

Battista's Levels of Spatial Structuring 2-D Arrays

Level 1: Complete lack of row or column structuring

The student makes no use of a row or column as a composite unit. He or she has difficulty both visualizing the location of the squares in array and counting square tiles that cover the interior of a rectangle.

One-dimensional paths, fill the borders, follow a unidirectional path

Level 2: Partial Row-or Column-Structuring

The student makes some use of a row or column as a composite unit, but this composite is not used to cover the whole rectangle.

Structure one dimension but not both. Example: use repeated addition in the rows but not able to consider simultaneously how many rows (Fosnot)

Level 3A: Structuring an Array as a set of row- or column composites

The student conceptualizes the rectangular array as being completed by copies of row- or column-composites but does not properly coordinate those composites with the orthogonal dimension.

Use square as indicators as to how many columns and rows but struggle to understand how one square can simultaneously represent a column and a row. (Fosnot)

Level 3B: Visual Row-or Column-Iteration

The student iterates a row-as-composite by distributing it over the element of a column. When either drawn squares or square tiles are available, the student uses them to index the iteration. When perceptual material is absent the student determines iterations by visually estimating how the rows fits in the rectangle.

Level 3C: Row-by-Column Structuring: Iterative Process Interiorized

The student iterates a row or column, using the number of squares in an orthogonal column or row to determine the iterations. The original perceptual material (drawn squares or square tiles) is not used during the iteration.

Can consider one square as implicitly both a row and a column. (Fosnot))

“The Constructivist view of the operation of the mind such structuring is not “in” the arrays- it must be personally constructed by each individual.

The traditional instructional treatments of multiplication and area need to be rethought. If students do not see a row by column structure in these arrays, how can using multiplication to enumerate the objects in the arrays, much less using the area formulas make sense to them?

“Students’¹ Spatial Structuring of 2 D Arrays and Squares”

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