CHAPTER 1

DETERMINING IF THERE IS AN INCREASE IN MATHEMATICAL ACHIEVEMENT WHEN IMPLEMENTING THE USE OF MANIPULATIVES IN A FIRST GRADE CLASSROOM

(QUASI-EXPERIMENTAL)

Most early childhood educators are aware of the problem that most small children are unable to completely comprehend the concepts of addition and subtraction in their math class. In past years teachers tried to instill memorization of mathematical facts. Teachers did not allow ~~the use of~~ STUDENTS TO USE their hands or other concrete figures while computing math facts. The children were instructed to memorize numbers resulting in an unclear understanding of what they were actually doing.

YOUR OPINION. ORDINARILY YOU WOULD BE REQUIRED TO SUPPORT THIS STATEMENT.

Through the work of Piaget we know that children build two types of knowledge when working with objects: physical knowledge, which is involved in science education, and logicomathematical knowledge, which is involved in math. Logicomathematical knowledge is created when we make relationships between objects. Piaget also revealed that children can obtain sensory information only when they act on an object physically and mentally. The physical knowledge is acquired when children handle objects and observe how they react.

Children need some type of stimulation to help them explore. The purpose of this study is to determine if early childhood children have a greater increase in mathematic ability using manipulative than if they do not use them.

DON'T PUT THE PURPOSE HERE. THIS SECTION JUST LAYS THE BACKGROUND FOR THE PROBLEM STATEMENT THAT COMES NEXT.

Statement of the Problem

WHERE? IN THE COUNTRY? IN ALABAMA? YOU MUST SUPPORT STATEMENTS LIKE THIS.

There is an extremely high percentage of children that have a great amount of difficulty with mathematical concepts such as addition and subtraction. There is not a method of using concrete materials being ~~implicated~~ IMPLEMENTED in all early childhood classrooms. Restricting early childhood students could be restraining them from their full capability in math.

THIS IS SUPPOSITION. WHAT IS THE REAL PROBLEM ON WHICH YOUR STUDY IS BASED.

Purpose of the Study

The purpose of this study will be to determine if there is an increase in mathematical achievement at the early childhood level by implementing the use of manipulatives during their math classes.

Significance of the Study

Teaching mathematics is extremely important with ~~the early childhood~~ children. If they do not develop a strong foundation, innumerable difficulties could appear later. Too often we see a nice facade, with papers done accurately or alogrithms copied and performed well, but the student's understanding does not hold

up when he or she tries to learn the next logically connected concept. If the most basic mathematical concepts are not mastered at a young age, it will be very difficult to build an advanced mathematic ability.

Many educators realize that students desire hands on activities, but what they may not be aware of is the fact that the children are gaining a much greater concrete foundation by using them. A child may know that 5. + 5 = 10, but they have no idea that if you have five blocks in a pile and five blocks in another they have ten in all.

This study is important because ~~this math problem~~ PROBLEMS WITH MATH will follow these children throughout their lifetime if ~~it is~~ they are not corrected at a young age. If educators are given proof that manipulatives are well worth their time and effort, they may be able to implement the use of manipulatives as a requirement in all early childhood math classrooms.

Limiations of the Study

The opportunity to randomly select SUBJECTS will be unavailable for this study. Therefore, the study will not be applicable to every school. However, in an attempt to strengthen this study, a first grade class in a 50% - 50% ratio of black and white students in a school located in a middle socioeconomic community from Montgomery Public School System will be used.

HOW WILL THIS STRENGTHEN THE STUDY?

Random assignment is not feasible because the experiment will be conducted in a classroom setting. Previously developed classrooms will have to be used. In an attempt to equate the two groups (the control group and the experimental group) in terms of ability, the Cognitive Abilities Test will be given to all the students six weeks prior to the study. Analysis of covariance will allow the researchers to make fair comparisons when comparing (post) test results.

→ [Mathematics is a subject taught across the United States. However, the curriculum may not be the same in every school district. Therefore, the study may not be generalizable across the United States.] Because the curriculum is uniform for all elementary schools in Montgomery County, the results will be generalizable to most first grade classes in the county. There will be exceptions for those schools that are extremely different in the county.

YOU SAID THIS PREVIOUSLY.

NOT WITHOUT RANDOM SELECTION

The study will last over a seven week period. This is not an extremely long time span that will put a high threat on the experimental mortality, but because there is always a chance of a subject moving or other reasons for a change in school it is a threat to validity.

Another limitation is the testing procedures. First graders are not usually tested except in special circumstances and this will be one of them. Because they are not tested on a regular basis, they are unaware of the "true" meaning of a test. Because of this, they will not be instructed that they are being tested.

They will be given the test and ask to complete it after the mathematical units has been completed. [This may be a threat because the students may not perform well on their test that day for any number of reasons enabling the study to result in adequate results.] AWKWARD SENTENCE STRUCTURE.

The students' amount of home help varies with each student. A student may show an increase in mathematical ability because of home help and not from the use of manipulatives. This may decrease the validity in the findings of the study, because there is no way for each students to receive equal amounts of home help.

With every attempt to equalize the quality of the teacher from the control group and the experimental group, there will be no way to find two teachers exactly alike. Because the study will involve two of the three first grade math teachers in that particular school, there will be a great limitation in the similarity of the teachers. Both teachers will have at least five years of teaching experience and will be regarded by their principal and peer teachers as exceptional teachers. The teachers will work with the research team prior to the experiment for procedures on instruction for their class. Both teachers will be ask to follow the same procedures except the experimental group will be ask to work with the manipulatives during the instruction and seat work in math class.

GOOD

There may be a threat to validity with the type of testing used because it is not a standardized test. Every attempt will be made to construct a high quality test according to the objectives of the course.

YOU SHOULD DEVELOP PROCEDURES FOR ESTABLISHING VALIDITY AND RELIABILITY FOR THESE TESTS.

Definition of Terms

Manipulative - Any concrete material that the student can place their hand on to use for counting, adding, subtracting, etc. An example of a manipulative that a first grader could use would be beans, blocks, popsicle sticks, etc.

Mathematical Achievement - This will be determined by the teacher made test given to the students at the end of the study. We are looking for the group score differences, not individual achievement.

YOU DON'T NEED TO DEFINE THIS HERE, SINCE IT'S MEASURED BY AN ACADEMIC TEST.

Methodology

The quasi-experimental study will involve first grade students from Montgomery County, Alabama that attend Bear Elementary School. Permission from the principal will be given enabling the study to take place in their school. The study will take place during the last quarter of the school year and will last seven weeks. Six weeks prior to the study the students will be given cognitive abilities test to insure there is equally intelligent students in the control group and the experimental group.

The two first grade math teachers will meet with the research team to go over instructional procedures, objectives and activities. The experimental teacher will be told when to implement the use of manipulatives, which type to use, etc. The teachers will be given lesson plans to follow to help equalize all teaching, except for the use of manipulatives. The teachers will also be advised that they are to have math classes at the same time. This will give

both groups the same chance at learning during a stimulating part of the day. For example, if one group was instructed in the morning and the other group was instructed during the afternoon, the morning group may have a better performance simply because they are more alert at that time.

The teachers will begin teaching the concept of addition on the first day of the seven-week-long study. They will begin instruction according to their lesson plans. The experimental group will be taught by demonstrations using manipulatives and then allowing them time to work with the manipulatives and complete their assignments using them.

The teachers will continue for three weeks teaching addition. At the beginning of the fourth week the teachers will begin teaching subtraction. The classes will work on the subtraction concept for three weeks. The experimental group will use manipulatives to subtract and the control group will not use them.

On the first day of the seventh week both classes will combine addition and subtraction problems to combine their abilities and concepts. The experimental group will still be using manipulatives. The last day of the seventh week the experimental and control group will be given a researcher developed test to determine the mathematical achievement. The research developed test will be content valid because it will be directly related to the instructional objectives set at the beginning of the study.

The research team will grade the test giving each student a

score from 0 - 100. The grading of the test will be double checked by another member of the research team.

Inferential statistics will be used to determine if the independent variable, use of manipulatives, has a true effect on the dependent variable, mathematical achievement. Parametric method will be used for data analysis. The ANCOVA will be applied to the results [and establish results using the T-test.] This procedure will take place with both sets of test.

YOU DON'T NEED A t-TEST IF YOU'RE USING ANCOVA.

The results from the experimental group will be compared as a whole to the results of the control group to determine the experimental group did have a greater increase in mathematical achievement than the control group by implementing the use of manipulatives. The comparison will be done by using the mean~~, median, and mode~~ of each groups scores compiled. If the experimental group has significantly higher scores than the control group, the researcher will be able to conclude that there is greater mathematical achievement in early childhood students that are instructed in math with the use of manipulatives.

GOOD, DETAILED DESCRIPTION OF THE METHODOLOGY. THERE'S ENOUGH INFORMATION HERE TO ALLOW OTHER RESEARCHERS TO REPLICATE THE STUDY.

WORKS CITED

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