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ABSTRACT

This action research study examined the effectiveness of Touch Math, a math series that emphasizes use of manipulatives, to improve mathematics achievement with four third or fourth grade students with special needs (either mild mental retardation, learning disability, or health impairment). The students received mathematics instruction for 45 minutes daily (of which 20 minutes were spent on Touch Math) in a resource room setting over 14 weeks. Students were tested each week using Math Mad Minute Addition Tests. All students improved significantly in both speed and accuracy from pre-test to post-test, which supported the effectiveness of the Touch Math intervention. (DB)

Running head: HOW EFFECTIVE IS TOUCH MATH

How Effective Is Touch Math for Improving Students with Special Needs Academic Achievement on Math Addition Mad Minute Timed Tests?

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Abstract

The purpose of this action research study was to see if implementing Touch Math into the math curriculum would improve student achievement scores. Touch Math effectiveness was measured by comparing pre and post Mad Minute Tests. The results of this action research study suggest that Touch Math was effective in improving students with disabilities academic achievement as measured by Mad Minute Tests. Furthermore, students with disabilities were able to complete their math facts in less time as the semester progressed. The positive results from this action research study suggest that teaching Touch Math to students with disabilities is beneficial.

Introduction

Students with special needs are increasingly being placed in the general education classroom creating a need for special education teachers to use strategies that improve students with disabilities academic performance. Students with special needs have difficulty understanding abstract concepts. By using manipulatives students with disabilities are able to grasp and understand concepts being taught. Students who are mild mentally disabled or learning disabled have difficulty with memory. Thus, the purpose of this action research study was to examine the effectiveness of Touch Math, a math series that uses manipulatives, on improving students with disabilities math achievement.

Literature Review

Teachers have used math manipulatives for many years. For example, Marilyn Burns (1996) indicated that she has been using manipulative material at all levels for over 30 years and is convinced that she cannot and should not teach without them.

Textbooks, materials, and manipulatives should be carefully evaluated before they are used in the classroom to ensure that they meet student's needs (Lambert, 1996). Manipulatives provide students a concrete basis for developing abstract concepts.

When a child is having difficulty learning a teacher needs to consider how instruction can be adjusted so that it harmonizes with the child (Broody, 1987). Touch Math uses three modalities, visual, auditory, and kinesthetic (Scoot, 1993). When teachers use strategies for all learning styles, individual students are able to learn through

their strongest modality while strengthening the others (Bullock, 1996). Many students with special needs have difficulty using manipulatives. They forget how many they had counted by the time they are ready to transfer the answer to their worksheet. With Touch Math the student does not have to leave the worksheet to calculate the problem. Instead, students are taught that each number 1 through 9 has touch points corresponding to the digits value. Numbers 1 through 5 have single "Touch points" or dots. Numbers 6 through 9 use double "Touch points" which is characterized by a dot inside a circle. In Touch Math calculations, the student touches single "Touch points" once and counts out loud. They count and touch double "Touch Points" twice. This method helps students compute addition problems.

When using the Touch Math strategy the student must be able to rote count up to 20 fluently. This is a skill that seems to be easy for most students to achieve, even students with disabilities. Rote counting is a skill that is started in preschool and continued throughout the primary grades. Most students with learning disabilities and mild mental disabilities are able to rote count with little or no instruction since it has been a part of their preschool instruction.

Methods

Participants

The students who participated in this action research study were enrolled in third and fourth grade. They were identified as having either a mild mental disability, learning disability, or other health impairment. They received special education services in a resource room for more than 3 to 3 ½ hours for direct instruction daily. All students had math goals on their IEPs and received direct instruction from a resource teacher for

45 minutes daily. Written permission was obtained from the parents for all students to participate in this action research study.

The school was an elementary having grades kindergarten through sixth grade. It is located in a small rural community with predominately middle class families. Fourteen percent of the students live within the town limits. Thirteen percent are underprivileged. Thirteen percent come from single parent homes. In 45% of the homes both parents work.

Materials

In the action research study, the Touch Math manual and a videocassette from Innovative Learning Concepts were used to become familiar with the correct procedure in using Touch Math. Touch Math workbooks and supplemental worksheets from the Touch Math Addition Mastery Kit were also used. In addition to the mastery kit Touch Math Addition Flash Cards were used. Touch point posters were made to display in the classroom to help the students remember the location of touch points. Mad Minute Addition Test of 40, 50, and 60 problems were used weekly for the addition tests. Students were permitted to use the Touch Math Number Line to compute problems for the pre-test only.

Procedure

Students were taught touch points on each number one through nine. The Touch Math manual states it should only take one day to teach touch points with students who are in third grade and higher. Although it was not stated, it was believed that the manual was referring to students who were of average or above average intelligence. For this action research study, the teacher allowed the students to practice locating the touch points throughout the 14 weeks. Students were tested each week on Friday using math

Mad Minute Addition Tests (see Appendix for a sample of an addition test). This data was used to measure their improvement with addition facts. Students were not given the Mad Minute Addition Tests until they were able to use Touch Math on worksheets without the touch points. The results of the scores were graphed and compared to determine academic achievement progress. The students were in the math class 45 minutes daily. Only 20 minutes was devoted to using Touch Math to enable the students to cover other math curriculum concepts. After the administration of the pre-test, the following weeks focused on giving the students practice using touch points for computing addition problems. Students worked three days a week adding math problems on worksheets. Worksheets consisted of simple addition facts and two digit addition problems with and without regrouping. One day a week was spent using touch point addition flash cards. Each Friday, before taking the Mad Minute Addition Test, a quick review of how to touch points with numbers 1-9 was done on the chalkboard by the students. The Mad Minute Addition Tests was used to show progress being made with addition facts, as well as answering the action research question (See Appendix for Mad Minute Addition Test.).

Results

Findings

A Mad Minute Addition Pre Test consisting of 40 problems was given before students were introduced to Touch Math. Students were allowed to use a number line, manipulatives, or a touch math number line for the pre test only. The same test was used for the post-test. The students did not use any manipulatives except for Touch Math to compute addition problems for the post-test. The results of the pre test and post-test for

each student are as follows; Student 1 scored 85% with a time of 5 minutes on the pre test and on the post-test 100% with a time 5 minutes. Student 2 scored 98% with a time of 10 minutes on the pre test and on the post-test 95% with a time of four minutes. Student 3 scored 100% with a time of 7 minutes on the pre test and on the post-test scored 100% with a time of 4 minutes. Student 4 scored 23% with a time of 8 minutes on the pre test and on the post-test scored 93% with a time of 4 minutes. See figures #1 and #2 for the results of the 14 week study of their times and percentages on mad minute addition tests.

Discussion

Interpretations

Reviewing the percentage scores and amount of time needed to complete the mad minute addition tests suggests that using Touch Math completion time improved and students' academic achievement scores improved. Students 1 and 3 had prior knowledge of Touch Math. Students 2 and 4 had no prior knowledge to using Touch Math. When comparing the scores for Student 4 it is evident that teaching the use of Touch Math helped to improve his academic score and reduced the time on the mad minute addition tests. However, it should be noted that Student 4 had some difficulty remembering the location of the touch points. After several weeks of having percentages of 74% to 84% an error analysis was conducted. It was noticed that the student was missing addition problems with the number 4. Student 4 was only seeing three touch points instead of four. After re-teaching the number 4 "Touch point" to Student 4 the final test increased by 70%. Student 2 did not show an increase of percentage, but did show an improvement with completing mad minute addition tests in less time. Student 1 increased the percentage 15% between the pre test and the post-test, with maintaining an average of

98% throughout the 14-week study. Student 3 maintained an average of 97% on the mad minute addition tests through out the study. Improvements were made by all students on daily math average worksheets, see Figures 1 and 2 for the results of Mad Minute Addition Tests.

Summary

Previous studies by Kristin Scott (1993) have shown the effectiveness of Touch Math for addition, subtraction, including double-digit problems with and without regrouping. Although this action research study only focused on Touch Math addition, it is believed that these findings support using Touch Math procedures to help students with special needs improve their math abilities.

It should be noted that students were on spring break for a week during the 14 week study. After being out of school for one week all students were able to maintain an understanding of the location of the touch points and were able to score high percentages on the post-test as well as reducing times. Students with disabilities have difficulty maintaining skills learned. The findings of this action research study found that all of the students were able to maintain the skills of touch points consistently. Further studies in how well the students are able to generalize and use the touch points on achievement test needs to be conducted.

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Figure 1: Percentage for Mad Minute Addition Test

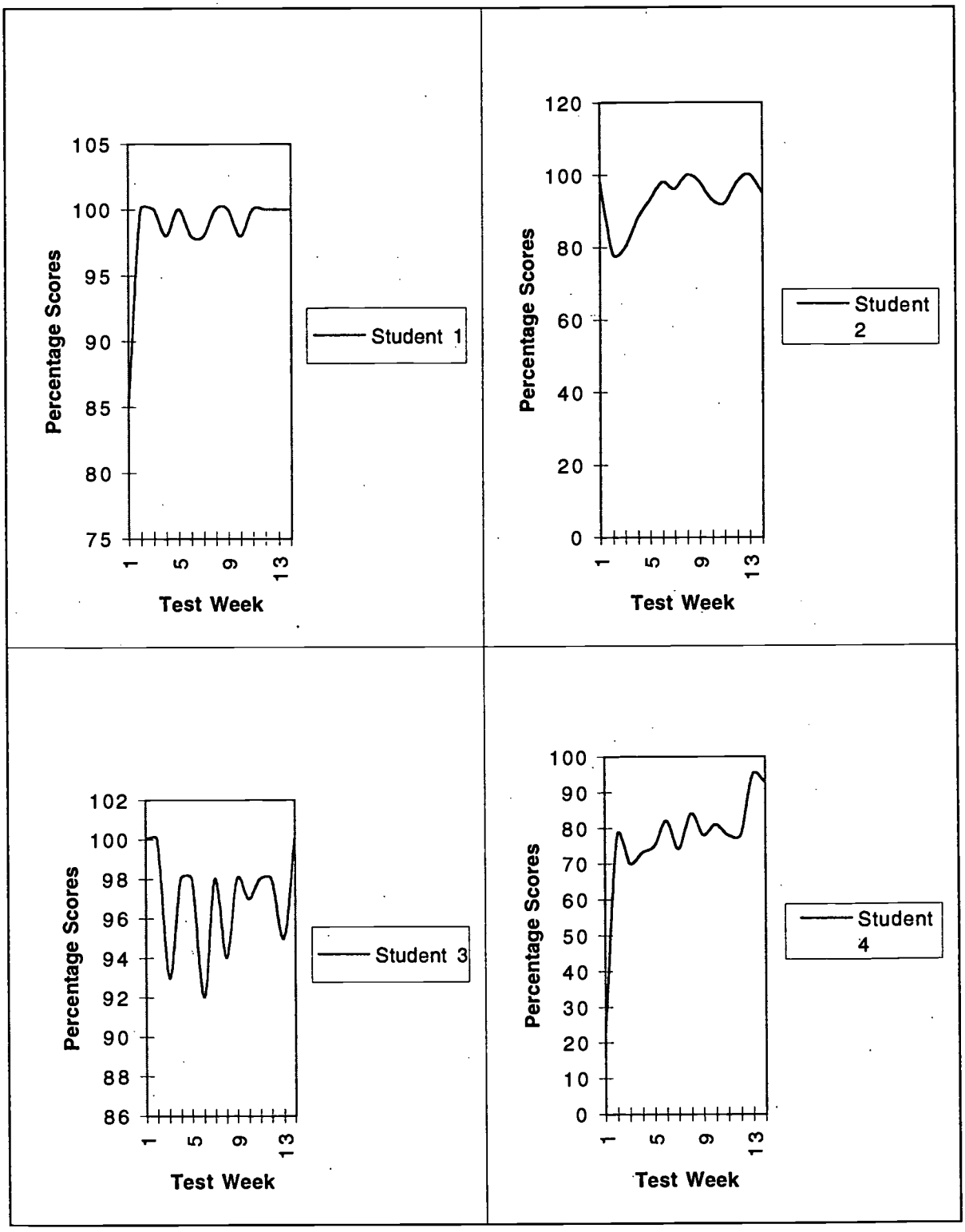
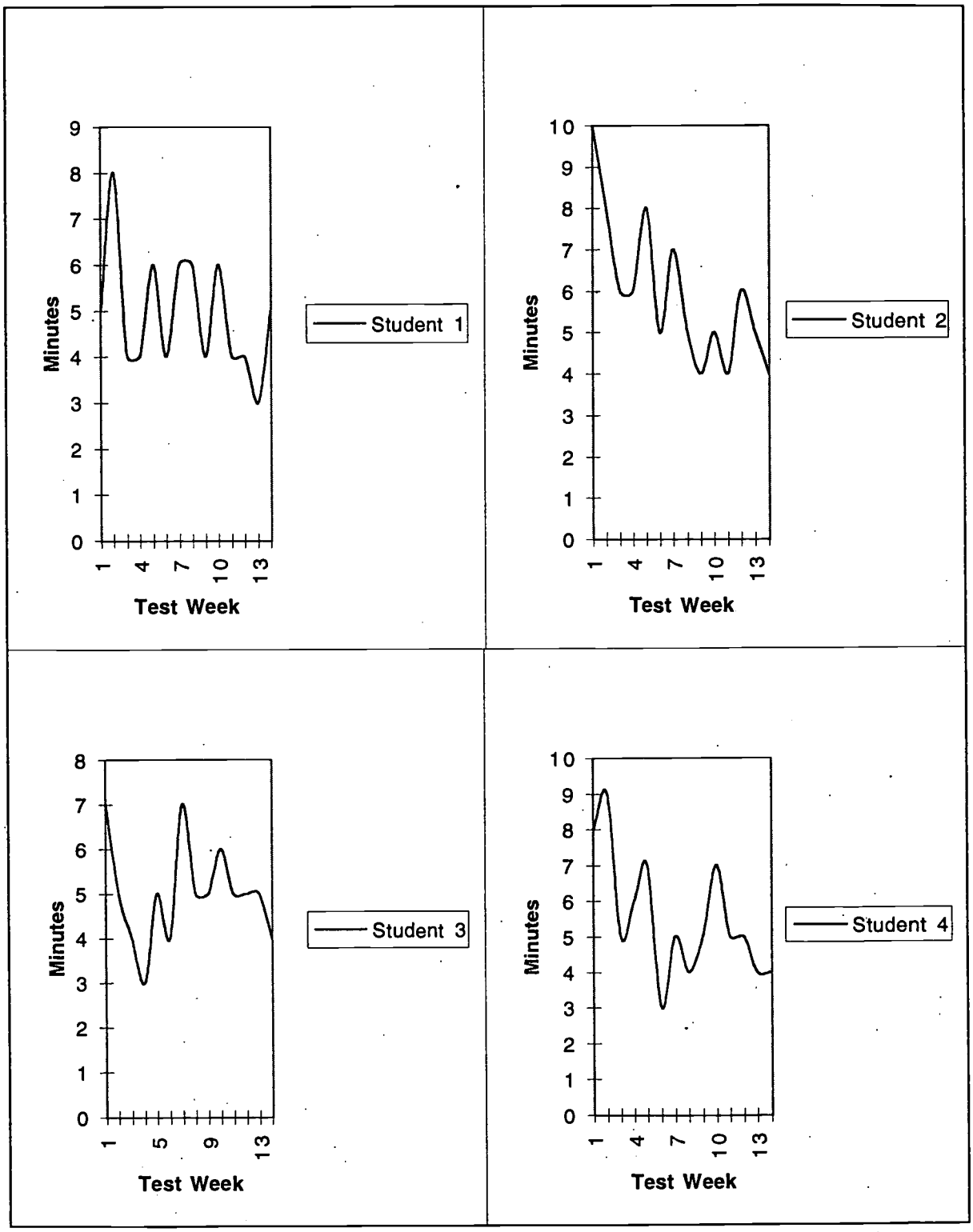


Figure 2: Mad Minute Test Times



Appendix A: 40 Addition Facts

B 1 1 *Forty addition facts*

THE MAD MINUTE

6 +6	1 +9	4 +6	8 +8	7 +6	2 +8	0 +8	3 +6	6 +9	1 +8
2 +9	2 +7	8 +6	7	0 +1	6 +7	2 +6	7 +8	4 +7	7 +9
9 +8	8 +7	3 +9	6 +8	9 +6	5 +5	5 +7	4 +9	3 +8	9 +0
8 +9	5 +6	7 +5	3 +7	9 +5	4 +8	5 +9	8 +5	2 +5	9 +9

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