

## APPENDIX I: INSTRUCTIONS FOR USE

The following are the steps to follow when setting up the Nesting Number Blocks for learning.

### Initial Set Up

(set up completed by the instructor)

If necessary, unnest the blocks from each other. The Nesting Number Blocks can be placed on the floor or a table. They can either be arranged according to their size or scattered around each other. It is important to note that the boxes must be placed with the open side facing up.

### Approach 1: Teacher Facilitates Learning

The Nesting Number Blocks can be incorporated as a one-on-one lesson within the classroom. However before a formal lesson, the student should have the opportunity to explore the manipulatives on their own.

The teacher and student sit down together with the instructor teaching the concept of numbers both verbally and visually. Researchers Furner and Worrell (2017) caution that teachers cannot assume that students will automatically discern the correct conclusions from using manipulatives without guidance.

Through verbal and visual means, the teacher can explicitly show the student the math concepts behind the 1-unit block, 2-unit block, etc by showing them the symbols on the blocks and demonstrating how the blocks fit inside each other.



Figure 1. Two 1-unit blocks in a 2-unit block to demonstrate the concept of addition

The teacher should also scaffold learning by asking open-ended questions such as “How could you show me?” to engage the student and encourage them to explore the answers.

## Approach 2: Student Explores Manipulatives Alone

It is important for users to also play and explore the manipulatives and start to make connections on their own and discover different ways to solve a problem.<sup>30</sup> According to Jean Piaget, it is essential for learners to experiment in order to gain understanding. One of Piaget's central ideas is that humans create their own understanding of the world by interacting with the objects within it and learning through play.<sup>31</sup>

Through exploratory means, students may attempt to stack blocks inside of each other. Stacking smaller blocks such as the 1-unit block into larger blocks like the 5-unit block implies that 5 is larger than the smaller unit blocks. Additionally, if the student attempts to stack a larger block inside of a smaller block, such as the 5-block inside of the 1-block, they would not fit and thus the student would learn that the number 1 is less than 5. Learning by trial-and-error and making mistakes is an important part of the learning process.

## References

Fournier, C., "How Jean Piaget's Theories Underpin Math Mastery," *Maths No Problem!* September 15, 2022, <https://mathsnoproblem.com/blog/teaching-maths-mastery/piagets-theories-underpin-maths-mastery>

Furner, J.M. and N.L. Worrell, "The Importance of Using Manipulatives in Teaching Math Today," *Transformations*, Vol. 3, 2017, <https://nsuworks.nova.edu/transformations/vol3/iss1/2>

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<sup>30</sup> Furner, J.M. and N.L. Worrell, "The Importance of Using Manipulatives in Teaching Math Today," *Transformations*, Vol. 3, 2017, <https://nsuworks.nova.edu/transformations/vol3/iss1/2>

<sup>31</sup> Fournier, C., "How Jean Piaget's Theories Underpin Math Mastery," *Maths No Problem!* September 15, 2022, <https://mathsnoproblem.com/blog/teaching-maths-mastery/piagets-theories-underpin-maths-mastery>