



## **The Math and Movement Pilot Study**

The Math and Movement Pilot Study, conducted at Northeast Elementary School, Ithaca, New York, was a ten-week study to test the idea that movement enhanced math learning, math retention and promoted math confidence. One classroom of first graders were taught to skip count and multiply by twos through tens using movement activities and techniques from the book *Multiply With Me: Learning to Multiply Can Be Fun*.

The total number of contact hours was 17.5 which included ten, one-hour sessions and 30 fifteen minute practice sessions.

## **Activities Included in the One-Hour Sessions**

1. The students used the whisper/loud method to practice counting groups of objects. This technique strengthens one-to-one correspondence. The whisper/loud technique is fully described in the book *Multiply With Me*.
2. The students continued to practice the whisper/loud method by combining it with cross-lateral movement activities specific for each number.
3. The children used physical activity to practice skip counting. For example, the children skip counted by threes while doing jumping jacks or skip counted by fours while doing push-ups. The children were encouraged to suggest ideas for physical activities. Some of their creative ideas included: running in place, karate punches, disco dance moves, twirls, or pretending to swing a baseball bat.



## **Activities Included in the Fifteen-Minute Practice Sessions**

The practice sessions were a shortened version of the one-hour sessions. They generally occurred in the last fifteen minutes of the day before dismissal.

## **Data**

Data was collected on each of the students in the first grade class. During the pre- and post- testing, each child was asked to skip count by each number from twos to tens. If a child could count 3, 6, 9, then 9 was recorded. If a child could count 3, 6, 9, 12, 15, 18, then 18 was recorded. If a child could not skip count by threes, then 0 was recorded.

The recording of each child's skip counting was truncated at 20 for twos, 30 for threes, 40 for fours, and so on, regardless of the child's ability to demonstrate skip counting to a higher number. For example, if a child counted to 150 by fives, the data would be recorded as 50. The children knew how to skip count by 2's, 5's and 10's during both the pre- and post-test, therefore the results of 2's, 5's and 10's are not included below.



## Results of the Data Collected in the Math and Movement Pilot Study.

3's pre	3's post	4's pre	4's post	6's pre	6's post	7's pre	7's post	8's pre	8's post	9's pre	9's post
9	30	24	40	0	60	0	63	0	40	0	90
15	30	12	40	-	-	0	56	0	56	0	90
0	30	0	40	0	60	0	70	0	80	0	90
0	30	0	40	0	60	0	70	0	80	0	90
12	30	0	40	0	60	0	70	0	80	0	90
30	30	40	40	54	60	42	70	0	80	0	27
0	12	0	28	0	30	0	28	0	40	0	90
30	30	40	40	48	60	14	70	16	80	36	90
0	30	0	40	0	60	0	70	0	80	0	90
21	30	0	40	0	60	14	70	0	80	0	90
12	30	12	40	12	60	14	70	0	80	0	90
9	30	16	40	0	60	0	35	0	16	0	-
0	30	0	40	0	60	0	70	0	80	0	90
30	30	40	40	60	60	42	70	80	80	0	90
0	30	0	40	0	60	0	70	0	-	0	-
0	30	0	40	0	60	0	70	0	80	0	90
% inc	175	% inc	241	% inc	400	% inc	800	% inc	892	% inc	779



# MATH & MOVEMENT

Because learning math can be fun!

During the pre- and post- tests, each child was asked to solve six addition problems and six multiplication problems. The pre- and post- addition and multiplication problems were the same. The data below represents the number of correct answers. For example, a score of five represents five questions out of the six questions were answered correctly.

Addition	Addition	Multiplication	Multiplication
pre	post	pre	post
5	6	0	6
6	6	5	5
5	6	0	6
6	6	2	5
6	6	6	6
6	6	6	6
2	6	0	6
6	6	6	6
6	6	6	6
6	6	0	4
6	6	0	6
6	6	0	5
6	6	0	6
6	6	0	6
6	6	6	5
6	6	0	6
6	6	0	6



**Here's what the classroom teacher has to say about math and movement:**

*"There is a range of math abilities in my classroom. It is hard to find a one-size-fits-all program. This is the perfect fit for everyone. They all feel successful."*

*Margaret Steinacher, first grade classroom teacher*

**Here is what the students have to say about skip counting and multiplying:**

*"I like to skip count because it's fun."*

*"I like multiplying and skip counting."*

*"I like math because I can do all kinds of math like multiply, plus, and skip count. Also, I like multiplying monkeys. Multiplying is good overall."*

**Here's what parents have to say about math and movement:**

*"I just wanted to thank you for spending time last year doing Multiplying Monkeys in Mrs. Steinacher's first grade class. I am amazed at how quickly Imani learned to multiply. It really built her confidence in math! She is so proud that she was a first grader who could multiply. I especially like that the kids understand what multiplying really is—I hope your research becomes a standard for teaching multiplication."*

*"I was very impressed with the Math and Movement Pilot Study – and surprised – that my son knew so many multiplication facts. I think combining movement with saying the facts must be good for the tactile learners. I wish my other children had benefitted from this study and I hope that Northeast will adopt it permanently."*

*"It was a fun and easy way for kids to learn math."*



**Here's what parents have to say about whether or not math and movement increased their child's confidence in math:**

*"Absolutely! My son loved doing it. He was very proud of the fact that he knew his multiplication and loved to impress us and his sister who is in 3<sup>rd</sup> grade. He is definitely more confident about his ability to do math."*

## **Simon Says "Geometry"**

**Play the game Simon says with geometry. Children learn geometry terminology more quickly when they learn can to make the shapes with their body.**

**Play the game "Simon Says" with the following geometry terms and motions. To play Simon Says, one person is the "Simon. The others players must do what Simon tells them to do when asked with a request that begins with "Simon says." If the Simon says "Simon says make parallel lines," the players must make parallel lines (players that do not make parallel lines are out). However, if the Simon says "make parallel lines," *without* first saying "Simon says," players that do this request are out. Play game until one player is left. This player becomes Simon.**

**Parallel lines are *lines in a plane that do not intersect.***

- **Raise both arms over your head. Make sure that the arms are straight and fingers point upwards.**



**Right Angle:** *an angle that measures 90 degrees.*

- Raise one arm as straight as possible over your head, fingers pointing upwards. Raise the other arm straight out to the side.

**Perpendicular lines:** *lines that intersect to form right angles.*

- Raise one arm as straight as possible over your head, fingers pointing upwards. Use the other arm to cross the straight arm. (Try to cross at the elbow.)

**Acute Angle:** *an angle that measures less than 90 degrees.*

- Demonstrate a right angle by raising the left arm as straight as possible your head, fingers pointing upwards. Raise the right arm straight out to the side. Demonstrate the acute angle by moving the left arm to the right. Do not extend past the right arm.

**Straight Angle:** *an angle that measures 180 degrees.*

- Raise both arms as straight as possible out to each side.



**Obtuse Angle:** *an angle whose measure is greater than 90 degrees and less than 180 degrees.*

- **Extend right arm as straight as possible to side of your body. Raise left arm over your head to demonstrate 90 degrees, then move arm to the left. (Do not point it straight out from your side which would demonstrate a straight angle.)**

**Circle:**

**The definition of circle is *the set of all points in a plane that are the same distance from a given point called the center.***

- **Hold arms out in front, so your fingertips touch. Curve arms so that they approximate a circle.**





## Benefits of Including Math and Movement in your Classroom

- 1. Promotes Equity.** This year, equity is the NCTM's focus in math education. Each classroom has a range of skill level. All children benefit from including math and movement to the existing curriculum.
- 2. Encourages Wellness.** Children benefit from physical activity. The movement activities reinforce crucial math skills and keep children physically active.
- 3. An Efficient System.** In a curriculum packed day, efficiency is essential. Activities can be included in morning meeting, between lessons or while standing in line.
- 4. Strengthens One-to-One Correspondence.** Building skills in one-to-one correspondence lays the foundation for math competence. Kindergartners through third grade benefit from including math and movement activities.
- 5. Low Cost Implementation.** Cost is training the teachers and workbooks for students. The program enhances the Everyday Math program.
- 6. Significant Benefit Relative to the Time Invested.** Program requires little time. Pilot study showed significant improvement in math ability and math confidence in only 17.5 hours.
- 7. Provides a Positive Math Experience for Young Children.** When children participate in math and movement, they feel that they are successful in math. They develop math confidence and the "I can do math" attitude. It is nearly impossible to convince a child that they can do math once a child develops the "I can't do math" attitude. It is crucial to provide positive math experiences before children develop the "I can't do math" attitude.
- 8. Math and Movement Promotes Understanding of Math Concepts.** Math and movement takes multiplication from rote memorization to a level of understanding that allows for life-long improvement in advanced mathematical ability. Learning skip counting at a young age allows children



to use skip counting as a tool when learning multiplication, division, fractions, factoring, and algebra.

9. **Children Enjoy Practicing Math Basics.** The recent National Math Panel report encourages more practice of basic math skills. Children enjoy practicing when it is combined with movement. Practice is necessary for competence.
10. **Movement Enhances Learning.** Research supports the idea that movement and physical exercise enhance learning. According to Carla Hannaford, PhD and author of the researched-based book, *Smart Moves, Why Learning is Not All in your Head*, Great River Books, 2005, “The more closely we consider the elaborate interplay of brain and body, the more clearly one compelling theme emerges: movement is essential to learning. .. Movement awakens and activates our mental capacities. Movement integrates and anchors new information and experience into our neural networks. ...Moving while learning increases learning... And in a close look at thirteen other studies on the exercise/brainpower link, exercise was found to stimulate the growth of developing brains and prevent the deterioration of older brains. ” Eric Jensen writes “Research suggests that physical activity benefits learning. Movement increases heart rate and circulation, enhances spatial learning, provides a break from learning, allows cognitive maturation, stimulates the release of beneficial chemicals, counteracts excessive sitting, and affirms the value of implicit learning.” *Moving With the Brain in Mind*, Educational Leadership, v58 n3 p34-37 Nov 2000.

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