (Cuthrell et al., 2010, p. 106). These community resources can also provide insights into the student and the once a teacher has that relationship established. An example is athletics and other extra-curricular activities that students participate in. If teachers attend these events, they are not only showing support for the members of the activity, they have the opportunity to meet parents, guardians, grandparents, younger siblings, cousins and outside-of-school friends. Another example, a teacher could visit a local Boys and Girls Club or YMCA in the community where their students live. Staff members at these facilities have possibly known the students for many years and may have a different perspective on the child. It is also possible that the staff members know other family members and family situations that may be very useful for a teacher.

Culturally-Relevant Teaching

Geneva Gay (2002) defines culturally relevant teaching as: "using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively" (p. 106). For teachers, this means that all students bring different experiences and values to the classroom and in order to teach them effectively, teachers need to incorporate these experiences into their learning. It seems obvious that humans are more eager to learn something if they can make connections to it. Gay (2002) describes five essential dimensions to culturally-relevant teaching: knowing about culture, creating caring environments conducive to learning, building

relationships with diverse students, incorporating diversity into instruction and responding to the diversity of the learners.

As stated above, it is crucial for successful teachers to get to know their students and find out what drives them. For many teachers, their students' culture is different than their own; the teachers have not experienced many of the things the students have experienced in life. Because of these differences in life experiences, teachers may not know their students as well as they would like. Knowing about culture includes knowing about the characteristics and the contributions of different ethnic groups (Gay, 2002). Because 95% of Minnesota teachers are white (MN Department of Education, 2015), they need to understand that behaviors and ideas that they value may be different from their students. Likewise, their students may value behaviors and values different from the teacher. Teachers need to be alert to these differences and try to value both groups.

Creating caring environments that are conducive to learning is also very important for students. Graybill (1997) suggests that since African-American students are more communal and relational, their learning style favors more of an arts approach such as music, dance and poetry. This relates to the research question because it shows there are multiple modes students can use to show understanding and mastery of a concept. As an educator, it is important to know students learn in different ways. A learning style may be beneficial to one student, or type of student, and another learning style may be better for others. It is the job of a teacher to be aware of these differences and use a variety of teaching styles in order to better engage all students.

Learning styles can be defined as "a mode through which one effectively processes information from knowledge and recall to synthesis and evaluation" (Walker &

Chappell, 1997, p. 206). A learning style is a way in which a student prefers to learn. Some students are auditory, visual or kinesthetic learners. It is important for teachers to discover the learning styles of their students. "Allowing students to work in their strong styles helps them build confidence in themselves as they acquire essential content that might otherwise elude them" (Silver, Strong & Perini, 1996, p. 481). Students will be able to learn and show their knowledge of the content if they can interact with the material in a way that suits them.

A large part of culturally-relevant teaching is connecting teaching lessons to students' lives. William Tate (1995) suggests good mathematics will include student interests in problem-solving topics in the classroom. This idea is important for this research because teachers should use what interests their students to engage them in their learning. If teachers include an idea that the students care about, they may be more willing to want to learn the material that needs to be taught.

One strategy to find out about student interests is to have students write about how they encounter different academic concepts outside of school (Ensign, 2003). In this case, students would write about how they experience different mathematical concepts outside of the classroom. These experiences would be considered by the teacher and incorporated into the lessons when appropriate. To extend this strategy, students would take these experiences and write their own math problems to solve. Doing this would accomplish several things. First of all, students would see how they can connect to the material being taught. They will make connections they otherwise may not have made. Also, it would build community in the classroom as students would be solving each others' problems. Finally, the teacher and other students would gain knowledge of what

their classmates experience in life. It could help build relationships among students if others see what they have in common through these problems they create.

As another perspective of connecting the teaching material to students' lives, Rubel and Chu (2011) suggest that teachers should make mathematics student-centered. The students should be the focus of the problem-solving in the classroom rather than the teacher. Meaning, all students should be participating in the mathematics everyday even if the material does not directly relates to their life. Mathematics is not a passive subject, students need to be "doing" mathematics to truly learn and understand it.

Effective Teaching Strategies

Just as there are different learning styles for different students, there are different teaching strategies that teachers can use in the classroom. Certain teaching strategies are more beneficial for certain groups of students than others. Walker and Chappell (1997) suggest cooperative learning as a strategy to help diverse learners.

Woolfolk (2008) defines cooperative learning as "an arrangement in which students work in mixed-ability groups and are rewarded on the basis of the success of the group" (p. 455). Cooperative learning is a tool educators can use when they place students in small groups to better facilitate learning. There are many ways a teacher can purposefully group students depending on the desired outcome. Two of the more common cooperative learning groups are reciprocal questioning and the jigsaw method.

Reciprocal questioning is a strategy that places students in groups of two or three. The purpose is for each student to ask questions about the lesson and the other students to answer (Woolfolk, 2008). The teacher can provide beginning questions to help the

students. This strategy is great in that it allows students to talk to each other about the lesson without the pressure of having the whole class hearing.

The jigsaw strategy is a method in which small groups of students join together and each student becomes an expert in some area of the concept being learned. The students then group each other by what they are the expert in and discuss ways to teach their original group about their topic. The original group re-forms, and each student teaches the group (Silver et al., 1996). The jigsaw method works really well in classrooms because each student is responsible to teach the rest of their group about a concept, but they get to discuss these concepts with the other "experts" first.

According to Debra Viadero (2009), African-American students tend to learn better through cooperative learning.   It is more aligned to African American culture in that it focuses on group efforts and rewards, which is similar to how many of their family structures operate (Haynes & Gebreyesus, 1992). It is not uncommon for students to live with parents, siblings, grandparents, aunts, uncles and cousins. There is the African proverb, "It takes a village to raise a child." If teachers take the time to get to know their students, they may realize this is the case with their some of their students as well. This knowledge about the home life will inform a teacher's practice because they can use similar concepts in the classroom, particularly cooperative learning to better engage their students in learning.

DeCapua and Marshall (2010) give two examples of how to use cooperative groups in a math classroom. The first is to assign roles in each group of students and have groups present problems on the board. In each group, one student would read the problem, another will solve the problem and the last student would double check the

problem. This model is effective because all the students are working on the problem together before they go to the board and there are different levels of involvement for each student. For struggling students, this is a great scaffolding technique. Initially, their role could be reading the problem or possibly do the double check in the end. This way, they are still involved in the process and will ideally gain the confidence necessary to solve the problems on their own.

The second method DeCapua and Marshall (2010) describe is to assign a problem to each student but have the students solve the problems in groups. After the students finish in their groups, they solve each problem on the board for the rest of the class to see (DeCapua & Marshall, 2010). This approach is effective because it holds each student accountable for presenting the work to the class but they can work with a group to make sure they are confident in their answer first.

In the broader sense, Martin Haberman (2010) gives several examples of what good teaching looks like in a classroom. Good teaching is going on when students are an active participant in the classroom, learning by first-hand experience, apart of heterogeneous groups, correcting or redoing previous work, using technology to enhance learning, involved in the planning and asked to think about an idea that questions common sense or fairness.

Summary

Teachers, especially those who teach students from low-income families, need to have high expectations for all of their students and commit to building relationships in the classroom. A quality teacher goes beyond the student to build relationships with the family and the community where their students live. This extra step, if done in a positive

way, can be a great resource for a teacher when looking for ways to help a student.

Quality teachers also look for ways to make their teaching culturally-relevant and make

sure students play a central role in their learning everyday. In addition to connecting

lessons to the students' lives, teachers should also choose appropriate and effective

teaching strategies for their students. Choosing these strategies becomes easier as the

teacher builds stronger relationships with their students. Making sure students have

quality mathematics teachers is important because all students need to learn high-level

mathematics. This information is important to the research question because it provides

several specific strategies that can be used in the classroom. These strategies will need to

be included in the project that will help answer the research question. In the following

section, the research on the importance of learning high-level mathematics will be given.

High-Level Mathematics

Oftentimes while conversing with fellow teachers about some of the struggles

mathematics teacher see in their classroom, mathematics teachers get the same question,

"Why are you teaching that anyways?" Other than the fact that the state of Minnesota

requires three years of mathematics (one year needing to be Algebra II or equivalent) to

receive a high school diploma, it is important for all students to learn high-level

mathematics. Gloria Ladson-Billings (1997) states it nicely when she writes, "Ours is a

nation where no one would readily admit to being unable to read, but many proclaim with

pride their inability to balance their checkbooks or compute the amount of interest on a

loan" (p. 698). It is simply unacceptable for a person to not have a certain level of

mathematical understanding. This last section of the literature review will discuss why

all students should be taught mathematics and how mathematics impacts college and career readiness.

Access for All

Means and Knapp (1991) argue that higher-level skills should absolutely be taught to all students, including those who are educationally disadvantaged. Previously, it had been thought that if students did not master the basic skills of a particular subject, then their learning could not be advanced to the next level. Because many students coming from low-income families have gaps in their education, many were denied access to higher-level content (Means & Knapp, 1991). The National Council of Teachers of Mathematics says, "The question is not whether all students can succeed in mathematics but whether the adults organizing mathematics learning opportunities can alter traditional beliefs and practices to promote success for all (Principles for Action, 2014, p. 61). If a group of students lack the basic skills in mathematics, then teachers should find ways to incorporate, appropriately, in the context of the grade-level material that is to be taught (Means & Knapp, 1991). Students who struggle in mathematics can not be ignored or pushed to the side, they need to be taught the same material as their peers. They may need to be taught in a different way; but they need to be taught.

College and Career Readiness

The National Center for Educational Statistics (2004), shows that more and more students are needing to take remedial math courses in college. Remedial courses are problematic to a college student because they cost money, meaning the course(s) may be wasting financial aid money and they do not count towards college credit. A student may

need to take several remedial courses before getting to the course they actually need for their diploma. All of this is a burden to a college student.

Burney and Beilke (2008) state that the biggest predictor of success in college is success in a math class beyond Algebra II during high school. This suggests that not only do students need to reach the minimum level of the graduation requirements for high school, but they need to surpass this in order to be successful in college. Furthermore, this same study concluded that a student's chance of graduating college more than doubled if that student took a trigonometry or pre-calculus class in high school (Burney & Beilke, 2008).

Even if students choose to enter the workforce directly after high school, "…higher scores on Algebra and Geometry assessments significantly increased their predicted job performance and success in job training (Gaertner, Kim, DesJardins, & McClarty, 2014, p. 147). The same study also found that success in higher-level mathematics correlated with students earning more money later on in life compared to those who were not successful in higher-level mathematics (Gaertner et al.,2014)

Summary

These findings are important for high school teachers because they are building the mathematical base for which students need to be successful in Algebra II and beyond. In today's job market, it is not enough to only have a high-school diploma; students need to attend and graduate college. Having a strong mathematics background will help students become successful in life beyond high school. This information impacts the research question because it provides the background reasons of why the research question should be answered. It answers the question of why educators should care if

their students are learning mathematics or not; mathematics is a necessity and every student has the right to learn high-level mathematics.

Conclusion

Teaching students who come from low-income families is a big job. These students frequently come to school unprepared to learn. They are unprepared in the sense that physically, mentally and emotionally they are not ready to learn. It is my job as a teacher to be aware of these deficiencies and respond accordingly. There are several important elements to remember to include in my project to answer my question: What instructional strategies can I employ with my high school students of poverty to better engage them in learning mathematics? The key elements I need to make sure are in place are building relationships with my students and creating a safe, positive learning environment for all.

In addition to building relationships and creating a classroom conducive to learning, there are other elements I can put into place to better engage my students in learning. A crucial component to a successful classroom is culturally-relevant teaching and the use of cooperative learning. By building relationships with students, I can learn what it is that motivates them in life and incorporate as much of that as I can into my daily lessons. If the students are interested in the context of mathematical problems, they may be more interested to learn the methods of how to solve that problem. I may also be able to spark the interest of my students if I offer more opportunities for cooperative learning. For many of my students, working together toward a common goal is similar to how they live their daily lives. If I can more closely model their everyday life, they may be more willing to engage in their learning. I need to make sure they are engaged in their

learning because they need the knowledge of high-level mathematics in today's ever-changing, high-technology world.

Chapter Three will describe the adult learning presentation that was created to answer the research question, the frameworks included in the project, the intended audience and timeline for the project. Chapter Four will be a reflection chapter on the journey of finishing this project and on the project itself.

CHAPTER THREE

Project Description

Overview

The first two chapters offered the explanation and researched literature for the basis of my research question: What instructional strategies can I employ with my high school students of poverty to better engage them in learning mathematics? In this chapter, I will explain the project I designed to assist me in answering that question. My project is an adult learning presentation to share this research and its implication for teaching high-level mathematics to students from poverty in a Power Point presentation.

This chapter will explain why the choice of adult learning was used for this project and the frameworks used to create this presentation. The chapter will go on to describe the intended audience, the context in which this Power Point presentation would be given and a description of the Power Point presentation. At the end of the chapter I discuss how this Power Point presentation was assessed and give an appropriate timeline for the presentation.

Rationale

The manner in which I chose to convey my research and its implication to students was making a Power Point presentation to share with teachers. I wanted to share this knowledge with the people who will be teaching the students everyday. Originally, I had thought I would create a curriculum unit that would be used with my students. However, I realized that much of my literature review focused on more of the background knowledge of the characteristics of students living in poverty and qualities teachers should possess. I decided much of this knowledge would not necessarily show

up in a lesson plan. It is information teachers learn over the course of the school year and

teachers demonstrate it through conversations with students in and outside of the

classroom; none of this would be visible in a lesson plan. Therefore, I decided that the

most appropriate choice for my project would be an adult learning presentation. There

were two important frameworks to keep in mind while I created my presentation;

Malcolm Knowles' work in adult learning and Grant Wiggins and Jay McTighe's work

with Understand by Design for lesson planning. This next section will describe those two

frameworks and how it impacted my presentation.

<div align="center">**Project Frameworks**</div>

My project is an adult learning presentation. The framework for which I created

and modeled the presentation comes from Malcolm Knowles' work with adult learning.

My project is comprised of two pieces; a Power Point presentation and a handout for the

participants. The design of my Power Point followed Malcolm Knowles' Whole-Part-

Whole (WPW) Learning Model. The handout for the participants included five lesson

plans that illustrated each of the five instructional activities described in the Power Point.

The lesson plans were created using Wiggins and McTighe's Understanding by Design

(UbD) lesson planning template. This next section will describe these three theories

incorporated in my project.

Adult Learning Framework

The framework for this project comes from the adult educator Malcolm Knowles.

Andragogy, in contrast to pedagogy, is the method and practice of teaching adults.

Knowles' andragogical model has six assumptions: need to know, learners' self-concept,

learners' experiences, readiness to learn, orientation to learning and motivation (Knowles, 2005).

To start with, teachers need to know why they are a participating in this professional development. It was my job as facilitator to make sure I conveyed in the beginning why the information I have is important and relevant to their teaching. This presentation will help them help their students be more engage in their learning.

As facilitator, I had to make sure I was not too forceful and did not come across as all-knowing. This would have disrupted the participants' self-concept; they had to be treated as equals to the facilitator and not as if they were the children in the classroom (Knowles, 2005).

An important piece of this presentation is the experience of the teachers who participated. Students are human beings and therefore are unique and unpredictable. Because of the different experiences of the participants, the presentation included multiple prompts for the participants to share their experiences and ideas of how to apply the information to their classrooms.

The next two assumptions are the readiness to learn and orientation to learning. I did not think I needed to do much to ensure the participants were ready to learn. I believed as educators, they would all be interested and wanting to learn about strategies that may help their teaching. Furthermore, because the intended audience was teachers who teach students from low-income families, their orientation to learn was already present. This presentation helped them in their everyday teaching. This presentation is, by nature, life-centered, which is the orientation of adults' learning (Knowles, 2005).

The final assumption is motivation. It was my hope that the information in this presentation will motivate the participants to take the ideas and suggestions to heart and use them in their teaching. It is my belief that if they do, their students will be more engaged in their learning and as a result, the teacher will have higher job satisfaction. Higher job satisfaction will motivate them to continue to use the strategies.

Whole-Part-Whole Learning Model

The design of my Power Point presentation was modeled after Knowles' Whole-Part-Whole (WPW) Learning Model. Knowles (2005) states that the WPW Learning Model is a model that emulates the natural way in which people learn. As the name suggests, the WPW Learning Model has three parts; the first whole, the parts and the second whole.

"Through the 'first whole', the model introduces new content to learners by forming in their minds the organizational framework required to effectively and efficiently absorb the forthcoming concepts into their cognitive capabilities" (Knowles, 2005, p. 241). This portion of the presentation has two purposes. First, it provides a mental scaffold, such as an advanced organizer, to prepare the participants for the new information that will be presented. Secondly, it provides motivation for participants to want to learn what is being presented. Knowles (2005) says motivation is important "…due to the fact that without learners valuing the new content that is being taught, there is little hope for retention or transfer to the workplace" (p. 243). Adults are motivated to learn as they experience wants and needs in their lives. In group settings, they are also motivated to learn when given clear and explicit learning objectives. Learning objectives help motivate learners because they state what is to come and how the information is

related to the learner. Learners know what their outcomes will be if they participate in the upcoming learning activities (Knowles, 2005).

The "parts" of the WPW Learning Model are the typical learning activities that occur during instruction. The "parts" make up the bulk of the presentation as they are the knowledge and skills the learners will learn.

The "second whole" of the WPW Learning Model is the portion of the presentation that ties all the "parts" together. Knowles (2005) states this about the "second whole":

> The 'second whole' links the individual 'parts' back together to form the complete whole, for it is not only the mastery of each individual part of instruction that is important but also the relationship between those 'parts' through the 'second whole' that provides the learner with the complete understanding of the content. (p. 245)

The "second whole" is the segment in which the learners see how everything is connected and intertwined. The facilitator can strengthen the "second whole" by incorporating active learning in this portion. By having the participants actively engage in this portion of the presentation, it will help move the information learned from short-term memory to long-term memory (Knowles, 2005).

Understanding by Design

The framework for which I designed the lesson plans came from Wiggins and McTighe's (2011) Understand by Design (UbD), a framework in which the teacher starts with the desired results and essential questions of the lesson and ends with the specific activities for that lesson.

The UbD lesson plan is divided into three segments; Stage One: Desired Results, Stage Two: Assessment Evidence and Stage Three: Learning Plan. Stage One requires teachers to identify the standards the lesson covers and use those standards to decide what it is they want students to know, understand and be able to do after the completion of lesson. Stage Two is focused on assessment and performance tasks. Teachers need to decide how students will demonstrate what it is they have learned. Furthermore, teachers need to decide what evidence they will accept for students showing understanding and proficiency. Finally, Stage Three is where teachers lay out what specifically they are going to do in the classroom. This is where teachers think about what learning activities they will use to facilitate the learning for students (Wiggins & McTighe, 1998).

Summary

Adults do not learn in the same way as children learn. I wanted the teachers in my presentation to be willing to adjust their teaching, if need be, and be willing to try something new. In order to accomplish this, I needed to give the participants time to discuss with other teachers their experiences in the classroom, as it relates to the topic at hand, and allow a space for brainstorming ways to include the ideas in their teaching.

The WPW Learning Model is an effective model to use when designing adult learning presentations. The model's three parts help facilitators design a presentation that is considered best practice for adult learning.

Finally, I used the Understand by Design lesson planning template to create my lesson plans. By working backwards, with the desired results, I was able to make sure all of my learning activities fit into what it was I wanted students to know and be able to do

and I knew what I wanted students to show as evidence of mastering the material. Next, I will describe the setting and preferred audience for this presentation.

Setting and Audience

The intended audience for my presentation was high school mathematics teachers. These mathematics teachers would be new teachers teaching a high-poverty class or who were in a predominantly low-income school. On the other hand, this presentation was also for veteran teachers who are new to a predominantly low-income school or classroom.

Depending on the size of the schools' mathematics department, teachers would benefit from sitting in groups with teachers who teach the same courses as they do. There was time given for discussion and brainstorming ways to incorporate the ideas in the presentation into their classrooms and it would be helpful if they were around others who are familiar with what they have to teach in a school year.

The setting of this presentation was anywhere in a school where staff meetings or trainings are typically done. The room would need a computer, a projector and tables for teachers to sit in groups. In the next section I will describe the parts of my presentation.

Presentation Description

This project is an adult learning presentation that was given through a Power Point presentation and included a handout of teaching strategies with several sample lesson plans illustrating those strategies. This section will describe the contents of the Power Point, the handout and will also describe how the presentation was assessed.

Power Point

The presentation has two major components. The first included information about students from low-income families. This included the research about Maslow's Hierarchy of Needs, the research about teacher quality and past educational experiences for students of poverty, and the qualities teachers of students from low-income families should possess. The presentation gave ideas and examples of how each of these topics can be applied in their classroom. According to Knowles (1992), "…the educative quality of a large meeting is directly a function of the quantity and quality of interaction in the meeting" (p. 11). Meaning, in addition to providing knowledge to the participants, an effective presentation will allow the participants to interact with one another in regards to the information presented. Because of this, there was also time for the teachers to brainstorm additional ways to apply the research findings to their classroom.

The second portion of the presentation focused on ways to improve mathematics teaching to students of poverty. It shared the research on culturally-relevant lessons and effective teaching activities to use in the classroom. The teaching activities were card sorts, walk-arounds, jigsaw learning, cooperative learning and vocabulary activities. There were examples of how these could be implemented in the mathematics classroom. There was, again, time for teachers to brainstorm learning activities that could be used in their classroom.

Handout

Along with the Power Point, which was printed out for the participants, there was a handout. This handout included a table of six teaching activities which included a description of the activity and explanation of why the activity is effective with students of

poverty. In addition to this table, the handout included a lesson plan of how each activity could be used in a mathematics classroom. The lesson plans included any additional resources a teacher would need to use it in their classroom.

Assessment

In order to obtain feedback for this presentation, teachers completed an exit ticket at the end as they were leaving. The exit ticket had three questions to for the participants to answer. The questions were: 1) Was the information presented worthwhile to your teaching? 2) Do you think your teaching will improve after participating in this presentation? 3) Do you have any additional questions or need any other information/ tools to improve your teaching of students from poverty?

Summary

I believe there was something in this presentation for all teachers to gravitate towards and all tried to find ways to improve their teaching. This presentation addressed the background information teachers should be aware of when teaching students of poverty and how to effectively engage them in the classroom. A handout of the Power Point and of the teaching activities with a sample lesson plan for each was given to every participant. An assessment in the form of an exit ticket was given at the end of the presentation to help determine its effectiveness. In addition to evaluating the effectiveness of the presentation, it is also important to be conscious of the timing of the presentation which is discussed in the following section.

<div align="center">

Timeline

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This presentation would be most effective if given before the school year begins or early on in the school year. Many of the factors that make teachers an effective

teacher are put into place at the beginning of the school year. The presentation, including discussions, took approximately one and a half hours. Depending on teacher feedback after the presentation, there are opportunities for follow-up throughout the year. This project does not include any formal presentation(s) for a follow-up but follow-up could be as informal as teachers checking in with one another as to how they are doing with implementing the ideas discussed in the presentation.

Conclusion

To answer my research question: What instructional strategies can I employ with my high school students of poverty to better engage them in learning mathematics?, I created a Power Point presentation to share with other high school mathematics teachers who teach similar students as I do. The presentation follows Malcolm Knowles Whole-Part-Whole Learning Model, a model that is effective in adult learning. The presentation described how poverty affects students in the classroom. Oftentimes, students are not ready to learn and may not be prepared to learn high-level material as a result of gaps in their education. The presentation gave suggestions as to how teachers may begin to remedy some of these barriers and allow students to fully engage in their learning. Included in the handout given to all participants is five lesson plans that show how each teaching strategy can be implemented in a high school mathematics classroom. The lesson plans were created using the Understand by Design template based off the work of Grant Wiggins and Jay McTighe. In Chapter Four I will reflect on my journey of completing this Capstone project, my research, the implications of my project in the education world and its limitations.

CHAPTER FOUR

Reflection

Overview

This project was designed to help answer my research question: What instructional strategies can I employ with my high school students of poverty to better engage them in learning mathematics? To answer this question I created a Power Point presentation with a handout to give as a teacher training. In this chapter, I will take some time to reflect on my project as a whole. I will reflect on my journey of writing my Capstone as the writing started several years ago. Then I will reflect on the research I found and how the research guided me to create my presentation. I go on to reflect on my project choice of teacher training. In this section I also discuss the implications of my project and what I hope other educators will gain from the presentation. And finally I will discuss the limitations of my project.

My Journey

I started writing the first two chapters of my Capstone during the Fall of 2013. I had been teaching for four years. I originally began taking Master's classes because I was not ready to begin paying my student loans. As a teacher, I love learning and I knew the importance of keeping current in my profession. After I finished my Undergraduate degree, I did not exactly have it planned in my head to go for my Masters degree, it just sort of happened by chance. I am very happy with my choice as I have learned and grown tremendously as an educator and as a writer.

When I began writing my first two chapters, it seemed as if I had all the time in the world to research and write. At work, I was working in a Title One position that

allowed me more flexibility during my day. Because this Title One position was new to

my school, part of what my principal wanted me to do was look for new ways to

accelerate the learning of our students and to look for what other educators have done

with students. This task meshed well with researching for this project. At home, it was

my husband and I. If I needed to spend an evening late at school to work on my research

it was not a big deal. Now, I have a sixteen-month old daughter and made the choice to

stay home. I do not have the freedom to write whenever I would like. I find myself

writing ideas on paper, paper is not as exciting in the eyes of my daughter as my

computer, and waiting for that much anticipated nap to get my ideas typed out. I find

myself hoping and praying that her nap is long enough that I can get a decent amount of

work done or at least being able to finish the paragraph I am working on. I have learned

to appreciate the down-time I do get and to make sure I make the most of the time I have.

I now find myself in the final moments of finishing my Masters of Arts in Education

degree. There were many times when I thought I would never get to this point. I

attempted to finish my Capstone once before my daughter was born but I did not have the

drive needed to do so. I love learning and participating in classes but when it comes to

self-paced, individual work, I struggle. As with many of my students, I need structure.

Looking back on my journey, I can see how my project captures the four

conceptual frameworks of Hamline's School of Education. First, my Capstone

"Promotes Equity in Schools and Society" because it focuses on a group of students who,

as data shows, in general are lagging in academic achievement when compared to White,

middle-class students (MN Department of Education, 2015). Secondly, because my

project is a presentation for teachers, I believe it captures "Build Communities of

Teachers and Learners". A major theme in my Power Point presentation is to build relationships with students in a meaningful way in order to connect the teaching material to the students' lives and to create a positive and safe learning environment. Next, my project helps "Construct Knowledge" because it encourages teachers to take what they know about students of poverty and apply it to their teaching. Lastly, my project aims to "Practice Thoughtful Inquiry and Reflection" by using current research to design this presentation and my reflections on this project in my Capstone paper. I believe this Capstone project embodies all four aspects of Hamline's School of Education conceptual framework. In addition to reflecting on my personal journey, I also took some time to reflect on the research I found to support my project.

The Research

As I look back on the research I did in Chapter Two, it validates many of the aspects of teaching I feel is important for a teacher to know in order to be successful.

Eric Jensen's research from *How Poverty Affects Classroom Engagement* has been very impactful for me and my research. Students who have poor nutrition, poor health and who have high stress levels have a harder time in school. This is because of the impact it has on their brains which affects their attention and working memory. This all has detrimental effects on their academic success (Jensen, 2013).

Rubel and Chu's (2011) study of high school mathematics teachers who teach students of poverty showed that when teachers present tasks for students to complete that connect mathematical ideas to procedures, offer multiple ways and opportunities for students to participate in the mathematics, and center the mathematics on the students' everyday lives student achievement was greatly increased (Rubel & Chu, 2011). This

study was very important in advancing my research because it mirrored what I was looking to do in my classroom. I knew I needed to find ways for my students to make connections to the mathematics in my classroom. The scenario I described in Chapter One outlined this clearly. I had taught my unit on quadratic equations and it appeared my students were learning the material but when it came to test day, my students failed. I also knew I needed to provide more opportunities for my students to participate in the mathematics. Having my students take notes everyday and completing guided practice problems was not a sufficient method of teaching. And finally, I needed to find a way to connect the mathematics to their lives. I needed to find a way to make my students *want* to learn the material. As I describe in Chapter One, when I was in high school, I always knew why I was learning the mathematics my teacher was teaching. Our units were centered on a core unit problem and I knew I needed to learn the material in order to solve the unit problem. My students did not know why the material I was teaching was important for them to learn. When it came time to pick a research question, I knew I needed to pick a question that would help me bring these aspects into my teaching.

Finally, when I came across Parrett and Budge's seven qualities of successful teachers, I knew I found something that embodied all of the traits I admired in the successful teachers in my building. The seven traits are: teach in a thinking way, engage students and emphasize effort, accurately assess and advocate, create community, high expectations and be bearers of hope, educate the whole child and regard relationships as paramount to learning (Parrett & Budge, 2012, p. 167). I believe these seven qualities are the heart of my project. In order to successfully teach students, teachers need engaging lessons and need to have high expectations but they also need to build relationships and

think about the whole child. My belief in needing these two related but different aspects of teaching led to an important decision when it come to deciding on the direction of my project.   I had to decide between a curriculum unit and an adult learning project. Throughout the course of finishing this project, I frequently reflected on that choice and wondered if it was the correct one.

Project Choice and Implications

I have learned over my years of teaching students from poverty that relationships mean everything to them. I have heard students say, "I'm not doing this teacher's work because I don't even know them like that" or "This teacher has no respect for me so I'm not going to their class". Even when a student knows a class is required for graduation, if they do not feel valued and respected by a teacher, they may choose to have nothing to do with that teacher. Growing up middle class, and as a person who liked school, I usually liked my teachers and if there was one I did not like, I would have never thought about not doing my work simply because I did not respect the teacher or thought the teacher did not respect me. I respected my teachers simply because they were the teacher and that was how it was suppose to be at school. This is not the case for many students living in poverty.

While working on my research and on my project I found myself going back and forth between whether I should focus on curriculum or on professional development. I wanted to create something I, and other mathematics teachers, could use in their classrooms but I also wanted to share the research I found with other teachers. I believe teachers need this "background knowledge" of working with students of poverty. They need to know about Maslow's Hierarchy of Needs and how having those needs not met

affect a student's ability to be successful in the classroom. They need to know the importance of maintaining high expectations and building relationships with all students. But, they also need to have tools to actively engage students in their learning. They need to have tools to encourage all students to participate in their learning. I knew I needed to include both pieces in my project to truly come up with something I, and other teachers, could use to become better educators.

It is my hope that my project will inspire teachers to think about the children in their classes as a whole person and not just as a math student while at the same time, inspire them to want to create more engaging lessons in attempts to increase their mathematics achievement. Even if a teacher only takes away one thing from my project, I will view my project as a success. I believe teachers are the best resource for each other. You can go to any educational conference and see so many teachers are finding new and exciting ways to engage their students. Because we are teachers, I think it is in our nature to want to share what we are doing with others. While I think it is important to share information, it is also important to be aware of the limitations of what we are doing. My project certainly has limitations and because of these limitations, may not be applicable to all mathematics teachers.

Limitations

While I believe my project is a very useful tool for educators, there are some limitations to my project. Some of the limitations are time, money, class sizes and teacher buy-in.

First of all, time is an issue for many teachers. Many of the suggestions I make for teachers to do takes time out of their already busy days. Before my daughter was

born and I was in the classroom, it was no problem to come into work one to two hours early to prepare lessons, stay after school with students or attend extra-curricular activities. I can see one reason why teachers arrive and leave on-time. They have other obligations outside of their jobs and should not be expected to put in additional time.

Secondly, some of the suggestions I make cost money. It cost money, most of the time out of the teacher's own pocket, to provide snacks for students who are often hungry. It cost money to provide prizes for classroom competitions. Depending on the budget of the school, even providing extra supplies for classroom use may need to come out of the pocket of teachers.

Another limitation is class sizes. I taught at a small charter school and was fortunate enough to have small class sizes. In my presentation I advise teachers to try activities that get students out of their seats and to try games that have two students coming to the front of the class. I have dome all of the activities I have suggested but my class sizes ranged from five to fifteen students on average. I have never tried the activities with class sizes similar to the more traditional schools. I do not know how well they would work if a teacher had a class of 30 or more students.

Finally, teacher buy-in is an absolute necessity for teachers to gain any useful tools from my project. Teachers need to be willing to accept the fact that students may have certain needs that need to be met before they are to be a productive member of their class. Teachers need to be willing to accept that outside factors affect students in the classroom and students may not be able to compartmentalize as well as adults. Teachers need to be willing to accept students are people who may come to us with various needs and various struggles; they are not simply a math student. Teachers need be willing to

accept that they may need to change their teaching methods, even if it is how they were taught to teach or it is how they have been teaching for years. If teachers are not willing to accept these things, my project is useless.

Conclusion

I have learned many things during my journey to answer my research question: What instructional strategies can I employ with my high school students of poverty to better engage them in learning mathematics? Teaching students of poverty is rewarding, exciting, difficult and a privilege. I do not think there is one "right" way to teach students, whether they are from poverty or not. As teachers, we need to be flexible and constantly reflecting on our practice. If it is not working, we need to find ways to modify and change it to work for us and for our students. Teachers make the biggest difference for students living in poverty (Pascopella, 2006). We have to find a way to reach these students and catch them from fall through the cracks. Their education is just too important and they deserve the best.

REFERENCES

Banovetz, N. November, 1 2011. *New data shows Minnesota's achievement gap widening*. Retrieved from http://minncan.org/news-blog/media-room/new-data-shows-minnesota%E2%80%99s-achievement-gap-widening.

Burney, V. H., & Beilke, J. R. (2008). The constraints of poverty on high achievement. *Journal for the Education of the Gifted*, 31(3), 295-321. doi: http://dx.doi.org/10.4219/jeg-2008-771

Cuthrell, K., Stapleton, J., & Ledford, C. (2009). Examining the culture of poverty: Promising practices. *Preventing School Failure: Alternative Education for Children and Youth*, 54(2), 104-110. doi: 10.1080/10459880903217689

Darling-Hammond, L. (2007). Third annual Brown lecture in education research – The flat world and education: How America's commitment to equity will determine our future. *Educational Researcher*, 36(6), 318-334. doi: 10.3102/0013189X07308253

DeCapua, A., & Marshall, H. W. (2010). Reaching ELLs at risk: Instruction for students with limited or interrupted formal education. *Preventing School Failure*, 55(1). 35-41. doi: 10.1080/10459880903291680

Ensign, J. (2003). Including culturally relevant math in an urban school. *Educational Studies*, 34(4), 414-423. Retrieved from http://www.erlbaum.com/Journals/journals/ES/es.htm

Elton, L. (1996). Strategies to enhance student motivation: A conceptual analysis. *Studies in Higher Education*, 21(1), 57-67. doi: http://dx.doi.org/10.1080/03075079612331381457

Gaertner, M. N., Kim, J., DesJardins, S. L., & McClarty, K. L. (2014). Preparing students for college and careers: The casual role of Algebra II. *Research in Higher Education*, 55(2), 143-165. doi: 10.1007/s11162-013-9322-7

Gay, G. (2002). Preparing for culturally responsive teaching. *Journal of Teacher Education,* 53(106), 106-116. doi: 10.1177/0022487102053002003

Gorski, P. (2013). Building a pedagogy of engagement for students in poverty. *Phi Delta Kappan*, 95(1), 48-52. Retrieved from http://www.pdkintl.org/kappan/kappan.htm

Graybill, S. W. (1997). Questions of race and culture: How they relate to the classroom for African American students. *Clearing House, 70*, 311-318. Retrieved from http://www.taylorandfrancisgroup.com/

Haberman, M. (2010). The pedagogy of poverty versus good teaching. *Phi Delta Kappan Magazine*, 92(2), 81-87. doi: 10.1177/003172171009200223

Haycock, K., & Crawford, C. (2008). Closing the teacher quality gap. *Educational Leadership,* (65)7, 14-19. Retrieved from http://www.ascd.org/

Haynes, N. M., & Gebreyesus, S. (1992). Cooperative learning: A case for African-

    American students. *School Psychology Review,* 21(4), 577-585. Retrieved from

    http://www.naspweb.org/publications/index.html

Holt, C. B., & Garcia, P. (2005). Preparing teachers for children in poverty. *School*

    Administrator, 62(11), 22-25. Retrieved from

    http://www.aasa.org/publications/sa/2001_06/contents_006.htm

Jensen, E. (2013). How poverty affects classroom engagement. *Educational*

    Leadership, 70(8), 24-30. Retrieved from http://www.ascd.org/

Knapp, M. S., Shields, P. M., & Turnbull, B. J. (1995). Academic Challenge in High-

    Poverty Classrooms. *The Phi Delta Kappan*, 76(10), 770-776. Retrieved from

    http://www.jstor.org/stable/20405455

Knowles, M. S. (1992). Applying principles of adult learning in conference

    presentations, *Adult Learning*, 4(1), 11-14. doi: 10.1177/104515959200400105

Knowles, M. S., Holton III, E. F., & Swanson, R. A. (2005). *The adult learner* (6th ed.).

    Amsterdam ; Boston : Elsevier.

Ladson-Billings, G. (1997). It doesn't add up: African American students' mathematics

    achievement. *Journal for Research in Mathematics Education*, 28(6), 697-708.

    Retrieved from http://www.jstor.org/stable/749368

Means, B., & Knapp, M. S. (1991). Cognitive approaches to teaching advanced skills to

    educationally disadvantaged students. *The Phi Delta Kappan*, 73(4), 282-289.

    Retrieved from http://www.jstor.org./stable/20404619

Minnesota Department of Education. 2012. *Data for Educators and Parents*. Retrieved

    from http://w20.education.state.mn.us/MDEAnalytics/Reports.jsp.

National Center for Children in Poverty. (2013). *Basic facts about low-income children*. Retrieved from http://www.nccp.org/publications/pub_1170.html

National Center for Education Statistics. (2004). The condition of education. Retrieved from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2004077

National Council of Teachers of Mathematics. (2014). *Principles to action: Ensuring mathematical success for all* (5th ed.). Reston, VA: NCTM.

Parrett, W. H., & Budge, K. M. (2012). *Turning high-poverty schools into high-performing schools*. Alexandria, VA: ASCD.

Pascopella, A. (2006). Teachers are still the most important tool. *District Administration,* 42(8), 20-20. Retrieved from http://www.districtadministration.com/

Prince, D. L., & Howard, E. M. (2002). Children and their basic needs. *Early Childhood Education Journal,* 30(1), 27-31. Retrieved from http://www.springerlink.com/home/main.mpx

Rubel, L. H., & Chu, H. (2012). Reinscribing urban: teaching high school mathematics in low income, urban communities of color. *Journal of Mathematics Teacher Education*, 15(1), 39-52. doi: 10.1007/s10857-011-9200-1

Silver, E. A., & Stein, M. K. (1996). The quasar project: The "revolution of the possible" in mathematics instructional reform in urban middle schools, *Urban Education*, 30(4), 476-521. doi: 10.1111/0042085996030004006

Tate, W. (1995). Returning to the root: A culturally relevant approach to mathematics pedagogy. *Theory Into Practice,* 34(3), 166-173. doi: 10.1080/00405849509543676

Viadero, D. (2009). Study examines cooperative-learning results by race. *Education Week*, 28(31), 6. Retrieved from http://www.edweek.org/we/articles/2009/05/31group.h28.html?qs=debra+viadero++inmeta:Authors%3DDebra%2520Viadero+inmeta:gsaentity_Source%2520URL%2520entities%3DEducation%2520Week%2520Articles+inmeta:Issue%3D31

Walker, P. C., & Chappell, M, F. (1997). Reshaping perspectives on teaching mathematics in diverse urban schools. *Yearbook (National Council Of Teachers Of Mathematics)*, 201-208. Retrieved from http://www.nctm.org/

Wiggins, G. P., & McTighe, J. (1998). *Understanding by design*. Alexandria, VA: ASCD.

Woolfolk, A. (2008). *Educational Psychology* (7th ed.). Upper Saddle River, N. J.: Merrill.