

Cross Age/Cross Disability Peer Tutoring:  
a Strategy for Math Instruction

A Research Project Report

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a Strategy for Math Instruction

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### Abstract

Finding the most successful method for helping students with special needs learn and excel in the least restrictive environment is a mission of school districts and special education programs. A guiding objective has been to identify the methods that work and successfully apply them in the practical general education setting.

Students with disabilities have challenges learning in a traditional classroom setting. Common teaching techniques can be ineffective methods for students with special needs. The purpose of this study was to determine how serving as a peer tutor in math impacts the math skills and persistence of students identified as having Emotional/Behavior Disorders (EBD).

Cross-age peer tutoring has been demonstrated to help students learn. This study used Cross-age and Cross-disability tutoring. Three students were chosen as tutors from an EBD level II special education program in an upper Midwestern middle school/high school program. The tutors chosen were all older than the tutees by at least one grade and considered to have higher basic level math skills. Three tutees were chosen from a group of students in a program for students with cognitive disabilities located directly across the hall.

Students showed a slight improvement in basic math skills in post test results. Students were found to increase total math time involvement when actively tutoring compared with the traditional daily math lesson sessions.

## Chapter 1 – Introduction

Jason sat in his chair working on his math assignment. He stopped and asked to get a drink of water from the fountain. His teacher said okay but be quick so you can get back to work. Six minutes later Jason slowly returned and hung up the pass. He sat down and proceeded to stare out the window. His teacher encouraged him to get to work. Jason rolled his eyes back and sighed “it’s just SO boring”. His teacher tried to encourage him and reminded him that it won’t take long to finish. Trying to keep students engaged and motivated is a never ending battle for educators. Teachers are competing with television, video games, iPods, computers, and various other entertainment venues. With the quick paced constantly moving, high energy forms of entertainment available today, how can teachers engage students? The quest to find the answer to this educational dilemma is ongoing and still one of the biggest challenges facing educators and our society.

### Research Problem

“No Child Left Behind Act of 2001 was set forth to improve and encourage the academic achievement of all students” (Bowman-Perrott, 2009, p. 259). Effectiveness of teaching strategies is frequently the topic of consideration and analysis. According to Bowman-Perrott (2009) students with disabilities are at high risk of failing in school. Students with disabilities have challenges learning in a traditional classroom setting. Common teaching techniques can be ineffective for students with special needs. Finding the most successful method for helping students with special needs learn and excel in the least restrictive environment is a mission of school districts and special education programs. Throughout the education system there is a struggle to provide extra, efficient resources to help students with special needs learn and

succeed. A guiding objective has been to identify the methods that work and successfully apply them in the practical general education setting.

### Current Research on the Problem

Alter, Brown, and Lingo (2008) found that students diagnosed with behavioral disorders struggle with the rigors of a traditional lecture based math classroom format. Students have difficulty maintaining concentration and achieving reasonable retention with lecture style teaching. The cycle of poor academic achievement followed by being removed from general education setting results in students with behavior disorders falling behind academically. Students with behavior disorders find themselves in smaller setting classrooms with fewer distractions. Test scores and overall math skill performance has traditionally suffered in special education settings and self-enclosed math classes.

Peer tutoring is one method of engaging students in working with a particular subject or educational concept. Observations of student reaction and performance on the peer tutoring programs were generally favorable. Students were reported to be more on task and displayed fewer off-task behaviors during peer tutoring sessions (Bowman-Perrott, 2009, p. 263).

“No Child Left Behind Act of 2001 was set forth to improve and encourage the academic achievement of all students” (Bowman-Perrott, 2009, p. 259). According to Lane, Barton-Arwood, Nelson, and Webby (2007), several studies suggest that students diagnosed with Emotional Behavior Disorder achieve at an academic level 2 years below grade level in several school subject areas, including math skills. Developing a method of intervention to help at-risk students improve scores and succeed in school is a monumental challenge for educators today (Bowman-Perrott, 2009). Peer tutoring has been researched and a found to be a successful teaching method for students with and without disabilities (Bowman-Perrott, 2009). Although

studies show that peer tutoring is a promising teaching method for improving math skills in both the tutor and tutee there are very few studies employing EBD students as peer tutors (Lane et al., 2007).

### Importance of this Study

Districts are trying to meet the standards for student achievement set forth by No Child Left Behind. Students are expected to achieve the skills needed to pass the grade level standards tests in mathematics and all core subjects. All schools, including Midwestern middle/high schools are under strong local and national pressure to achieve to reach and maintain state math grade level standard scores. Schools and districts that are not able to achieve satisfactory federal and state standard scores in core subjects, including math, are facing sanctions and funding cuts. To meet federal standards, new and more effective methods must be found and implemented to help the students the students with disabilities learn math skills and attain improved test scores. In considering educational strategies for helping students of all capabilities, peer tutoring is an appealing method in regards to resources and time considerations to implement and maintain as a teaching method. The need for an effective method within the limited resource capabilities of school districts indicate that more consideration should be given to the effects of peer tutoring on the math skills of the tutors diagnosed with EBD. As a special education teacher with a responsibility to teach mathematics to students identified as having EBD, this researcher began to wonder: How might peer tutoring affect the math skills learning of high school students with behavioral disorders in a setting two resource room at an upper Midwestern middle/high school?

### Research Purpose and Questions

The purpose of this study was to determine how serving as a peer tutor in math impacts the math skills and persistence of students identified as having Emotional/Behavior Disorders. This research sought to answer the following questions:

1. Does serving as a math peer tutor for students with cognitive disabilities increase the amount of time students identified as having emotional behavior disabilities spend engaged in the study of math?
2. Does serving as a math peer tutor for students with cognitive disabilities improve the math skills of students diagnosed with Emotional Behavior Disabilities?

### Definitions

EBD – Emotional Behavior Disorder- Individuals with Disabilities Education Act defines as follows:

A condition exhibiting one or more of the following characteristics over a long period of time and to a marked degree that adversely affects a child's educational performance:

- An inability to learn that cannot be explained by intellectual, sensory, or health factors
- An inability to build or maintain satisfactory interpersonal relationships with peers and teachers
- Inappropriate types of behavior or feelings under normal circumstances
- A general pervasive mood of unhappiness or depression
- A tendency to develop physical symptoms or fears associated with personal or school factors.

-[Code of Federal Regulations, Title 34, Section 300.7(c)(4)(i)]

NCLB – No Child Left Behind Act of 2001- A legislative Federal education act holding school districts accountable for educating all children. This act Intends to elevate all students to the proficient level on state tests by the 2013-2014 school year, and to hold states and schools more accountable for academic results. These sub-groups include students with disabilities.

Peer Tutoring- Two people considered similar in status working together to help the other learner.

## Chapter 2

### A Review of the Literature

#### Problem and Purpose

“No Child Left Behind Act of 2001 was set forth to improve and encourage the academic achievement of all students” (Bowman-Perrott, 2009, p. 259). Effectiveness of teaching strategies is frequently the topic of consideration and analysis. According to Bowman-Perrott (2009) students with disabilities are at an amplified risk of failing in school. Students with disabilities have challenges learning in a traditional classroom setting. Common teaching techniques can be ineffective methods for students with special needs. Finding the most successful method for helping students with special needs to learn and do well in the least restrictive environment is a mission of school districts and special education programs. Throughout the education system there is a struggle to provide extra, efficient resources to help students with special needs learn and succeed in the general school system. An objective has been to identify the methods that work and to successfully employ them in the practical everyday educational setting.

Peer tutoring is one method of engaging student’s in working with a particular subject or educational concept. Observations of student reaction and performance on the peer tutoring programs were generally favorable. Students were reported to be more on task and displayed fewer off task behaviors during peer tutoring sessions (Bowman-Perrott, 2009, p. 263).

Alter, Brown, and Lingo (2008) found that students diagnosed with behavioral disorders struggle with the rigors of a traditional lecture based math classroom format. Students have difficulty maintaining concentration and achieving reasonable retention with lecture style teaching. The cycle of poor academic achievement followed by being removed from general

education setting results in students with behavior disorders falling behind academically. Students with behavior disorders find themselves in smaller setting classrooms with fewer distractions. Test scores and overall math skill performance has traditionally suffered in special education settings and self-enclosed math classes.

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2. Does serving as a math peer tutor for students with cognitive disabilities improve the math skills of students with Emotional Behavior Disabilities?

### Peer Tutoring

Peer tutoring has been researched and a found to be successful teaching method for students with and without disabilities (Bowman-Perrott, 2009). Observations of student reaction and performance on the peer tutoring programs were generally favorable. Students were reported to be more on task and displayed fewer off task behaviors during peer tutoring sessions (Bowman-Perrott, 2009, p. 263). In addition, peer tutoring improves student self-reported self-esteem, consisting of both self-worth and self-competence (Miller, Topping, and Thurston, 2010).

Three types of Peer Tutoring have been utilized and researched and benefits for all types have been identified in the research: Unidirectional Peer Tutoring, Bi-directional Peer Tutoring and Cross-Age Peer Tutoring.

### Unidirectional Peer Tutoring

Unidirectional peer tutoring is considered the most traditional form of tutoring paired technique. One student does the teaching and the other student receives the instruction. In a study by Robinson, Schofield, and Steers-Wentzell (2005) peer tutoring benefited students in basic math performance and mathematics readiness.

### Bi-directional Peer Tutoring

Bowman-Perrott (2009) state Class Wide Peer Tutoring (CWPT) is a form of bi-directional peer tutoring that has several benefits for instruction, teacher, and the student. Instruction for students is one-on-one, each student is taught and gets to teach, there is a designed error correcting system, and students engage in social interaction. Teachers can benefit by saving on teaching workload, using current curriculum, fitting lessons into current class time periods, and accommodating the sharing of results with parents and administrators. The students benefit from frequent repetitions responding to academics, student-focus, cooperative learning, experiencing success and improved confidence, team work, error correction, and improved mastery of the material.

### Cross-age peer tutoring

Cross-age tutoring has shown strong results as an effective educational method of peer tutoring. According to Topping, Thurston, McGavock, and Conlin (2012) in overall measures of performance cross-age students performed better in studies using control groups.

### Peer Tutor Training

To develop an effective teaching intervention program tutors must be trained. Training of the student tutors is vital to ensure proper instruction that cover the curriculum. Tutors should be trained on how to be supportive and encouraging when working with the special education student (Meese, 2001). In the vast majority of studies examined, training is emphasized and discussed as a foundation that makes the tutor teaching consistent and effective. Instructional techniques are a central theme and starting points of several of the existing studies. Temple and Lynnes (2001) highlight common components in training tutors in instructional techniques. Training should include proper methods for providing feedback to tutees, the system of least prompts, error detection, disability specific techniques, managing behaviors, and proper demonstration modeling. Bowman-Perrott (2009) detailed a tutor error correction and oral feedback that provides the correct answer three times. Also the handbook should detail how to award points and how to assist the tutee to find the correct answers. Students were trained to pick up their folders and provide predetermined responses for partially correct responses (McDuffie, Mastropieri, & Scruggs 2009). According to Young (2011) some students felt that instructors could give more precise and complete answers. The students felt getting instructions directly from the teacher was the best method. It should be noted that the teacher is always the main resource and I believe teacher instruction should not be replaced, only supplemented with a tutoring program. Most studies provided training over several sessions. Wright and Cleary (2006) trained tutors over four scripted sessions. The sessions each lasted about 40 minutes. The first session covered the expected behaviors of tutors during tutoring sessions, including moving through the halls and picking up the students from their classroom. In the second session tutors were taught verbal encouragement and praise during tutoring. In the third session tutors learned

specific techniques for teaching curriculum. The fourth and final session student tutors reviewed and practiced what they had learned in the previous three sessions.

Support staff, teachers, and parents need to be instructed on the projected benefits and structure of the tutoring program. If this step is missed the classroom teachers and parents may not understand and accommodate for the changes in schedules and routines. Teachers and parents may not want students to miss regular general education or to incur problems with behaviors (Wright and Cleary, 2006). By keeping surrounding the supporting adults informed on these details, peer tutoring programs are given the greatest chance for success. The more people that buy in to the program, the more likely the tutoring program can succeed. Concerned teachers and adults should be reminded that research supports peer tutoring as an evidence-based teaching practice that supports improved student learning for general education and special education students (Okilwa and Shelby, 2010). The peer tutoring process provides additional opportunities for students to respond and practice lesson materials (Mcallum, Neddenriep, Skinner, & Wallace, 2009). In addition, peer tutoring improves student self-reported self-esteem, consisting of both self-worth and self-competence (Miller, Topping, and Thurston, 2010). There are a variety of opinions on who should do the tutor training. Some studies had teachers do the training and other studies brought in education students to perform training and manage the study sites. Wright and Cleary (2006) suggest tapping other teachers for input and expertise to help schools establish self-sustaining, successful, peer tutoring programs. In addition to individual benefits, all students benefit from lower teacher to student ratios (Miller, 2005). The decision is related to the size of the sample group. This study did not require additional teacher assistants to be employed. According to Miller (2005) group training of tutors is the most efficient method.

Peer Tutor Training and Tutoring and Math Instruction

Research indicates basic math performance improves over the course of peer-tutoring sessions. Franca, Vany Martins, And Others, (1990) found student tutors and tutees with behavior disorders that were involved in the peer tutoring research monitoring showed improved performance in academics and improved self-concepts and attitudes. Tutors and tutees reflected higher correct answers on post-tests and improved performance times.

#### Need for This Study

Although Peer Tutoring has been shown to be useful in general, few studies have addressed the use of this technique to address its usefulness as an actual math teaching strategy for students who have emotional behavioral disabilities. In addition, few studies have been done assessing the usefulness of Cross Age/Cross Disability Peer Tutoring. This study set out to do that.

## Chapter 3

### Methodology

#### Research Purpose and Questions

Students with disabilities have challenges learning in a traditional classroom setting. Common teaching techniques can be ineffective methods for students with special needs. The purpose of this study was to determine how serving as a peer tutor in math impacts the math skills and persistence of students identified as having Emotional/Behavior Disorders. This study sought to answer the following questions:

1. Does serving as a math peer tutor for students with cognitive disabilities increase the amount of time students with Emotional Behavior Disabilities spend engaged in the study of math?
2. Does serving as a math peer tutor for students with cognitive disabilities improve the math skills of students with Emotional Behavior Disabilities?

#### Strategy and Rationale

Cross-age peer tutoring has been demonstrated to help students learn; new strategies for helping EBD students improve math skills need to be explored. This study used Cross-age and Cross-disability tutoring. Three students were chosen as tutors from an EBD level II special education program in an upper Midwestern middle school/high school program. The tutors chosen were all older than the tutees by at least one grade and considered to have higher basic level math skills. Three tutees were chosen from a group of students in a program for students with cognitive disabilities located directly across the hall.

#### Population/Sample

The population addressed was secondary school students identified as having EBD and in need of math skill improvement.

The sample chosen for this study was a convenience sample of students identified as having EBD who are assigned to this researcher in a public school setting.

### Instrumentation

Students were chosen according to the criteria stated above. They were paired with younger students identified as having cognitive disabilities and needing assistance in mastering math skills. Peer tutor training was designed for and carried out with EBD students.

The study commenced with one week of peer tutor training for the three designated students in the classroom for the students diagnosed with EBD. Training consisted of five primary components.

- a. How to greet tutee and suggested session dialog.
- b. How to engage and maintain on-task behavior throughout each tutoring session.
- c. How to provide prompts to assist tutee with problem areas during session. When to give prompt and when to allow tutee to work on solution without assistance.
- d. Maintaining positive reinforcement for all tutee responses throughout sessions.
- e. Addressing various behaviors by brief prompts and redirecting. How to recognize major behaviors that should be referred to the teacher.

### Intervention

Tutor- tutee sessions took place for a minimum of 30 minutes during the each student's scheduled math time during the school day. The tutoring session were scheduled for Mondays and Wednesdays of each week for 6 consecutive weeks. If a member of the tutoring student pair was absent or needed to miss for a conflicting engagement, the session was automatically rescheduled for the following school day during the same math period scheduled time.

A student was considered on-task if he was not talking to anyone other than his partner, looking at the worker and/or his math assignment, and engaged using appropriate prompts and reinforcement.

### Data Collection

Baseline data of the amount of time spent on mathematics during school prior to the intervention was charted throughout the study.

Baseline test to determine math skill level of tutors was determined prior to the intervention. using basic skill tests including number sense, double/triple digit addition and subtraction, and multiplication/division (single and double digit). The oldest student with the higher math level of skills was given a higher level math skills test with some more advanced skills problems and some word problems. The same test was given following the study to ascertain the math skill/change of designated tutors.

### Data Analysis

Pre and post test scores were compared to determine the impact of cross-age/cross disability tutoring as an intervention to teach basic math skills mastery to designated program tutors involved in the research study. Participation level/engaged time was charted and recorded throughout research sessions in order to answer the following two questions:

1. Does serving as a math peer tutor for students with cognitive disabilities increase the amount of time students identified as having emotional behavior disabilities spend engaged in the study of math?
2. Does serving as a math peer tutor for students with cognitive disabilities improve the math skills of students with Emotional Behavior Disabilities?

### Limitations

The limitations of this research study include a small sample size of student base involvement. The sample chosen for this study was a convenience sample of students identified as having EBD who are assigned to this researcher in a public school setting. Three students were chosen from the students enrolled in the special education math course and paired with three students from a program for students diagnosed with CD efficiently located directly across the hall. Another limitation consideration is the duration of the study was only conducted over 6 school weeks.

## Chapter IV: Results of the Study

“No Child Left Behind Act of 2001 was set forth to improve and encourage the academic achievement of all students” (Bowman-Perrott, 2009, p. 259). Effectiveness of teaching strategies is frequently the topic of consideration and analysis. According to Bowman-Perrott (2009) students with disabilities are at risk of failing in school. Students with disabilities have challenges learning in a traditional classroom setting. Common teaching techniques can be ineffective methods for students with special needs. Finding the most successful method for helping students with special needs to learn and do well in the least restrictive environment is a mission of school districts and special education programs. Throughout the education system there is a struggle to provide extra, efficient resources to help students with special needs learn and succeed in the general school system. An objective has been to identify the methods that work and to successfully employ them in the practical everyday educational setting.

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### Engaged Time

Incorporating peer tutoring as a teaching aid has proven in several research studies to be beneficial in numerous ways as a mathematics teaching method. This research study specifically looked at how cross aged/cross categorical peer tutoring among middle school/high school students impacted the basic math skills and session participation prior and post the six week tutoring study.

Each day students were monitored for time on-task. Students were marked as off-task if they displayed any of the following behaviors; talking, putting head down, drawing, handling cell phone, watching others, etc. Each unit of 1 represents 6 minutes of the 30 minute math session. Students were marked off ½ point for brief off-task (under 3 minutes) and marked off a full point for being off-task for three to six minutes. Students could earn a maximum of 6 points for thirty minutes of dedicated participation during each tutor session.

The first question addressed was; Does serving as a math peer tutor for students with cognitive disabilities increase the amount of time students identified as having emotional behavior disabilities spend engaged in the study of math?

The study collected data on the tutor's participation level during math session prior to tutoring compared with participation during tutoring sessions. Data showed an overall improvement in engaged participation when students acted as tutors (see table 1). Baseline data collected for four weeks prior to this intervention indicated student's level of active participation averaged 25.2, 24, and 24 minutes/30 minute session respectively.

The time engagement in mathematics study/activities prior to this intervention indicates an average participation level of 4.06 points or 24.4 minutes /30 minute math session. Time/participation levels increase to an average level of 4.73 points/session or 28.4 average participation minutes per 30 minute math tutoring session. The intervention participation time reflects a net increase of 4 minutes per 30 minute mathematic session.

The second question addressed was: Does serving as a math peer tutor for students with cognitive disabilities improve the math skills of students identified as having Emotional Behavior Disabilities? This study found that students that acted as tutors showed a modest increase in math scores on a posttest of basic math skills, including student proximal appropriate math skills questions (see table 1). All students were given the same format test with the same and similar math problems to measure any change in math skill, post research study.

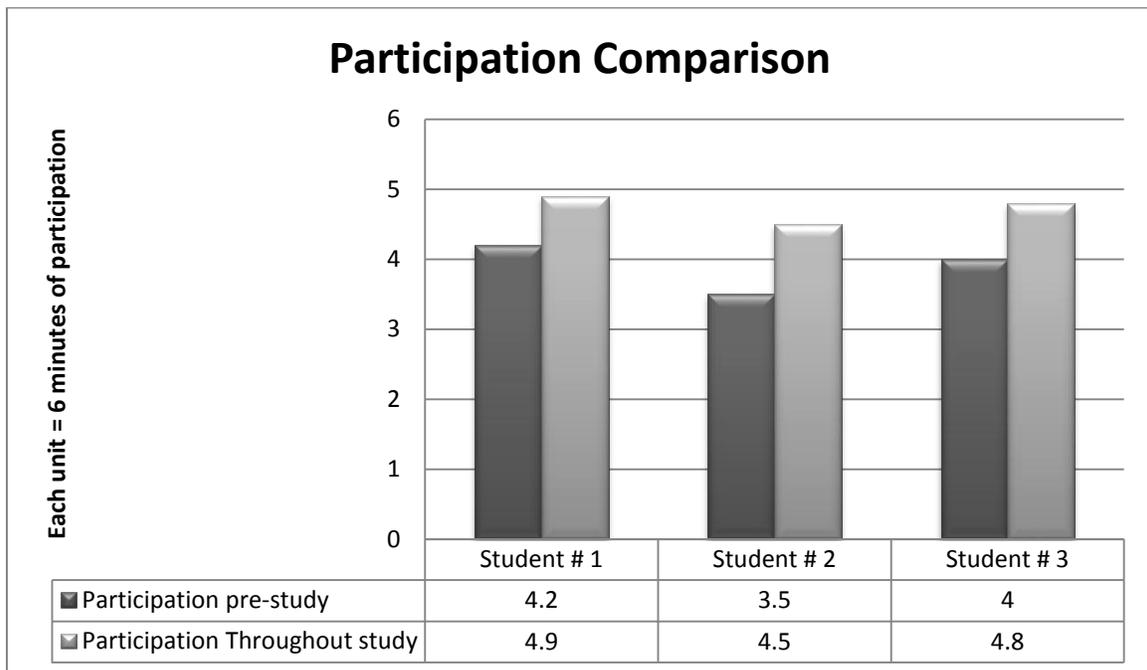
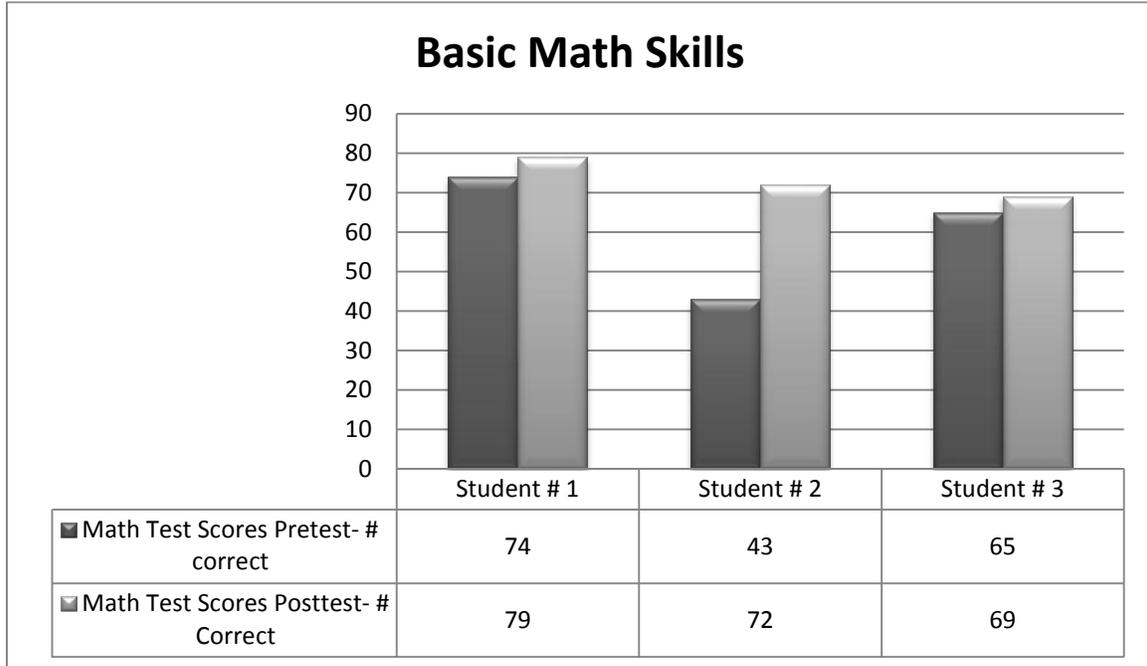
**Table 1: Participation/Engaged Time Comparisons for Students Pre-tutoring and Tutoring****Participation/Engagement**

Table 1 shows the level of active participation each student averaged during the observed mathematics sessions. Pre-study averages consist of the daily average students participated in mathematics class/30 minute samples prior to research intervention. The Participation throughout the study reflects the active participation time students averaged per 30 minute session during the 6 week research intervention.

**Table 2: Pre/Post Basic Math Skills Tests**

The results show a small increase in math scores in posttest scores. Students reflect a modest improvement in math skills on this specific math test. Student scores reflect the number correct each of the three participating students received on the basic skills math test. The average increase of this sample groups' scores in math skills assessed was 9.33 following this 6 week intervention.

## **Chapter V: Discussion and Summary**

“No Child Left Behind Act of 2001 was set forth to improve and encourage the academic achievement of all students” (Bowman-Perrott, 2009, p. 259). Effectiveness of teaching strategies is frequently the topic of consideration and analysis. According to Bowman-Perrott (2009) students with disabilities are at high risk of failing in school. Students with disabilities have challenges learning in a traditional classroom setting. Common teaching techniques can be ineffective for students with special needs. Finding the most successful method for helping students with special needs learn and excel in the least restrictive environment is a mission of school districts and special education programs. Throughout the education system there is a struggle to provide extra, efficient resources to help students with special needs learn and succeed. A guiding objective has been to identify the methods that work and successfully apply them in the practical general education setting.

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Cross-age peer tutoring has been demonstrated to help students learn; new strategies for helping EBD students improve math skills need to be explored. This study used Cross-age and Cross-disability tutoring. Three students were chosen as tutors from an EBD level II special

education program in an upper Midwestern middle school/high school program. The tutors chosen were all older than the tutees by at least one grade and considered to have higher basic level math skills. Three tutees were chosen from a group of students in a program for students with cognitive disabilities located directly across the hall.

My data reflected a moderate increase in student participation when serving as a peer-tutor. Students were consistently more engaged and focused on the subject being considered by the student tutee. Prompting and encouragement were regularly utilized and evidence of the tutors continued focus on-task. Peer-tutoring is a well-researched teaching method. Success in school is important to all students and challenging to many. Alter et al. (2008) found that students diagnosed with behavioral disorders struggle with the rigors of a traditional lecture-based math classroom format. Students have difficulty maintaining concentration and achieving reasonable retention with lecture style teaching. Many research studies are examining the effectiveness of peer-tutoring and improve math scores and participation. My data supports the findings Bowman-Perrott (2009) that peer tutoring improves participation levels. This intervention also found peer-tutoring to enhance learning for students diagnosed with EBD. It is generally accepted that students who are more engaged increase their learning. This research study data reflected an increased level of both participation and math scores.

The results of this study indicate that peer-tutoring is a promising method of helping students with EBD learning and with participation. Results indicate that for this study student tutors improved in key educational areas. Further study is needed and warranted to further examine the impact and effectiveness of peer-tutoring on student learning. This study was only 6 weeks of peer-tutoring; a longer study would further improve reliability of findings. The sample size of participating students was limited to only three tutoring pairs, additional research studies

should include a larger sample size across a range of diverse ethnic, demographic, and social economic settings. This study could also benefit from creating a control group. The result indicated an improvement in basic math skills based on a pretest, posttest comparison. Some improvement in math skills would be expected to occur under sustained traditional mathematics instruction. To gauge the actual effectiveness of peer-tutoring over conventional classroom teaching methods a comparison needs to be conducted of the research study sample group and a control group.

This strategy as teaching tool shows promise and I will continue to incorporate peer-tutoring in my weekly mathematics class; involved teachers felt that the students thrived when they acted in an instructional role. One participating teacher thought that many students with EBD operate daily in a constant defensive mode and when acting as a tutor they lower their defenses and show a caring and nurturing side of their personality that does not often surface in school. The students reported and displayed an increase in interest in the math sessions involving the tutees and willingly offered to go a little further than directed expectations to help their partner tutee succeed. I also received positive feedback from parents who recognized the need their child has to act as a positive support for another student's learning experience, as well as the effectiveness of learning by teaching.

The students, teachers, and parents, seemed to recognize the many benefits of peer-tutoring in the classroom. The strategy shows promise and deserves more time as a teaching method in my mathematics classroom. I will be continuing to use this method in mathematics for the remainder of this school year. The response and feedback have encouraged me to consider expanding this strategy into language arts and social studies. Peer-tutoring has had extensive positive research findings published confirming the method as a valid educational tool. This

study clarified these findings and practically confirmed the method's effectiveness in this cross-aged, cross categorical peer-tutoring Middle school/high school setting.

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