

TOUCHMATH®: IS IT AN EFFECTIVE, DEVELOPMENTALLY APPROPRIATE
INTERVENTION FOR PRESCHOOLERS?

593: Applied Project

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Introduction

Children begin to hear numbers from the moment they are born. At birth, numbers are spoken and written in accordance to the baby's length and weight on a chart. Parents will note how many ounces a baby drinks. Depending on how much math language is spoken at home, the child eventually will start to speak numbers, too. A child may "compare quantities, find patterns, navigate in space, and grapple with problems such as balancing a tall building or sharing a bowl of crackers fairly with a classmate" (NAEYC, 2010) as they play. These are just the fundamental beginnings of learning math skills, which are significant as it is a necessary component for school. Nell, Drew and Bush (2013) expound in their article, *From Play to Practice* on the importance of play and its "experiences to children's forming early understanding about the natural world, mathematical and early literacy ideas and social competence (Nell, Drew and Bush, 2013, p.33). So, what do we observe as math learning in child's play?

Theorists such as Piaget relate a child learning through concrete (hands on) manipulatives to the "sensorimotor stage of development" (transcript, p.3) while Bruner writes of three stages of mental development in the early years whereby children first learn through "concrete, pictorial and symbolic" (Vinson, p.6) and Garner who mentions "bodily kinesthetic" (transcript, p. 8) in his theory of multiple intelligences. Like these theorists, this researcher believes educators need to provide meaningful math experiences through play in preschool thereby laying the foundation for a child's future. However, what math skills are important?

The math skill of one to one correspondence, which lays the foundation for kindergarten, is important for preschoolers to develop and understand. The effectiveness

of TouchMath® was researched for improving math skills in a pilot program with little emphasis on “worksheet activities [which] are not developmentally appropriate” (Grossman, 2008). Worksheets were only used when the children placed their own choice of marker on the empty bubble TouchPoint (TouchMath, 2014) sheet after they used the hands on products.

Purpose Statement

The purpose of this classroom action research is to first examine TouchMath® effectiveness in teaching the intervention method with Pre-K students in one to one correspondence. Secondly, to see whether TouchMath® is effective as developmentally appropriate instruction for four year olds. This was done through researching studies where TouchMath® was used to improve math skills in children from five to eight years olds.

Subjects and Environment

The numbers of participants in this target project totaled eight and all the participants were four years old in age, with the exception of two who turned five before the completion of this project.

Method Section

Materials

Materials were purchased from Innovative Learning Concepts. A seventy-seven page PDF came with the 3D Numerals Teacher Guide which includes masters to run off of all the numerals from 0 to 9 along with instructions on how to use the TouchMath® program.

Materials used for the baseline data included a table, empty egg carton and plastic pumpkin counters bought at a craft store. For safety, the counters and the inside of the egg carton was sprayed with a disinfectant spray. The cardboard egg carton was numbered one through ten on the inside of each well.

The intervention was presented three different ways. Materials used for the first intervention include the TouchMath® Texture Cards. The second intervention used the TouchMath® 3D Numerals which are plastic, five inches in length and come in bright primary colors with raised TouchPoints. The third intervention used foam TouchMath® numerals and counters. The materials used in the assessment process were the laminated TouchMath® posters, TouchMath® Numerals which are made of foam and oversized with separate TouchPoint dots.

Intervention

Three TouchMath® interventions were used to teach one-to-one correspondence. The first intervention used the Textured Cards (which are no longer offered by the company). The second intervention used the TouchMath® 3D Numerals with raised TouchPoints and the last intervention used the foam TouchMath® numerals and counters. TouchMath® emphasizes multisensory learning through TouchPoints on numerals. The quantity of TouchPoints corresponds to the numeric value of the digit. Bullock's (1992) program had taught children to touch the dots on the numerals as they orally voice the numeral as they learn to add, subtract, multiply and divide.

Procedures

The first week of the intervention two participants were worked with for approximately five minutes each day of the week. The students observed the researcher model how to count and touch the card. The second week of the intervention the researcher modeled how to count with the plastic 3D Numerals on the table and the third week of the intervention, the Touch Math® foam numbers and counters were used with TouchMath® posters being taped to the wall for reference.

Summary Results

Each student progressed and one parent noted, “_____ is counting higher and more consistently” (Personal Communication, 2014). During parent conferences some parents mentioned that their child had been clearly distinguishing numbers from letters over a three-week period (see Appendix A). In comparing these findings to the findings in other articles the positive results were expected. However, it is clear that even solely using the texture cards, 3D Numerals, TouchMath® worksheets/counters and foam numerals that TouchMath® is for older students that are not in preschool. In other words, if used for PreK it would be best introduced in the spring or at the end of the year to give the students time to mature and socially bond. The students did well in using the texture cards, which unfortunately are no longer sold and the 3D numerals yet struggled when it came to the foam numerals and foam counters. Initially, when the students were given the counters to place on top of the numbers many students seemed to forget where they were to place them or they took too many of the foam dots to put on.

Discussion

The purpose of this study was twofold: to see if TouchMath® was an effective

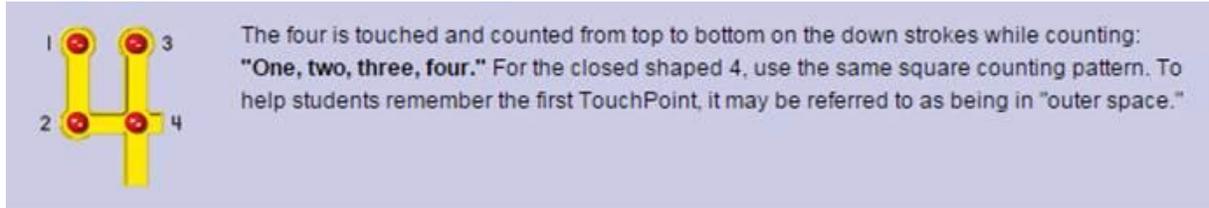
appropriate intervention for preschoolers and to use TouchMath® to teach the Early Learning Standard of one to one correspondence. The main finding of this study was that TouchMath® was a positive math intervention for four year olds and that children in PreK did develop one to one correspondence but less easily with other materials.

As for TouchMath® being appropriate, in an article by Linda Espinosa entitled, *A High-Quality Preschool: Why We Need It and What it Looks Like* (2002), children are to choose “from a variety of activities, decide what type of products they want to create... to make meaningful decisions throughout the day” (2002, p.5). It is they that need the “opportunity to learn basic school readiness skills [such as] concepts of numbers” (2002, p.5). So, children should have choices about how they should learn.

Other interesting findings were in how the students tapped and counted the numbers four and five. Some students tapped and counted the number four in a U-like fashion instead of counting top to bottom and top to bottom, a horizontal left to right fashion or in tapping and for counting the number five, students would start at the top and count the first three TouchPoints correctly then go to the last point instead of tapping the 4th which they use to count last.

It was at this point that the researcher contacted a TouchMath® representative via email to ask why TouchPoint placement (see Figure 1) was so crucial. Within 24 hours Jane Lord, answered the question of TouchPoint placement and how a “student would become confused when using subsequent activity sheets” (Lord, 2014). She likened “the number four TouchPoint placement...similar to the letter H” and instructing a child to count “top to bottom for the TouchPoint placement of 1, 3 (for top) and 2, 4 (for bottom).

Figure 1. Correct TouchPoint Placement Diagram (Touchmath®, 2014)



Overall Implications

Four implications can be drawn. The first implication is that with TouchMath® being verbally, visually, auditory and kinesthetic in form, it is well suited for preschoolers who use their senses to play while they are learning. Children learn a number of ways and offering them numerous ways to understand math with their senses is a wonderful way to instill curiosity into their math learning. TouchMath® did positively help students in fulfilling the one to one correspondence for “Arizona’s Early Learning Standard; Strand 1: Counting and Cardinality, Concept 3 counts to tell the number of objects (a. Counts groups of objects using one-to-one correspondence (one object for each number word))” (ELS, 2013) which is noted through the data analysis and trends (see Appendix A).

The second implication is that only two TouchMath® products that truly held the preschoolers interest were the Texture Cards and 3D Numerals. The foam numerals needed a visual cue of the TouchPoint Poster and were bent during instruction. Thematic plastic markers were used but any manipulatives in class will do with the paper worksheets. Lee and Ginsburg (2009) state in their article Early Childhood Teachers’ Misconceptions About Mathematics in Education for Young Children in the United States carefully cautions educators about “the use of materials [and how it] is effective only when they are used to encourage children to think and make connections between

the concrete and the abstract mathematical idea. It is not so much important that they simply have their hands on, but rather that they have their minds on” which is a point well taken (2009, p. 42).

Thirdly, was to assess children as NAEYC (2010) states through “child observation, documentation of children’s talk, interviews, collection of children’s work over time and the use of open-ended questions and appropriate performance assessments to illuminate children’s... mathematical strengths and needs” with both qualitative and quantitative methods (2010, p. 9). This study administered both qualitative and quantitative methods to reflect upon its developmentally appropriateness for preschoolers.

The last implication is to be flexible in math curriculum choice. There is no perfect approach that children will learn from. Children learn many different ways and an effective educator needs to have numerous methods at his/her disposal to help their struggling students. If only one lesson can be drawn from all these studies is to be wise enough to let it go if students do not learn. It is vital for the educator to do their part so that children will be able to do theirs: and that is to learn.

Limitations

Limitations that persisted within the treatment of this study ranged the gamut from the age of the students and illness to the classroom noise, school schedules and events. This pilot program was limited in that there was no other research or literature on using TouchMath® with preschoolers to refer to in how to deal with the issues of direction confusion and staying on task for such little ones. Previous research conducted with Kindergarteners sought to answer its effectiveness with addition, subtraction, and word problems instead of one to one correspondence. Most of the research found

focused on students with mild learning disabilities, which differed from the objective of this study.

Lastly, “the experimenter [teacher] of this study also authored the paper” (Korb, 2013) and manipulated groupings of students when friendships developed amongst the participants. The teacher selected the manipulatives (instead of the students as initially stipulated) to maintain interest levels and changed the Friday reviews when the small group of participants could not maintain focus at the table. Moreover, the researcher was biased in the fact that both of her children had TouchMath® ten years ago when they were in Kindergarten. It was this very fact that prompted the research itself since it had not been offered to preschoolers back then.

Next Steps/Recommendations

The next step is for additional research to be conducted regarding a younger target population (such as three year olds) since the company explicitly advertises to preschoolers from 3 to 5 year olds. Creating math products for younger children not only need to be fun (like a toy) durable (if dropped), and appealing to the senses (physical to touch, smell, hear and see) but made more for play; not worksheets. The next step for this class is to offer the seven students the full pilot program that did not get the intervention the same opportunity to learn TouchMath® using the same products.

Conclusion

The findings of this study conclude that TouchMath® indeed was decisive in increasing the participant’s knowledge for one to one correspondence with the added benefit of number identification. Students often squealed with delight at the products causing a stir in the classroom to the point that other children would come over to the

table to see what was happening. It held their interest and was durable for weekly interventions. TouchMath® was practical in everyday conversations, as children would count who was at the table during lunchtime or in line.

Analysis from the data collection implies the gains made by all the students. The numbers one through three were found to be easy for the students to learn. As to the numbers four and five the correct TouchPoint tapping was not as simple as the other numbers. Students diverted to the wrong TouchPoint. Sometimes they would self correct while other times the teacher prompted them to “try again”.

However, the appropriateness of this program for young four year olds did not meet this researcher’s criteria fully with the emphasis on seatwork offered on the DVD disks rather it was the physical items that were fun, creative, captivating to the preschoolers. Currently, TouchMath® offers a PreK Classic Kit for 3-5 years olds that uses “a workmat format [which] offers the options of coloring and writing, or using manipulatives to learn a new concept” (TouchMath, 2014). This researcher would love to see these products made into plush toys for the children to hold. Songs, puppets and counting poems besides props are always a big hit with children. TouchMath® advertises, “Uno Bear and his cuddly Critter Crew friends will engage your preschoolers and help them stay focused as they learn through play” (TouchMath, 2014). Within this DVD box are masters to many worksheets. Masters and many worksheets are not a developmentally appropriate teaching method in Preschool as cited by NAEYC, New Mexico PreK and Blausin.



The National Association Education for Young Children (NAEYC) state in their article, *10 Signs of a Great Preschool*, “children should work on projects and have long periods of time to play [emphasis added] and explore. Worksheets are used little if at all” (NAEYC, 2). TouchMath® sells their product digitally all in a box with only worksheets which saddened this researcher because the Texture Cards, which were discontinued, were such a big hit with the participants in this study as well as the 3D Numerals. Apps are also sold but were not used for this research.

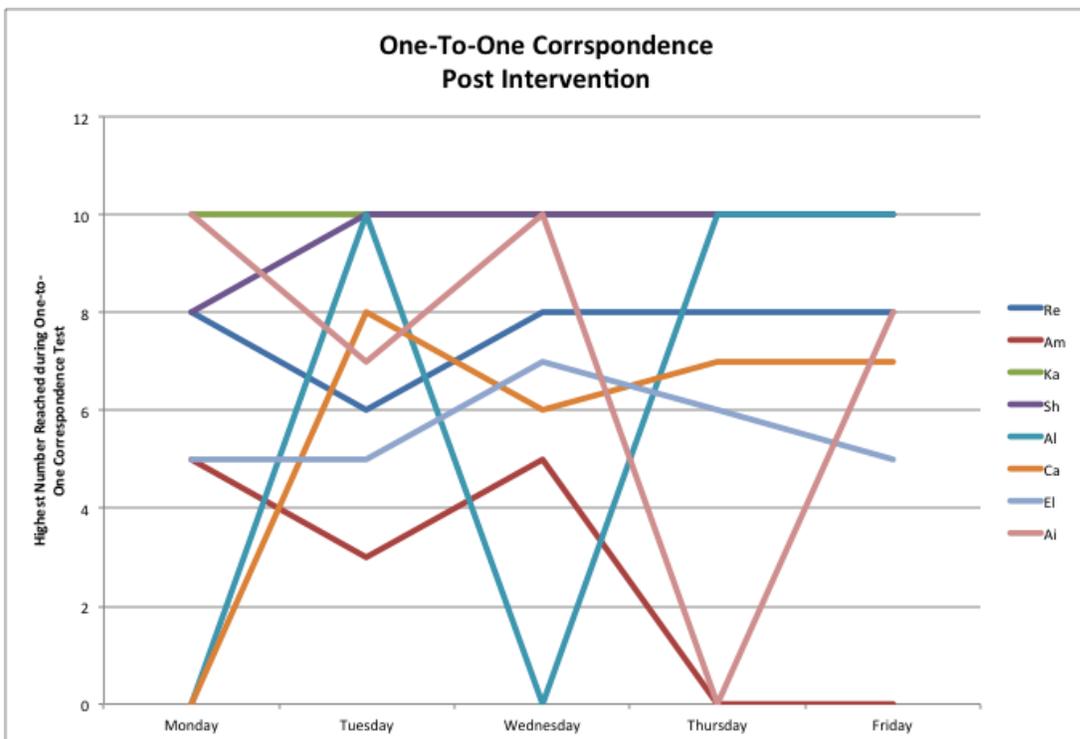
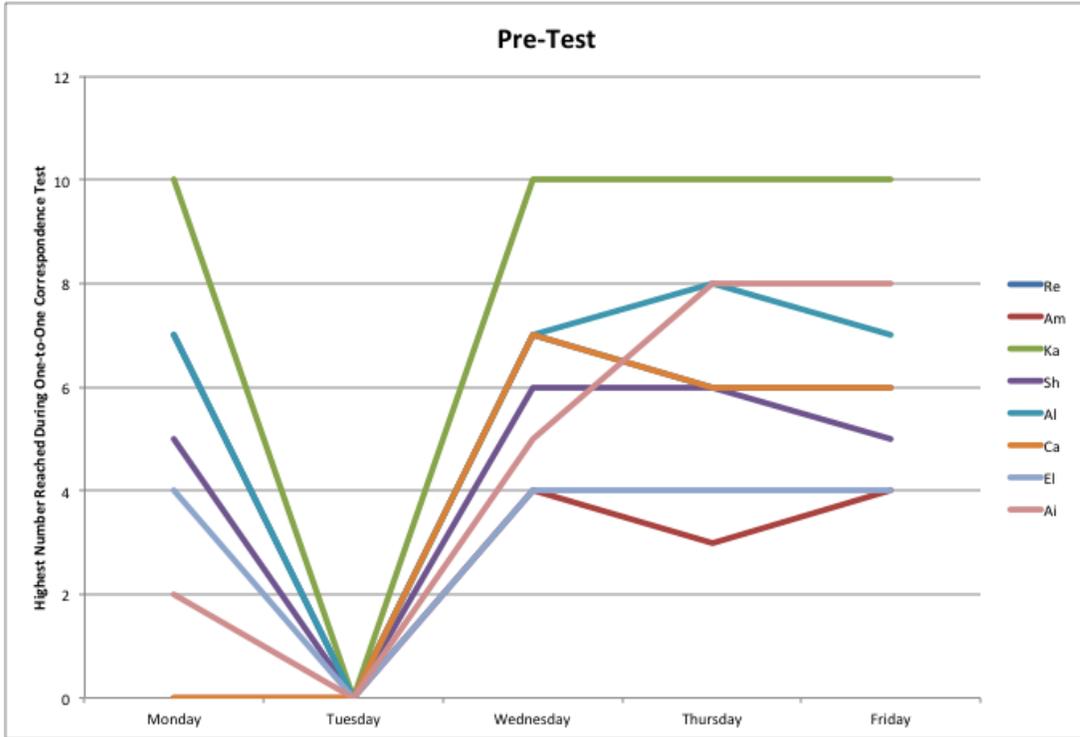
Blausin writes in *The Basics of Learning Readiness* for developmentally appropriate practice in NAEYC’s *Beyond the Journal*, of teaching children the three I’s (instead of the three R’s) which stand for “successful interactions not only expand a child’s personal knowledge base, social skills, and language abilities but also build self-esteem and create the confidence needed to instinctively make good decisions in challenging academic tasks in the future, imagination [in which children] explore and test creative ideas and develop a sense of which sets of circumstances are fact and which are fantasy [and] for the integration of the senses and how children build understanding and insights into the concrete world; generates new ideas; and allows children to wonder about, discuss and explore different outcomes” (Blausin, 2005, p.7, 8).

In preschool, less emphasis is given to sitting at a table unless the students are eating breakfast, having lunch, creating something, using manipulatives, clay, games, etc. In fact, the center where the research took place was a play-based center adhering to the state guidelines where “you won’t see children sitting at desks in a PreK classroom. PreK children are active-busy-working” (NM PreK, 2014). Playing is learning; worksheets are just that: work. This educator/researcher provides and considers “hands on play and

reflection experiences [important as they] lead to insight into children’s learning and the teaching process” (Nell, Drew and Bush, 2013, p. 33).

Lastly, were the unexpected benefits of how the program affected the participants. A post survey with open-ended questions asked the parents what changes had been noted in the past four months. Through the responses the researcher learned that other children had generalized their skills at home. One mother told of how her daughter identified numbers (distinguishing them from letters) and counted things in her environment including “pictures and grapes on her plate” (McKeough, 2014). Another mother wrote how her son “challenged himself and counted as high as he could” (Sleigh, 2014). The researcher had no idea how much this program had touched her participants families and was so glad she followed up with the parents to hear how it changed their children’s lives.

Appendix A: Charts



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