



Increasing Math Participation using Manipulatives

Jenesis Cabjuan

University of Hawaii West O'ahu



Abstract

The idea of using manipulatives such as blocks, counters, cubes, and even finger counting for math up until mid-elementary school and the emphasis on mental math with some written work can be detrimental to students as they progress into higher grade levels. Not only should focus shift to using such manipulatives but contribute towards a student's understanding in math and willingness to participate in math discussions inside and outside of the classroom.

Introduction & Research Question

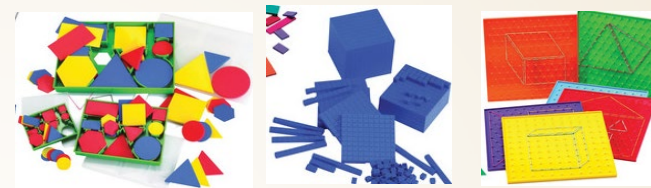
With math becoming an increasingly difficult concept for students to grasp, so has the motivation and confidence to participate in math discussions. Without math discussion students become shy and unwilling to share their thoughts and questions with peers, leading to an unfulfilled understanding and perspective of math entirely. By encouraging the use of various math manipulatives in the classroom there is hope for students to regain confidence in participating in math and finding it enjoyable, rather than scary and confusing.

How can using math manipulatives increase math participation in the classroom?

If using manipulatives at any grade level were acceptable, then students would be more confident in their math skills because it encourages participation in math discussions.

Methods

The necessary peer-reviewed journals and articles used to support my research questions were gathered through the University of Hawaii West Oahu Library online database and National Council of Teachers and Mathematics (NCTM). These resources further explored the idea of using math manipulatives in the classroom to increase math participation and student engagement.



Discussion & Results

Based on the research, developmentally appropriate manipulatives appeal to the senses and stimulate the student to bridge the gap from their sensory environment to more abstract ways of mathematical thinking. This goes hand in hand with student participation as it allows students to engage in a positive experience with math and overcoming difficulties one concept at a time with the right manipulatives.

After receiving different math manipulatives and using them in a workshop, the students were observed to have a positive change in attitudes, participation, and interactions. Students enjoyed each manipulative and exhibited confidence to engage and interact with peers. They also showed willingness contribute meaningful connections to group discussions.

TABLE 1 USEFULNESS RANKINGS

1	A	B	C	D	E	F	G
2	MANIPULATIVE	RATING	RATING	RATING	RATING	RATING	MEAN
3	NAME	5	4	3	2	1	RATING
4		FREQUENCY	FREQUENCY	FREQUENCY	FREQUENCY	FREQUENCY	X
4	OVERHEAD TI-34 CALCULATOR	37	2	1	0	0	4.90
5	TI-34 CALCULATORS	35	3	2	0	0	4.83
6	TI-81 GRAPHING CALCULATOR	36	1	0	1	0	4.65
7	WOODEN GEOBOARDS	27	12	1	0	0	4.65
8	OHP GEOBOARD	25	14	1	0	0	4.60
9	OHP TI-81 GRAPHING CALCULATOR	34	3	0	0	1	4.58
10	RUBBER BANDS	25	13	2	0	0	4.58
11	OVERHEAD TRIMAN COMPASS	26	9	4	1	0	4.50
12	SAGE KIT GEOMETRIC MODELS	25	10	4	1	0	4.47
13	TRIMAN CLASSMATE COMPASSES	25	10	4	1	0	4.47
14	OVERHEAD ALGEBRA TILES	22	12	6	0	0	4.40
15	ALGEBRA TILES	22	11	7	0	0	4.38
16	OVERHEAD ATTRIBUTE BLOCKS	20	14	6	0	0	4.35
17	TRIMAN CIRCLE PROTRACTORS	23	10	4	2	0	4.28
18	COLOR CUBES	16	19	5	0	0	4.28
19	OVERHEAD PATTERN BLOCKS	18	15	6	1	0	4.25
20	PATTERN BLOCKS	18	15	6	1	0	4.25
21	TRANSPARENT CIRCULAR COUNTERS	18	10	10	1	1	4.08
22	OVERHEAD COUNTERS	20	9	7	1	1	4.00
23	DICE	13	11	9	7	0	3.75
24	OVERHEAD FRACTION BARS	14	12	7	2	3	3.65
25	OVERHEAD SPINNERS	10	14	10	5	0	3.65
26	POLYHEDRA DICE	5	9	13	10	2	3.05



Conclusions

- Math manipulatives provide a positive hands-on experience for students
- Students gain confidence, increase participation, stay on task, and engage more often when using math manipulatives



Contact

Jenesis Cabjuan
University of Hawaii – West Oahu
Email: cabjuanj@hawaii.edu

References

1. Ernest, P. S. (1994). *Evaluation of the Effectiveness and Implementation of a Math Manipulatives Project*.
2. Hand, V., Kirtley, K., & Matassa, M. (2015, November). Narrowing Participation Gaps. Retrieved September 25, 2020, from <https://www.nctm.org/Publications/Mathematics-Teacher/2015/Vol109/Issue4/Narrowing-Participation-Gaps/>
3. Yeatts, K., & Dade Public Education Fund, M. F. (1991). *Manipulatives: Motivating Mathematics*.