


Chapter 9


Modern Art Meets Early Math: Cuisenaire Rods, Neuroscience, and Project-Based Learning in the Preschool Atelier

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ABSTRACT

This chapter explores how modern and contemporary art practices can enrich mathematical learning in early childhood through the use of Cuisenaire rods. Traditionally designed to represent numerical relations, these manipulatives are reimagined as artistic and modular elements that link mathematics with visual culture, design, and embodied inquiry. When children engage with art-inspired projects—drawing on movements such as De Stijl, Bauhaus, and Minimalism—they explore concepts like symmetry, proportion, and pattern in playful, sensory ways. Research in educational neuroscience highlights that early brain development benefits from novelty, multisensory experiences, and emotional salience (Goswami, 2006; Immordino-Yang & Damasio, 2007). Thus, integrating art with mathematical tools fosters deeper spatial reasoning, pattern recognition, and numerical fluency (Mix et al., 2016). Projects inspired by artists such as Mondrian, LeWitt, and Kusama

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enable preschoolers to experience mathematics not as abstract symbols but as a creative, collaborative, and aesthetic process. In this approach, learning becomes expressive, inclusive, and culturally meaningful.

1. INTRODUCTION

In early childhood education, mathematics is often conceptualized as a discrete cognitive domain, separated from the arts, play, and cultural expression. This separation reflects long-standing educational traditions that privilege symbolic abstraction over sensory, aesthetic, and embodied forms of knowing (Eisner, 2002). Yet, research in educational neuroscience, developmental psychology, and art education has increasingly shown that such compartmentalization may hinder the richness of children's meaning-making, particularly in the early years when learning is multisensory, exploratory, and socially mediated (Goswami, 2006; Immordino-Yang & Damasio, 2007). Mathematics, in this context, is not simply a set of skills to be acquired but a language that can emerge organically through engagement with the arts, material exploration, and collaborative inquiry. This chapter examines the integration of modern and contemporary art practices with mathematical learning in early childhood education, using Cuisenaire rods as a central pedagogical tool. Project-Based Learning (PBL) offers a dynamic framework for early childhood mathematics education, emphasizing extended inquiry, collaboration, and the integration of real-world contexts (Bell, 2010; Thomas, 2000). In PBL, learning emerges through the exploration of meaningful problems or challenges, allowing children to construct knowledge actively rather than passively receiving instruction. This approach is particularly effective when combined with multisensory tools such as Cuisenaire rods, which support hands-on engagement and the development of spatial, quantitative, and relational thinking in young learners. Cuisenaire rods, with their varied lengths and colors, serve as concrete representations of abstract mathematical concepts, including measurement, proportion, addition, subtraction, and pattern recognition. When embedded in PBL experiences, these manipulatives enable children to explore mathematics as an embodied and creative process. For instance, a project in which children are asked to build a "mini city" using rods of different lengths and colors encourages them to compare sizes, calculate totals, and plan spatial arrangements. This task simultaneously fosters problem-solving, design thinking, and collaboration, as children negotiate the placement of structures, determine proportions, and discuss potential improvements. Integrating artistic inspirations into PBL further enriches the learning experience, connecting mathematics to cultural and aesthetic contexts. A project inspired by Piet Mondrian's geometric abstractions might invite children to create "rod paintings" on floor grids, arranging

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