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# USING THE “DO IT, DRAW IT, WRITE IT” METHOD TO HELP PRESERVICE TEACHERS ENGAGE ELEMENTARY MATH LEARNERS

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## **Abstract**

This paper introduces, examines, and applies the “Do It, Draw It, Write It” method of scaffolding early learners’ mathematics instruction. Specifically, it focuses upon how faculty members can facilitate the use of the “Do It, Draw It, Write It” method in teacher education to help preservice teachers meet the needs of elementary-level students learning mathematical concepts. Modeling fractions—a frequently challenging topic for early learners—is used for the example of the “Do It, Draw It, Write It” method. The appropriate uses of mathematics manipulatives (such as pattern blocks, in this case) are emphasized for the “Do It” and “Draw It” portions of the method.

## **Introducing the “Do It, Draw It, Write It” Method**

In our preservice teacher education program, students who wish to become elementary classroom teachers take a mathematics methods course that focuses upon both theoretical perspectives and hands-on approaches to teaching mathematics to young children. From a theoretical perspective, preservice teachers are introduced to learning theorists, such as Jean Piaget and Lev Vygotsky, so that the stages of cognitive development and the importance of scaffolding are understood in relationship to helping early learners grasp challenging mathematical concepts, such as fractions. Preservice teachers are trained in the appropriate use of manipulatives, such as pattern blocks, when introducing and exploring mathematical concepts with children. Further, in order to help children transfer learning from concrete to abstract, preservice teachers are introduced to the “Do It, Draw It, Write It” method of scaffolding children’s mathematical thinking from concrete (using manipulatives) to pictorial (using drawings) to abstract (using symbols) levels.

## **Examining the “Do It, Draw It, Write It” Method in Preservice Teacher Education**

The “Do It, Draw It, Write It” method is introduced to preservice teachers at the beginning of the semester and is used throughout the course, each and every time mathematics manipulatives are employed. Obviously, this method has three components or stages, which are explained below.

### **“Do It”**

The “Do It” stage allows children to explore and play with the mathematics manipulatives at the concrete level. Such “hands-on activities activate kids’ brains” (Cleaver, 2012) and help them process the concepts that are represented visually and kinesthetically (Smialek, 2012).

While it is crucial for children to explore mathematical concepts using manipulatives, it is also important for them to eventually transfer from concrete to more abstract levels of thinking and learning (Kamina & Iyer, 2009). Preservice

teachers realize that if they stop at the “Do It” stage, the manipulatives are simply used for fun. In other words, preservice teachers are failing to take their students to the next level.

### **“Draw It”**

The “Draw It” stage allows children to record what they are doing with the manipulatives in pictures. The children are transferring from a concrete object to a pictorial representation of the object, which is, in itself, a level of abstraction. This stage helps students record their manipulations, employing visual, kinesthetic, and tactile learning at a pictorial level (Smialek, 2012). At lower levels, children can trace the manipulatives, while older children can simply draw what they have done. This process takes student to a pictorial level of abstraction.

### **“Write It”**

The “Write It” component helps children analyze the visual representations of the manipulatives and express them in written form at an even higher abstract level. This is the ultimate goal. The children translate the pictures into numbers and symbols. They also explain the process in their own words. Explaining allows them to reach a much deeper level of understanding.

In the beginning the preservice teachers need to help the children with the symbolic interpretations, but eventually the children will be able to translate by themselves.

It is postulated that the repetition of the “Do It, Draw It, Write It” method is especially helpful for children whose minds have not yet matured to the abstract level of thinking. The concrete manipulations and the visual representations experienced by these children will provide them with something to fall back upon when faced with only symbolic representations. Eventually, the children will not need the concrete manipulatives, as they will be able to see them in their minds and translate those mental images into abstract symbols.

**Special Note:** While some systems recommend incorporating two of these stages at a time, the authors support doing all three stages, as it better allows for scaffolding and can wean the children off the need for the concrete manipulatives.

### **Applying the “Do It, Draw It, Write It” Method**

Mathematics manipulatives, such as pattern blocks, can help children understand more challenging mathematic concepts, such as fraction. So, preservice teachers practice solving fractions problems and puzzles, using pattern block manipulatives themselves,

such as those shown in Figure 1 below.

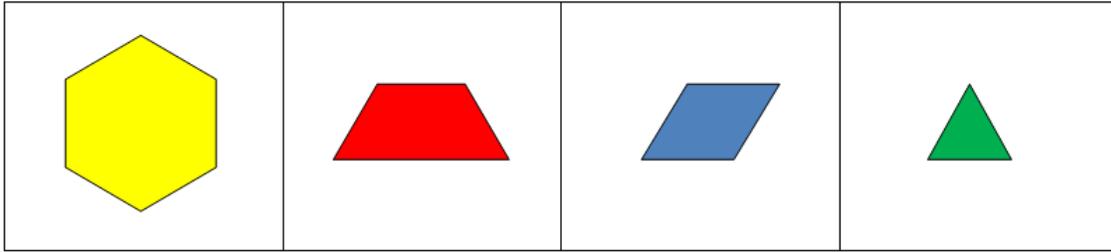


Figure 1: Pattern Block Manipulatives

For example, preservice teachers are asked to consider two yellow hexagons (pattern block manipulatives) as a whole ( $=1$ ), as show in Figure 2: Pattern Blocks Used to Represent the Whole (1) below.

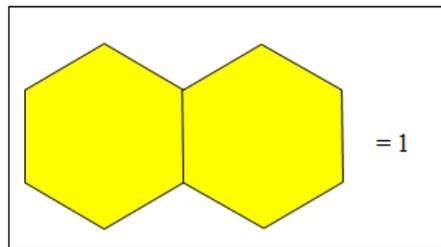


Figure 2: Pattern Blocks Used to Represent the Whole (1)

Based upon the whole presented above, preservice teachers use manipulatives to determine the following, shown in Figure 3: Problems to Solve Using Pattern Block Manipulatives below.

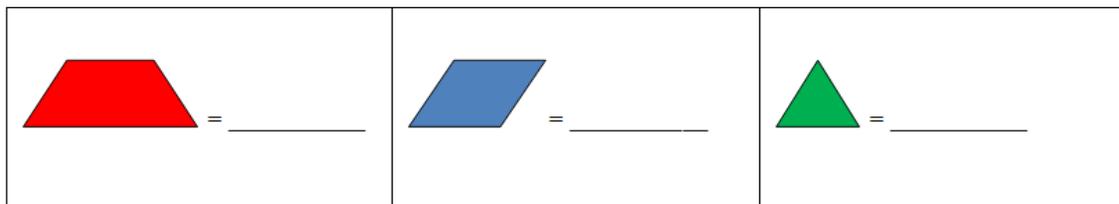


Figure 3: Problems to Solve Using Pattern Block Manipulatives

They physically use the manipulatives to show how they derived the solution to the problem as shown in Figure 4: Visual Representation of Solutions Using Pattern Block Manipulatives below. ("Do It" is a key, essential step for helping the children understand fractions, especially visual learners.)

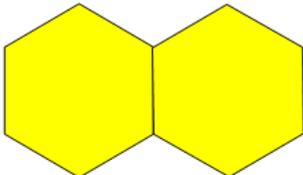
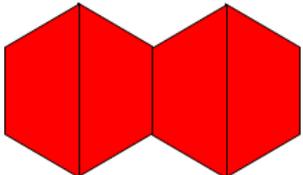
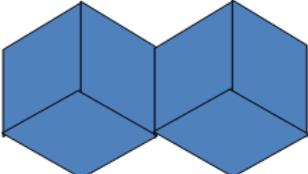
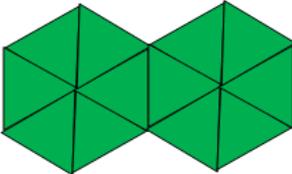
	<p>In this example, preservice teachers begin with the whole object, which is considered 1.</p>
	<p>Preservice teachers are provided with sufficient manipulates to solve the problem. They use the manipulates to create a visual representation/solution for each problem.</p>
	

Figure 4: Visual Representation of Solutions Using Pattern Block Manipulatives

Next, for each step of the problem solving process, they draw what they have done. If there are multiple steps, they create multiple drawings. (“Draw It” is a key, essential step for helping the children, especially kinesthetic and tactile learners.)

Finally, preservice teachers also write the symbolic/numeric representations of what they have done. Along with mathematical symbols, they explain their thinking in narrative text. The recorded explanation of how preservice teachers solved each problem or puzzle serves as a reference for future, more complex problems and puzzles. The analysis necessary for writing about their problem-solving process promotes higher-level thinking and facilitates long-term memory storage of the entire process. (“Write It” is a key, essential step for helping the children clarify and express their thinking as well.)

### Conclusions

In conclusion, we have found the “Do It, Draw It, Write It” method of working with manipulatives in mathematics preservice teacher education very beneficial. Each term, several preservice teachers express to us how they wish this method was used when they were learning mathematics in elementary school. Other preservice teachers humbly reveal that the “Do It, Draw It, Write It” method has helped them understanding many mathematical concepts that they either struggled with or simply never grasped . . . until now. Most important though, with the consistent use of the “Do It, Draw It, Write It”

method, we are confident that our preservice teachers will be able to use this scaffolding technique to help transfer mathematical learning from concrete (using manipulatives) to pictorial (using drawings) to abstract (using symbols) levels with the children they will teach.

### References

- Cleaver, S. (2012). *Hands-On Is Mind-On*. Retrieved from Scholastic:  
<http://www.scholastic.com/browse/article.jsp?id=3751901>
- Kamina, P., & Iyer, N. N. (2009). *From Concrete to Abstract: Teaching for Transfer of Learning When Using Manipulatives*. NERA Conference Proceeding. Retrieved from [http://digitalcommons.uconn.edu/nera\\_2009/6](http://digitalcommons.uconn.edu/nera_2009/6)
- Kirkpatrick, J., Swafford, J., & Findell, B. (2001). *Adding It Up: Helping Children Learning Mathematics*. Washington, D.C.: National Research Council.
- Smialek, M. A. (2012). *How Do Children Learn?* Retrieved from Together We Can Make a Difference:  
[http://www.maryannsmialek.com/resources/articles/how\\_learn.html](http://www.maryannsmialek.com/resources/articles/how_learn.html)