Blocks As a Tool for Learning:

Historical and Contemporary Perspectives

Karen Hewitt

Children have always built, testing their theories about the physical and social world. They stack units, knock them down, enclose spaces, bridge gaps, and repeat and refine ideas—often without the intervention of adults or the introduction of commercial materials.

The natural world provides abundant building material: heavy stones to pile, sticky burdock to connect, green twigs to tie and weave. And children are quick to pick up discarded construction and commerical materials such as wood pieces or boxes. Purchased building blocks and construction sets afford days of open-ended play and learning.

That children's impulse to construct is inherent and connected to learning is an old idea. It can be found in the writings of Plato (429–347 B.C.), Comenius (1592–1670), and Pestalozzi (1746–1827), as well as in the work of modern thinkers such as Jean Piaget (1896–1980).

The importance of play as a recognized mode of learning for young children is clearly reflected in the history of blocks and construction toys. As educators, we should appreciate the central historical and contemporary role of these toys in early childhood education.

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This article is based on Karen Hewitt's essay in the catalog published by the Katonah Museum of Art, Katonah, New York, for the 1997 exhibition, Toying with Architecture: The Building Toy in the Arena of Play.

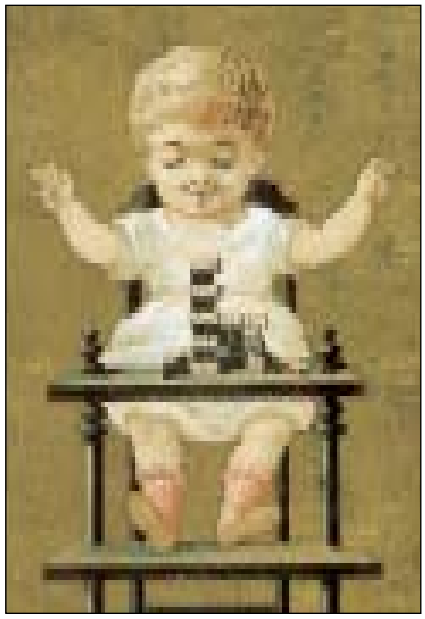
Courtesy of the author

Ivory Soap advertisement, early 20th century

Whether blocks were advertised for home use or found their way into the classroom as an educational device, they have always been linked to learning. In *Some Thoughts Concerning Education,* English philosopher John Locke (1693) went against the prevailing trend in childrearing and placed the carrot before the stick: "The chief art is to make all that [children] have to do, sport and play too.... Learning anything they should be taught, might be made as much a recreation to their play, as their play is to their learning."

Toys now began to be considered influential in a positive way—not as sinful pastimes or baubles, but as a necessity. Locke described what was to become one of the most popular educational block sets—the alphabet blocks—extolling the merits of sweetened learning.

In mid- to late nineteenth century, a small group of European and U.S. manufacturers began producing building toys, often as a sideline to their main woodworking or printing business. The blocks for the commercial market were characterized by three distinct ideas linking learn-



Courtesy of the author

Trade card, late 19th century

ing and play. The first centers on the building unit as a surface for displaying symbols—letters, words, narratives. The second addresses the pure activity of building—constructing with simple, abstract forms. The third focuses on the transmission of a cultural heritage—building a model of an important architectural structure and, through this process, learning architectural styles.

Although the categories often overlap in one block type, it is important to look at each one to understand the pedagogical implications and to consider the discrepancy between what adults want children to do or think they are doing and what children actually do.

Courtesy of Schecter Me Sun Lee, New York

Wide-Awake Alphabet Blocks, Charles M. Crandall Co., Montrose, Penn., ca. 1870s

Literacy and blocks

The tradition of cladding the surface of blocks with symbols and narratives burgeoned in the mid-nineteenth century and continues today, blending learning and amusement with a mix of symbol, fantasy, and vibrant color. S.L. Hill, one of the first manufacturers of spelling and alphabet blocks, patented his spelling blocks in 1858. Some were thin tablets, which emphasized symbol over structure, while others were cubes, more conducive to building. Hill sold thousands of these sets, and other companies, such as Westcott and Bliss, followed his lead.

Courtesy of Robert Hull Fleming Museum, Burlington, Vt

Alphabet Blocks and Building Blocks, S.L. Hill Co., Williamsburg, N.Y., ca. 1860

Charles Crandall, a manufacturer of furniture and croquet sets, and Jesse Crandall, his brother, produced two unique building toys that resulted from the manufacturing process rather than a priori design. Charles, so the story goes, observed his children building with the thin cutoff pieces of wood used in the manufacture of finger-joint boxes for his croquet sets. Inspired by his children's complex constructions, he began to manufacture his alphabet and construction blocks in 1867, adapting the finger-joint design. In 1881 Jesse Crandall, looking for an efficient way to pack the blocks, began producing nested blocks, a perfect marriage of efficient design and an understanding of children's developmental needs.

Literacy, in addition to knowing the letters of the alphabet, also meant a familiarity with stories, especially biblical ones. The biblical theme was common to a number of toys in the early and mid-nineteenth century, following the tradition of the popular Noah's Ark.

The design of the Cob House Blocks, produced by the McLoughlin Brothers in 1885, clearly placed the act of building on a par with word construction and the narrative possibilities of storytelling. Adults presumed—or at least hoped—that alphabet and story blocks would lead their children to an understanding of symbol systems, enticing them to learn their *ABC*s, arrange numerals in sequence, read simple words, and follow a narrative order.

For 200 years now, letters and numbers have been neatly painted, stamped, or chromo-lithographed and silk-screened on blocks, yet children continue to think spatially, piling these blocks, making towers and towns, and often blissfully ignoring the attempt of their elders to inject a dose of literacy.

Blocks as pure form

Playing with forms in space is an activity that has always been valued by artists, architects, and mathematicians as well as young children. These building sets contain unadorned wood forms with a serious intent. Although some sets come with plans or are packaged in a box whose cover indicates some possible building ideas, constructing seems to be the prime focus.

The Embossing Company produced numerous sets of plain building blocks, some with the added feature of holes that turned them into construction sets. Dandonah, The Fairy Palace, a German block set based on the architectural designs of Bruno Taut, reflects the modernist interest in form for form's sake. Bauspiel was designed by Alma Siedhoff-Busher in Weimar, Germany, where the Bauhaus marriage of art and industry influenced the world of architecture, design, and education after World

Courtesy of Collection Centre Canadien d'Architecture/Canadian Centre for Architecture, Montreal

Stabuilt Blocks, Embossing Co., Albany, N.Y., ca. 1915

Courtesy of Collection Centre Canadien dÔArchitecture/ Canadian Centre for Architecture, Montreal

Bauspiel blocks, Alma Siedhoff-Busher, designer (1923); Kurt Naef, Zeiningen, Switzerland, ca. 1980

War I. These blocks, and the theory behind them, parallel the pedagogy and aesthetics of many of the blocks designed by educators for school use and for the home.

A further extension of the use of pure form is the building sets designed for children to make their own repeatable forms. The child as a constructive worker, learning to be a useful part of the great industrial world, is implicit in these building sets. Also implicit is a strong gender bias, so often portrayed on the covers and advertisements of building toys, sometimes subtly, other times as blatant as The Boy Contractor—"Practical Construction for Boys."

Blocks as transmitters of culture: Rebuilding architectural history

The idea that children could be taught a range of building types and architectural styles and highlights of architectural history was a dominant focus of blocks designed by the European and American toy market. F. Ad Richter and Company produced thousands of building sets using blocks made of artificial sandstone and linseed oil. Perfectly proportioned and colored in muted tones of red, gray, and blue, these sets were compactly packaged (a lesson in spatial organization) and were accompanied by plan books and scale drawings of real and imagined buildings. They were a great success.

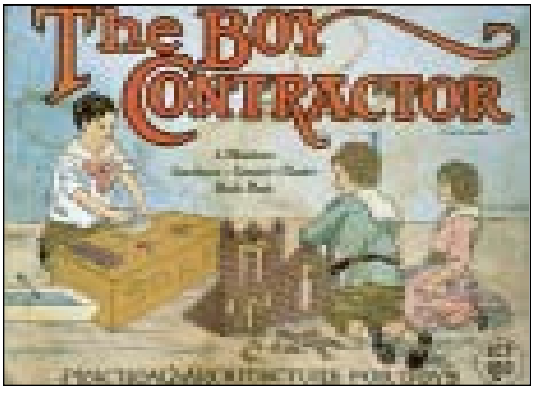
Courtesy of the author

AnchorBlocks instruction sheet, F. Ad Richter and Co., Germany and New York, 1899

Many block sets depicted buildings from "exotic" countries. The Peking Palace (1870), a fanciful set of German wood blocks with architecture decorations lithographed on paper, encouraged children to rearrange the building into a variety of forms, thus inventing their own versions of a palace.

Sets of village blocks were also common. Some sets contained simple block forms that represented specific buildings, allowing children to create arrangements of nineteenth-century town plans. Other village sets had components that could be combined like a three-dimensional puzzle to build a church or other familiar architectural structure. Although children most likely built many other wildly imaginative structures, at least their parents were reassured that they were being both constructive and religious—a winning combination for learning in the 1880s.

New building toys emerging in the early twentieth century encouraged children to represent more modern architectural forms. For example, the Bilt E-Z The Boy Builder construction set paralleled the curtain wall of the new modern skyscraper. Building toys were declared a necessity for every home. Newspapers and magazines and, later, television advertised an abundant variety of educational building blocks, and parents purchased them in ever-increasing quantity.



Courtesy of Robert Hull Fleming Museum, Burlington, Vt.

The Boy Contractor, Cruver Manufacturing Co., Chicago, 1919

Courtesy of Collection Centre Canadien d'Architecture/Canadian Centre for Architecture, Montreal

Bilt-E-Z "The Boy Builder"Set E, Scott Manufacturing Co., Chicago, ca. 1924

Learning materials in the classroom

During the late nineteenth century when the McLoughlin Brothers were

pumping out their charming nested blocks, children faced primary classrooms devoid of visual stimulation and, certainly, of objects of play. Although some nineteenth-century rural schoolteachers used the natural environment as part of their lessons—picking flowers, making baskets from reeds, collecting birds' nests—most teachers stuck to the slate board and seat work.

But a revolution in the education of very young children was brewing, a revolution that emphasized the importance of building/construction materials in the learning process. This began with Friedrich Froebel (who was certainly influenced by Johann Pestalozzi's hands-on learning approach), followed by Maria Montessori, Caroline Pratt, and Patty Smith Hill, and continued into the 1950s with George Cuisenaire and into today with computers and Seymour Papert. Although many theorists study the play behavior of children, only a few go on to design play/learning material and to write passionately about its use.

The materials designed by Froebel, Montessori, and Pratt were austere and monochromatic, emphasizing the structural relationships between the units. In contrast, the alphabet and picture blocks manufactured by Jesse Crandall, S.L. Hill, and R. Bliss were decorated with colorful images, following Locke's idea of mixing pleasure with learning.

If Froebel (1782–1852) is the father of kindergarten, then perhaps his Gifts and Occupations are the mother of manipulatives. Before Froebel, geometric blocks/toys were used as simple building materials or as drawing models. Froebel's series of Gifts and Occupations were designed as part of a systematic method for children to learn through play.

Based on the construction and transformation of forms, the materials were presented in a strictly determined sequence. Children began with solid shapes—the sphere, the cylinder, and the cube—moved to the flat plane and the line, and finally returned to three-dimensional construction with points and lines using peas or waxed pellets and sticks. Children would build three basic forms with the blocks: "forms of life"(representing objects from the world—houses, furniture, trees), "forms of knowledge" (giving physical substance to abstract ideas—number and geometry); and "forms of beauty" (creating imaginative designs, mainly based on symmetry, for aesthetic appreciation).

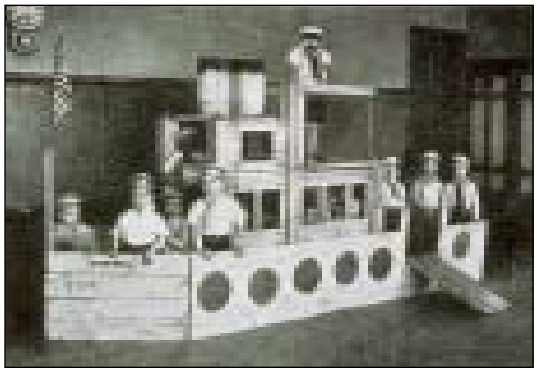
Although Froebel's work ([1826] 1887) was based on highly abstract ideas, symbolized by blocks and other three-dimensional materials, the fact that children were given physical objects to play with as the basis for learning revolutionized early childhood education.

The kindergarten movement, which started in Germany in the 1840s, quickly spread to the United States through the efforts of educators who had observed the Froebelian kindergartens in action. Milton Bradley, an enterprising lithographer, began in 1869 to manufacture the Gifts and Occupations for the American school market.

But by the 1890s the Froebelian materials and methods were under attack by kindergarten reformers. They criticized the formal, sequential use of the gifts, the lack of what they considered self-determined purpose in the child's play, the small size of the items, and the emphasis on sedentary activities.

In 1905 Patty Smith Hill, a faculty member of Teachers College/Columbia University, questioned the lack of free play and proceeded to make modifications to the blocks. Recognition of the child's need for large-motor activity and the child as a social being led to the design of larger blocks.

The Hill Blocks, first manufactured by the Schoenhut Company in Philadelphia, continued to be made in modified form into the 1950s.



Cooperative building with Patty Smith Hill blocks, ca. 1930

They consisted of a series of blocks, square pillars, and metal rods that secured the pieces. Because of their size and weight, the blocks necessitated the involvement and cooperation of several children to construct a building.

It is clear why John Dewey was in sympathy with the work of Patty Smith Hill: "The [Hill] kindergarten, as a laboratory of democratic citizenship, was in keeping with Dewey's pragmatic policy of expanding the school's social responsibility" (Weber 1979, 31). Children worked together as "a miniature community, an embryonic society" (Dewey 1899, 41) as they explored and represented the world they knew—their home, their neighborhood, and the larger community.

Courtesy of Robert Hull Fleming Museum, Burlington, Vt.

Froebel Gifts 5 and 6, Milton Bradley Co., Springfield, Mass., 1869

In 1913 Caroline Pratt, an educator who had received woodworking training in Sweden, developed unit system blocks for her experimental classroom at Harley House and at the City and Country School that she helped found in New York City. She designed "do-withs," wood figures of family and community workers, to accompany the unit blocks. Pratt's designs, and her pioneering work on the use of blocks ([1948] 1990) as a social, intellectual, and aesthetic learning tool, still resonate today.

Harriet Johnson, in her *Children in the Nursery School* ([1928] 1972), documented the block work of children 14 months to three years old at The Nursery School, a project of the Bureau of Educational Experiments, organized in New York City in 1917 by Harriet Johnson, Caroline Pratt, and Lucy Sprague Mitchell. (The City and Country School and Bank Street School for Children still carry on this strong block-building tradition.) This classic book presents a richly detailed discussion of children using blocks in a natural setting.

At the Casa dei Bambini in Italy, Maria Montessori (1870–1952) originated a series of blocks called "didactic materials" based on the systematic training of the senses as a way for children to understand the world. She observed that children between the ages of two and six go through a period in which they are interested in the placement of objects.

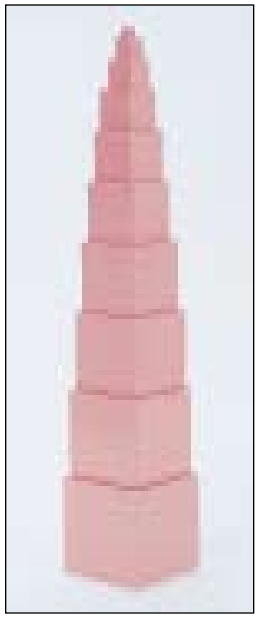
Montessori's sensorial materials, used on small mats, were designed to isolate a specific attribute such as height, length, width, depth, or color. For example, the Pink Tower builds up incrementally from large to small. The resulting structure is taken down and rebuilt over and over again until the child tires of the process.

In *Spontaneous Activity in Education,* Montessori wrote, "Our sensorial material, in fact, analyses and represents the attributes of things: dimensions, forms, colors, smoothness or roughness of surface, weight, temperature, flavor, noise, and sounds. It is the qualities of the object, not the objects themselves, which are important, although these qualities, isolated one from the other, are themselves represented by objects" ([1917] 1971, 203).

The materials designed by Montessori were precisely crafted and either painted with a single color or left natural. With little alteration, they are still being made for Montessori classrooms today.

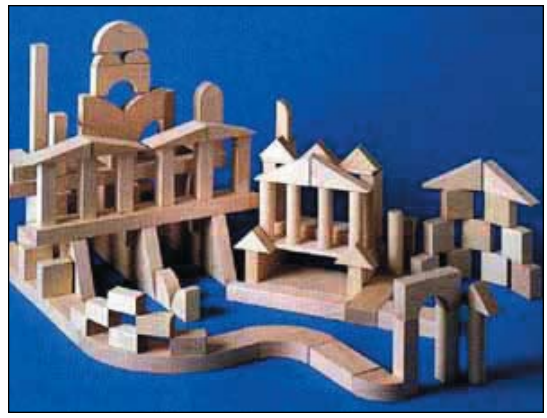
The blocks of Hill, Pratt, and Montessori were based in great part on the observation and knowledge of children's natural interests. Children's interaction with open-ended materials has been observed and studied by several developmental psychologists, beginning with G. Stanley Hall in the 1890s, by Arnold Gesell at the Yale Clinic in the 1930s, in clinical settings, and by Piaget with his own children. Teachers, informed by these studies and the work of early progressive educators, rallied together and tried to influence the selection of classroom materials and to change the prevailing methods of pedagogy.

Unit blocks can be found today in most preschools, nursery schools, and some kindergartens. More infrequently they are found in the early grades, where they are usually in the guise of math manipulatives; the floor blocks, literally and figuratively, have been elevated to the table, assuming an academic aura.



Courtesy of Robert Hull Fleming Museum, Burlington, Vt.

Pink Tower, Maria Montessori, designer (ca. 1908); Nienhuis Montessori USA, Mountain View, Calif., 1985



Courtesy of Gummy Lump (www.gummylump.com)

Unit blocks

This math emphasis began in the late 1950s as a reaction to the former Soviet Union's launch of Sputnik, with the U.S. government declaring that schools needed to improve the teaching of math and science. The initiative led to the development of a wide variety of manipulatives and supporting educational guides, derived in part from the work of Froebel, Montessori, and Pratt—for example, Cuisenaire Rods, the Stern Apparatus, Dienes Logiblocs, Unifix Cubes, and the Lowenfeld Poleidoblocs.

The richness of block building was funneled into one specific area of knowledge: mathematical thinking. "The variety of shapes and sizes in Poleidoblocs G and A enables children through construction and experiment to discover the basic structure of mathematics. The range of shapes gives wide opportunities for discovering and establishing equivalencies in length, height, area, and volume, making tangible, and therefore real, what children have so far learned only symbolically" (Educational Supply Association 1971, 28). But the originators of the new manipulatives also encouraged free play and exploration.

Electronic blocks

Computers, though seemingly not blocklike at all, have entered the block market. Gryphon Bricks, a CD-Rom developed in 1996 by

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Gryphon Software Company, is one of several software programs that allow children to "construct" on the computer.

Advertisements and articles extol the advantages of virtual computer blocks over physical blocks for the classroom teacher since they are "neat," "convenient," and "easy to manage"—not a convincing pedagogical argument. Although the computer has vast possibilities as a "manipulative," it is not a substitute for building in three dimensions.

The most complex and far-reaching work combining blocks and computers is occurring at the MIT Media Laboratory. Over the last 10 years, researchers there have developed a group of digital manipulatives (for example, LEGO MindStorms programmable bricks).

> We believe that these new manipulatives can combine the best of the physical and the digital worlds, drawing on children's passions and intuitions about physical objects, but extending those objects to allow new types of explorations. In this way, digital manipulatives are starkly different from traditional use of computers in education, which tend to draw children away from the physical-world interactions. (Resnick et al. 2000, 2)

MindStorms is aimed at children beyond preschool, but the underlying idea is common to all block building: "Learners are particularly likely to make new ideas when they are actively engaged in making some type of external artifact—be it a robot, a poem, a sandcastle, or a computer program—which they can reflect upon and share with others" (Kafai & Resnick 1996, 1).

Educators, developmental psychologists, designers, and manufacturers have helped develop and promote the educational value of blocks and open-ended play. Yet, except as math manipulatives, blocks are still rarely seen in classrooms beyond kindergarten. Even in many early childhood classrooms today, their full potential as learning tools is not considered.

The destructive/deconstructive activity characteristic of block play, an integral part of this activity, makes some adults uncomfortable. However, as in all learning, we cannot understand until we take apart, examine, and rebuild. Children need an environment with open-ended materials and teachers who understand, encourage, build on, and even participate in this basic and complex mode of learning. This means having enough

- classroom space devoted to block play;
- time set aside for serious and ongoing play with blocks;
- focus on block work as evidenced by teachers' interaction with children through observation, documentation, revisiting structures, and sometimes participating in the play process; and
- time for teachers to share observations with colleagues and understand how children's block play connects with the development of literacy, physical knowledge, and mathematical thinking.

Blocks have been with us for a long time—and the activity of building even longer. The rich potential of blocks as a learning tool for young children to invent and represent ideas is still a challenge for teachers today.

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