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Building for Learning in Postwar American Elementary Schools

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In 1955, editors at the *Architectural Forum* worried, "every 15 minutes enough babies are born to fill another classroom and we are already 250,000 classrooms behind."[1] The rising population of young American children made school building, together with housing, the most widely discussed architectural challenge after World War II. Enrollment in public U.S. elementary and secondary schools during the 1949–50 school year was 25.1 million. By 1959–60, it had increased by almost 11 million, and it peaked in 1971 at 46 million.[2] The surge of births increased the postwar demand for classrooms, which collided with an outdated and limited stock of school buildings.[3] To deal with the shortage of school seats, children often attended school in split sessions, overcrowded classrooms, rundown buildings, or hastily built temporary quarters. High prices and scarcity of materials during the depression and wartime had left few opportunities for renovating or even maintaining older structures, much less constructing new schools. Furthermore, the population migration to areas in the West and to developing suburban towns created a need where there was little existing provision for school-aged children and nothing that could match the ever-growing numbers.[4] Even in small districts a new classroom had to be ready for occupancy every third day of the year just to keep up with fresh enrollments.[5]

The public school, as an agent for national renewal and the cultivation of democracy, has long been a cultural symbol of American aspiration. After World War II, the implications of public education gained increased significance with the rising birthrate and the growing specter of a Communist threat. Postwar elementary schools, especially those built in suburban and rural areas between the mid-1940s and mid-1960s by prominent firms, reflected both ongoing educational debates and the unique circumstances of the postwar era. Nineteenth-century American schoolhouses already constituted a distinct architectural type closely tied to educational theory, but postwar questions about the school and its mission made space, materials, and pedagogy the concern of government officials, school board members, architects, designers, and parents.[6] Thousands of schools were built to meet postwar needs. Historians, however, have largely overlooked these buildings, despite the recent critical attention to other forms of postwar architecture.[7]

This article explores how the modern American elementary school, as a cultural and architectural form, emerged from a complex interaction of technical concerns, educational theory, and the larger historical forces of postwar expansion and Cold War anxiety. I argue that the prewar modernist preoccupations with building research and technology, along with a social romanticism in the form of educational progressivism, were resurgent in American school building campaigns after World War II, and together transformed the spatial, material, and aesthetic qualities of the postwar elementary school.

Unlike most earlier public school buildings, postwar schools exploited steel framing, plate glass, and low-rise

horizontal massing. Three basic types—long fingerlike corridors, compact clusters, and open schools—mark distinct shifts in school plant design from the mid-1940s to the mid-1960s.[8] The projects I discuss received considerable publicity and made these formal qualities widely known, but these buildings were not designed as heroic statements. Instead, these schools and their architects quietly contributed to the development of normative, mass-produced solutions.

This is not a quantitative analysis of schools built in a "modern" style. Rather, this article examines how architects, educators, and manufacturers created a popularly disseminated image of school bound to modern architectural forms, progressive methods of teaching, and a persistently romantic notion of childhood. The schools I discuss embodied a set of ideas. They were created primarily for white middle-class children, yet were promoted as model solutions to a nationwide crisis. Furthermore, they indicate how architects, planners, researchers, educators, and parents embraced the discourse of modernism and its faith in the power of design to change behavior and improve society.[9] As I suggest, postwar elementary schools and the debates around them reveal the conflicting aims, ideals, and realities of architects and middle-class citizens to give shape to the future.

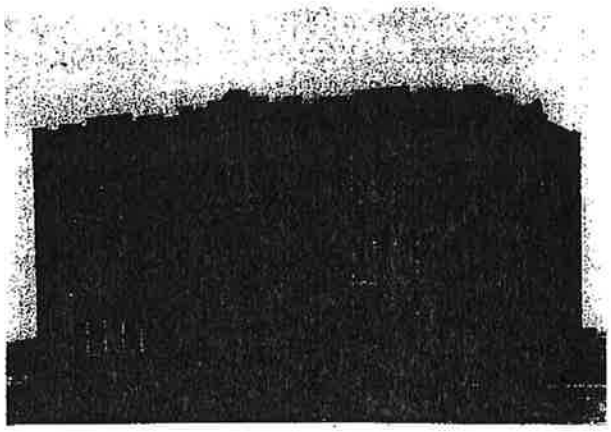


Figure 1 R. W. Shaw, Public School, Watonga, Okla., ca. 1914–25

Prewar Schools and the Progressive Ideal

As architects faced the problem of designing new school buildings, they quickly rejected the multistory prewar structures from earlier school building campaigns. The relatively standardized plans of these monumental four- or five-story brick buildings usually had a central entrance, symmetrically planned classrooms on either side of a long corridor, and a large auditorium (Figure 1).[10] Early twentieth-century schoolhouses were closely identified with urban sites, but similar structures were also built in rural areas. Embellished with Greek pediments, Neo-Gothic parapets, or Colonial Revival urns, elementary schoolhouses were designed to embody both venerable traditions of learning and a modern system of American education. In these buildings, the plan of the classroom was predictably rectangular (Figure 2). With blackboards on one or two walls, a bank of windows on one long side, desks in rows, and the teacher's desk located in the front, these classrooms emphasized order, desk work, and the teacher's authority.[11]

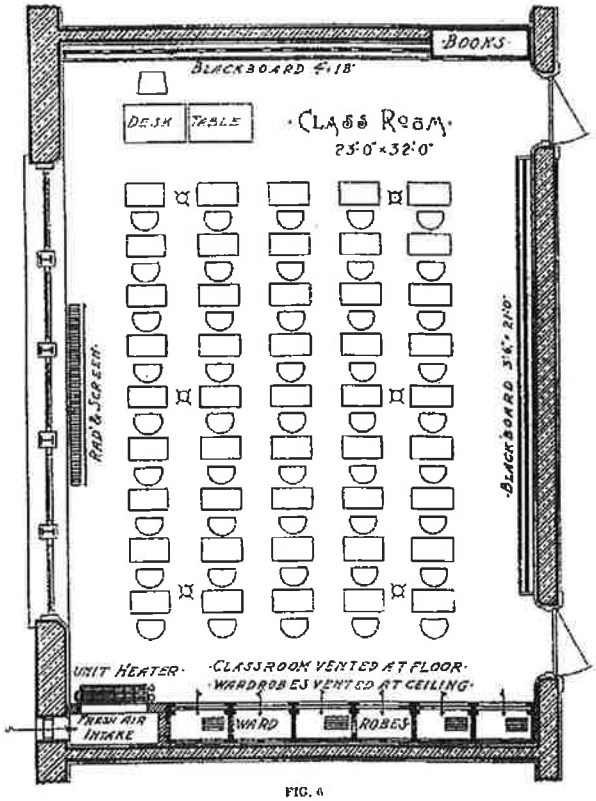


Figure 2 Plan of a schoolhouse, ca. 1925

Several schools designed by European-trained architects working in the United States during the late 1930s and early 1940s offered a competing ideal. These were small, one-story buildings with expansive windows and access to outdoor space just beyond the classroom. The Oak Lane Country Day School (1929) and the Hessian Hills School

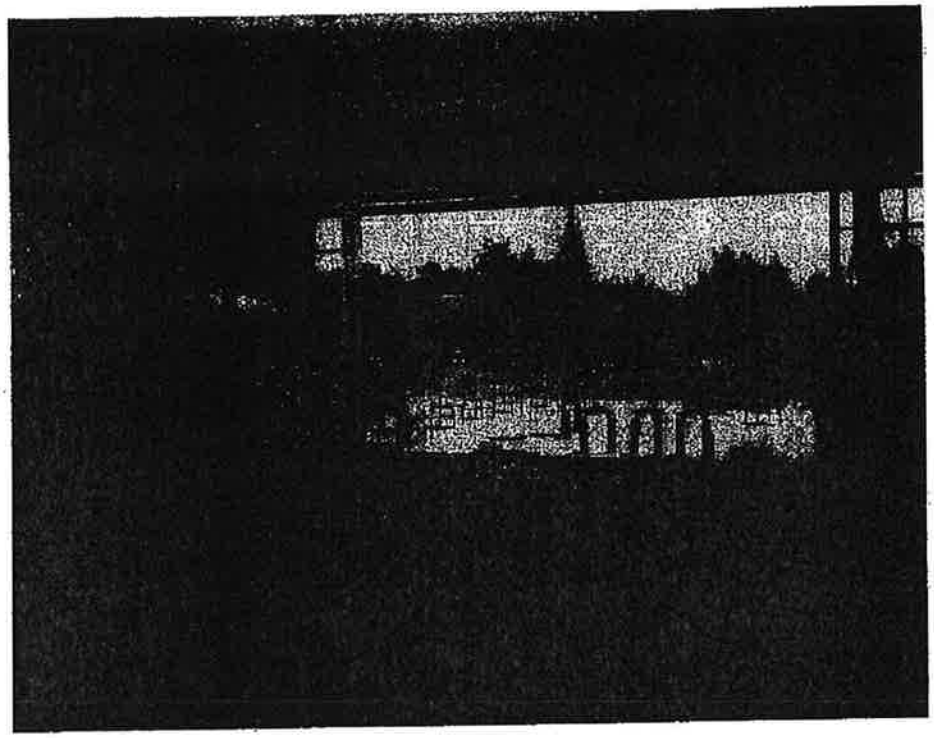


Figure 3 Richard Neutra, Kester Avenue School, Sherman Oaks, Calif., 1949. © J. Paul Getty Trust. Used with permission. Julius Shulman Photography Archive, Research Library at the Getty Research Institute

(1931–32) by the Philadelphia firm of Howe and Lescaze were both well-publicized single-story buildings with large corner windows to bring light into the classroom area. The experimental schools Richard Neutra designed in Los Angeles also favored open classrooms with extensive windows and access to the outdoors. From the 1930s, Neutra had developed an ideal school plan of one-story buildings that led to adjacent gardens through a large sliding glass door. Although modeled in part on contemporary ideas about access to air and light—such as Johannes Duiker's Open Air School (1928–30) in Amsterdam—Neutra's Corona Avenue School in Bell, California, was also a response to the mild California climate.[12] Called a "test tube" school, Neutra's Bell school had large, well-lit L-shaped classrooms outfitted with moveable chairs and tables, and it was equipped for an indoor–outdoor curriculum.[13]

These conspicuously avant-garde buildings gave a formal and spatial identity to progressive educational ideas. Deriving in part from John Dewey's emphasis on cultivating democracy, and learning both abstract concepts and real skills through projects, progressivism at the elementary-school level was always imprecise. It implied a child-centered (rather than teacher-centered) classroom, where children could move freely around the room, use materials other than textbooks, sit in moveable furniture that could be easily rearranged, and explore the physical world through hands-on projects. Historians of education are still divided on the real impact of progressivism on American education, but its effect on the architectural discourse was profound and enduring.[14] Neutra's later schools—especially the Kester Avenue School (1949) in Sherman Oaks, California—returned to his earlier forms, but by the postwar era they shared the spotlight with many similar school designs (Figure 3).

The Crow Island School, in Winnetka, Illinois, a wealthy suburb of Chicago, was indebted to these earlier projects but provided an even more influential model, which legions of architects and school designers adapted after the war (Figure 4). Designed by Eliel and Eero Saarinen, the father-and-son firm based in Bloomfield Hills, Michigan, along with the young Chicago designers Lawrence B. Perkins, E. Todd Wheeler, and Philip Will Jr. between 1939 and 1940, Crow Island evoked experimentalism in curricular ideals and architectural form.[15] Nursery, elementary, and intermediate school-age children were arranged in a pinwheel plan that provided access to the central block (containing the auditorium and basement workshops) with its monumental chimney (Figure 5). Within the low-rise brick structure the kindergarten and nursery classrooms were located toward the front entrance and paired with gardens and separate play areas. A wing of classrooms for the primary grades along one side of a corridor and the upper grades along two sides of another corridor reached into the adjacent wooded site. The building's innovations were the

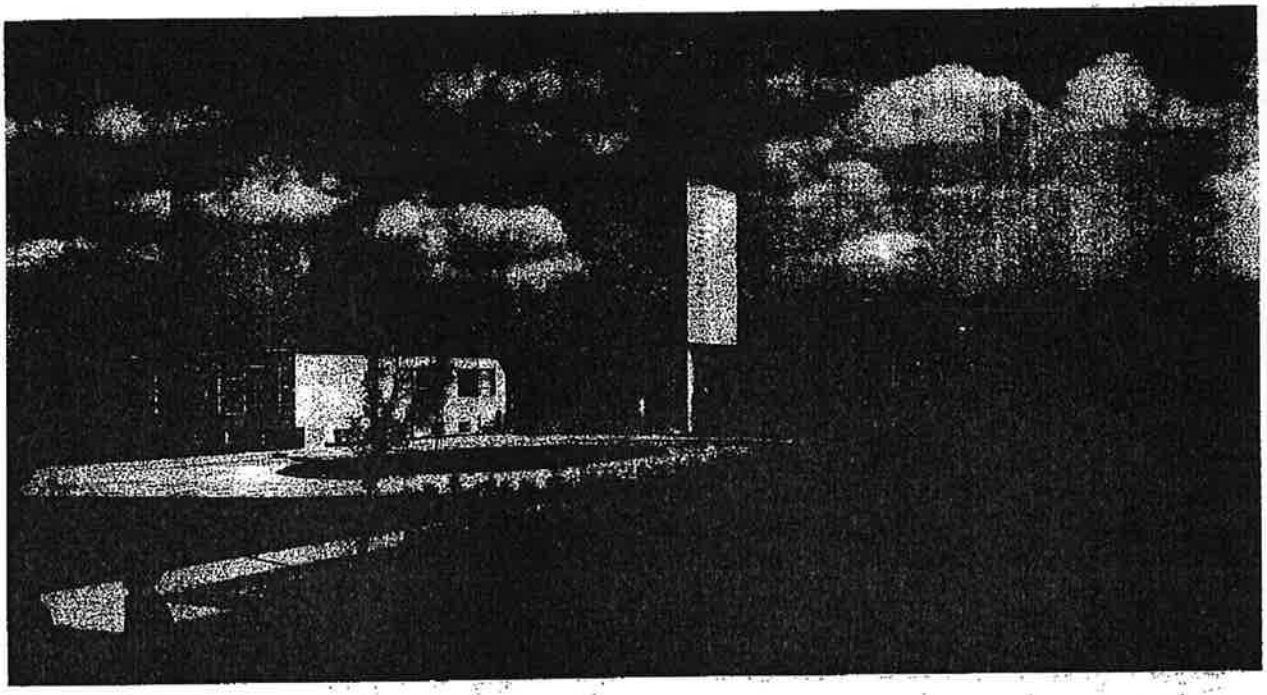


Figure 4 Eliel Saarinen, Eero Saarinen, Lawrence B. Perkins, E. Todd Wheeler, and Philip Will Jr., Crow Island School, Winnetka, Ill., 1939–40. Photograph by Ken Hedrich, Hedrich-Blessing, HB-06184-F2, Chicago History Museum

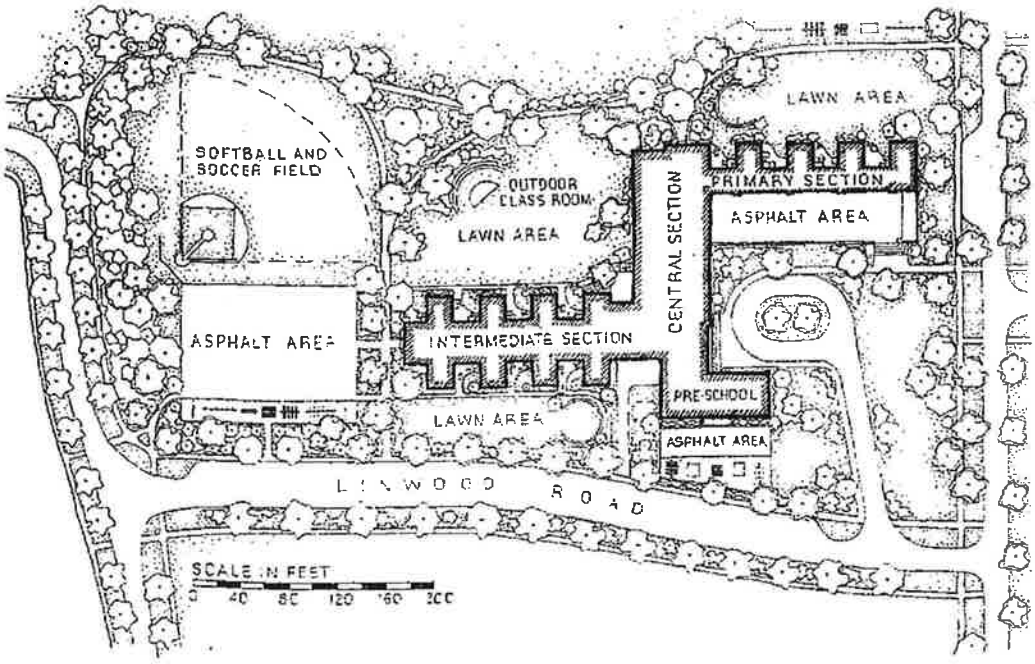


Figure 5 Crow Island School, plan

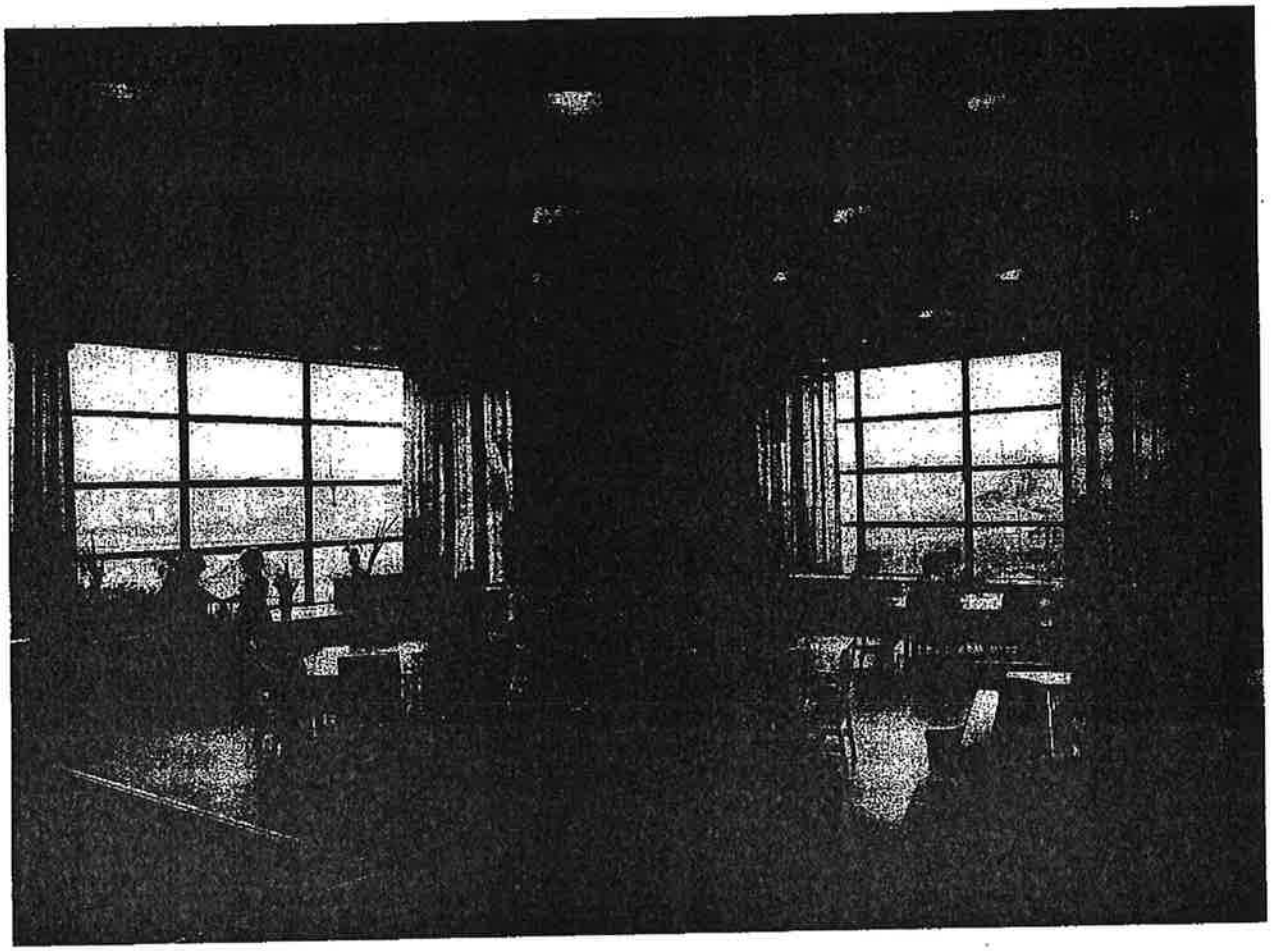


Figure 6 Crow Island School, Winnetka, Ill., 1939–40, Hedrich-Blessing, HB-06184-K, Chicago History Museum

long corridors connecting L-shaped classrooms, the individual gardens between classrooms, the expansive use of windows on two exposures, and ceilings lowered to a height common in residential architecture.

Crow Island reflected the pedagogy of Carleton Washburne, superintendent of the Winnetka schools, and teachers who collaborated with the architects on the plan. The design developed from a belief that young children were often overwhelmed by large schools and big spaces. The classroom was a self-contained L-shaped unit including a workroom with storage, long counters, a sink for messy projects, and a small toilet (Figure 6). Draperies, colorful shelves, built-in seating under the large plate-glass windows, and plywood chairs and tables that could be easily rearranged were designed to make each classroom seem friendly to young children. The autonomy of the classroom, comfortable sofas in the entrance hall, fireplace in the library, and individual gardens between each classroom reinforced a strongly domestic ideal. In a letter to the architects, Frances Pressler, the director of activities, hoped the classrooms would "give [a] feeling of security. These are especially the places of living together and should give feeling of inviting home-likeness, settings in which constant, confident realization of self and others together can take place."[16]

The interior decoration of the school was also part of the designers' vision and curricular aims. The capabilities of the Saarinen family were evident in the abstract patterned draperies that Eero designed with his mother, the weaver Loja Saarinen. Eero also designed the pale bent plywood classroom furniture, and Lillian Swann (his fiancée) made brightly glazed ceramic reliefs. Yet Pressler stressed from the outset that the building should not be entirely finished. Instead, she asked that "there be no illustrative frieze decoration as the means of *presenting* the place to children, lest such illustration be not the fanciful picture of the children who behold it, and lest it designate too definite a form of

creation thereby inhibiting instead of encouraging child expression."[17] This emphasis on an active emotional and imaginative life of young children was therefore written into both the program and design of the school.

Washburne was nationally known for his Winnetka program, which championed the individuality of each child and careful attention to his or her emotional needs.[18] This fundamentally progressive outlook on nurturing the individual, rather than adhering to a predetermined rate of progress, was augmented with practical experience through hands-on projects. The design of the structure and its curriculum were thoroughly considered before construction began. The architects observed the Winnetka pedagogy firsthand and created prototypes to present to the community.[19] Amy S. Weisser has argued that the Crow Island project advanced a local planning concern of the Village of Winnetka to keep it homogeneous and a beacon of good citizenship. By carefully managing the town plan and maintaining a rural character, as well as a solid social and physical infrastructure, the village leaders hoped to attract upper-middle class families and protect their property values.[20] The Crow Island School promoted citizenship, character, and creativity as its contribution to the community, and in so doing, helped to polish the reputation of the village.

Crow Island was widely published and became a model for postwar architects who designed spaces with progressive ideals in mind. The architect William Wayne Caudill, who conducted a study on the state of schools in Texas, showed how the Crow Island idea might be adapted in the Southwest. In *Space for Teaching* (1941), Caudill interpreted the signature features of Crow Island in his illustrations of schools he predicted the state would need to build. The useable "space for teaching," such as the L-shape classroom, fenestration, and access to the garden, rather than the structural materials of the Crow Island design, were most significant. Caudill admired the integral relationship between curriculum and design exemplified in Crow Island. For him, "the architect should interpret the curriculum in terms of architecture."[21]

Schools like Crow Island gained the attention of architects and educators, but they were also in the public eye. Since the burden of building, outfitting, and running schools fell to local communities, the concept and design of educational facilities became a highly public project. The primary source of funding for school building came from local budgets, and especially from property taxes. Between 1951 and 1957, 79 percent of total funds came from local district resources.[22] To publicize new ideas in school architecture, the Museum of Modern Art (MoMA) in New York sent a traveling exhibition, *Modern Architecture for the Modern School*, to universities, museums, and community centers across the country between 1942 and 1946.[23] Arguing that schools, especially at the elementary level, could answer the child's psychological needs through planning, materials, and new methods of teaching, curator Elizabeth Mock pressed for changes in American school design. She included Crow Island and two California schools—Neutra's Corona Avenue School (1934) in Bell, and Franklin and Kump's Acalanes Union High School (1939–40) in Lafayette—praising the one-story, "unpretentious" structures with bilateral lighting and access to the outdoors.[24]

The dissemination of a low-rise school plant with single- or double-loaded corridors and bilaterally lit, self-contained classrooms with lowered ceilings was the result of ongoing critical praise, as well as the availability of inexpensive building technology and new ideas about lighting and furnishing.[25] Another traveling exhibition, *Schoolroom Progress USA*, sponsored by the Henry Ford Museum and Greenfield Village and the *Encyclopedia Americana* nearly ten years after MoMA's exhibition, cast the modern elementary school as an institution sensitive to the psychological needs of young pupils. *Schoolroom Progress USA* toured the country in two railroad cars in the mid- to late 1950s. Five prominent architectural firms created model classrooms that showed the newest ideas in planning.[26] The up-to-date classrooms were exhibited along with displays of historical rooms from a frontier school, a rural school of the 1870s, and a city school of the 1890s. The rough seats, slates, dunce caps, switches for punishment, and folded paper kindergarten projects showed the material conditions and artifacts of schoolrooms of the past.[27] In contrast, the newly designed spaces depicted in architects' renderings were brightly lit, and the latest products and materials, donated from major suppliers, were displayed as a vignette. The Los Angeles firm Smith, Powell, and Morgridge, for example, designed an elementary schoolroom with direct proximity to nature through a sliding glass door, outfitted with moveable furniture and even a television set (Figure 7).

Although MoMA and the Henry Ford Museum were very different institutions, they shared a similar vision of postwar school design and a common aim of transforming the iconic nineteenth-century schoolroom into a modern learning environment. Mock emphasized avant-garde forms and new building techniques, but she was careful to note how "the latest development in elementary school architecture embodies the intimate and personal qualities of the little red school-house of our forefathers."[28] The sentimental image of the one-room school dovetailed with the congenial environment progressive educators envisioned, even as the schoolhouse underwent dramatic physical changes in

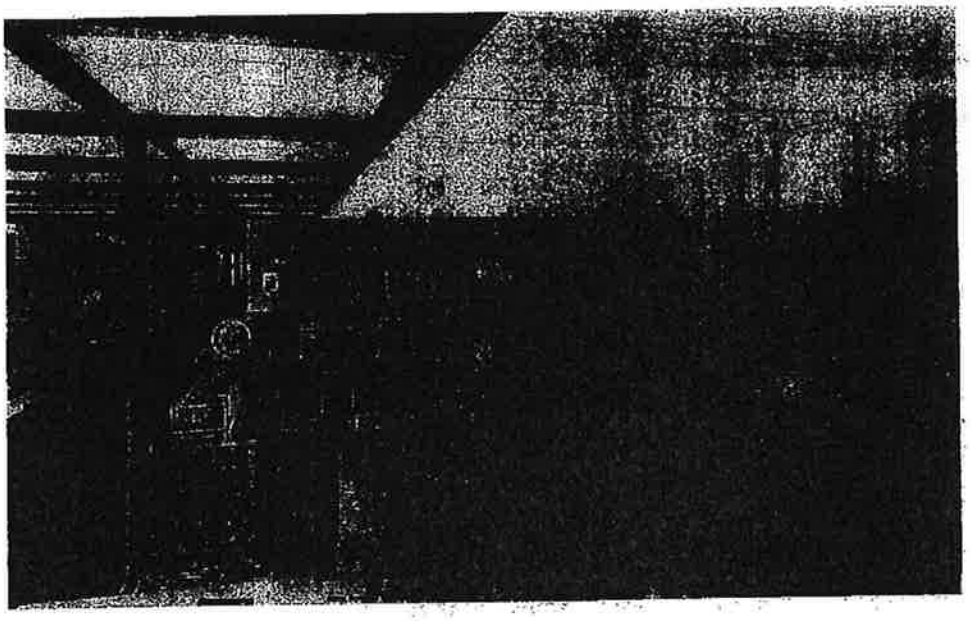


Figure 7 Smith, Powell, and Morgridge, "Elementary Schoolroom" from *Schoolroom Progress USA*, ca. 1955

the postwar period. Firms such as Perkins and Will of Chicago, Caudill Rowlett Scott of Texas, John Lyon Reid of San Francisco, The Architects Collaborative of Cambridge, and others who embraced these formal and pedagogical values, became leading school designers of the era.[29]

Economy and "Flexibility"

Many postwar architects emulated aspects of the Crow Island idea, but they adapted it to economical construction. The methods of building and profile of the elementary school changed significantly in the postwar period. Architects across the country used poured-concrete slab for low-rise structures, lightweight steel frames with exposed trusses and joists, radiant heat floors, and expanses of glass. The desire for "flexibility," a key term of postwar building, enhanced the popularity of new materials and finger or cluster plans for school plants. "Flexibility" was both a desirable quality for the structural aspects of the building, embodied in open corridors, non-load-bearing partitions, and zoned ventilation and heating systems, but it also included the provision of folding walls for small groups, moveable cabinets, and lightweight furniture deemed vital to new methods of instruction.

Low-rise schools became common in postwar suburban and rural locations. The lasting anxieties of wartime and newer Cold War fears led many to suggest that one-story schools were safer for evacuation.[30] In the mid-1940s, the National Council on Schoolhouse Construction proclaimed the staircases required in multiple-story buildings hazardous and unnecessarily expensive. Another benefit of one-story schools was expansibility.[31] Administrators embraced low- rise, rigid-frame construction and continuous fenestration in the hope of building the much-needed schools quickly while allowing for modifications in the future.[32] The output of the government-supported war industries made materials like steel ubiquitous in postwar school building.[33] The steel industry, moreover, promoted one-story, steel-framed schools as cost-effective, rapidly built, and flexible.

Reid's Northern California elementary schools from the late 1940s and early 1950s show how architects modified innovative prewar forms to suit postwar conditions. Reid's single-story Montecito School (1949), in Martinez, California, maximized space and access to light.[34] Unlike the Crow Island pinwheel, the Montecito plan was designed with parallel rows of classrooms and open corridors. This arrangement made reference to another celebrated prewar school, Franklin and Kump's Acalanes Union High School in nearby Lafayette, California.[35] Built contemporaneously with Crow Island, Acalanes was noted for its economical one-story classrooms, openness to light and air through the large windows, and especially for the long corridors of its "finger plan" that became closely associated with postwar school planning in California. Reid's Montecito School, built with H-shaped concrete columns and open-web steel joists that were erected in two and a half days, demonstrated that a low-cost building could also embrace the architectural and pedagogical innovations of more expensive models.

Like Crow Island, Montecito's L-shaped classrooms for the lower grades created sheltered gardens or yards for

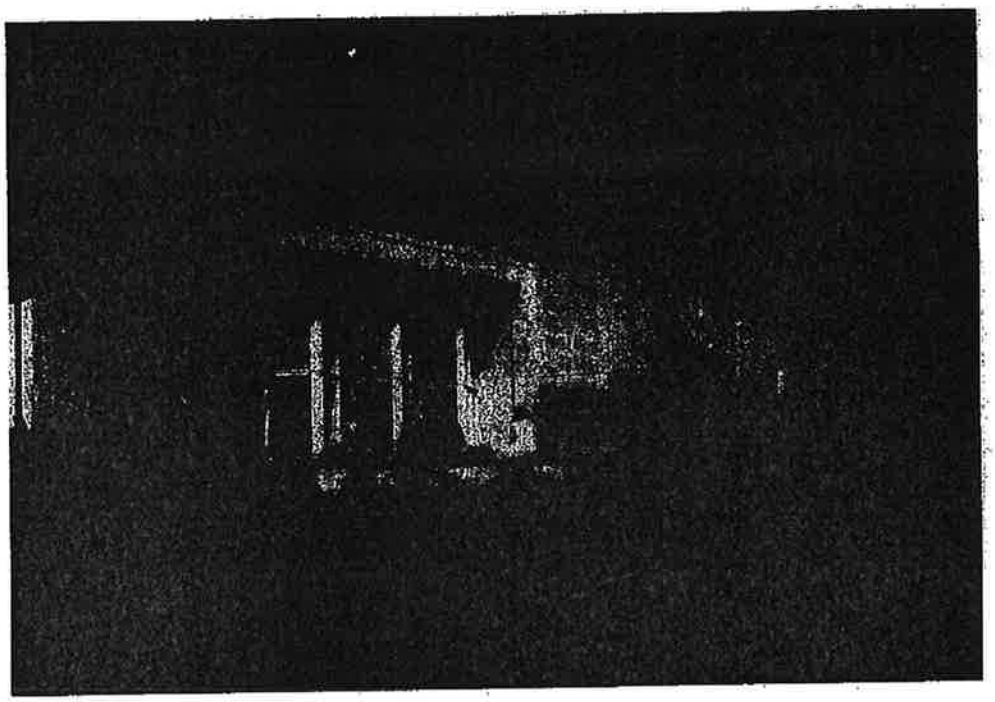


Figure 8 John Lyon Reid, John Muir School, Martinez, Calif., 1951

indoor–outdoor instruction. At the John Muir School, built for the same district in 1951, Reid used a similar plan of long open corridors and extensive bilateral lighting, but modified the L-shape so that the work alcoves were slanted for better supervision. In both schools, the long parallel outdoor corridors maximized space and traffic flow, light, and provided integrated areas for indoor and outdoor teaching for kindergarten to third grade. Instead of the large auditorium at Crow Island and other prewar schools, Reid created an "all-purpose" room, for meetings, lunches, and play, that looked onto a central courtyard through large sharply angled windows (Figure 8). Seeking to use space pedagogically, Reid even left the large heating plant at the John Muir School was left visible to the children through a plate-glass window.[36]

Unlike prewar public school buildings that embodied discipline, the postwar elementary school was designed to be friendly. In a 1947 handbook for school building, Reid and Charles Wesley Bursch, chief of the division of schoolhouse planning for the California Department of Education, described the material and psychological qualities of the new educational environment:

> school plant architecture must start off with its basic conception in terms of the child occupants; it must recognize that its forms, dimensions, color, materials, and texture are capable of creating an environment which either attracts or repels the child; which can influence his attitude and stimulate him. The school plant designed for the child is unpretentious, open, colorful; spread out planning permits him to blow off steam and breathe fresh air; doors can be opened without a major struggle against the strength of the door checks; the walls are built to be surreptitiously kicked; the general environment is not forbidding and monumental but as informal and devoid of affectation as the child himself.[37]

Researching Air, Light, and Color

The planning, forms, and materials of postwar schools reflected ongoing research into airflow, lighting, and reflectivity. Nineteenth-century schoolhouse designs were devised to maximize daylight, but experiments carried out during World War II raised the technical standard for classroom design.[38] Caudill and colleagues at the Texas Experimental Engineering Station researched airflow and lighting using smoke models and a steel-framed classroom that could be pivoted in place.[39] Other researchers in California experimented with overhangs and louvered shades to combat glare.[40] Darell Boyd Harmon, an educator and director of school services at the Texas State Department of Health, also explored how natural light varied in the classroom.[41] On a sunny day, he argued, the traditional organization of desks at 90 degrees to a bank of windows created minimal contrast for the student seated near the windows and too much for the child against the wall. He claimed that light

allowed to come in over the left shoulder was bad for a child's posture.[42] Believing that optimal light would ameliorate fatigue, Harmon conducted experiments with different classroom designs to find the correct brightness ratio between the localized visual task and the entire field of vision.[43] His research, published in the mid-1940s, led to a broad acceptance of new standards for lighting, color, and furniture design in American schools.

To equalize brightness, Harmon diffused the light coming in through the windows. Glass block above a "vision strip" of clear glass, included for social and psychological reasons rather than for luminousness, was one suggestion. Another way to optimize students' access to light was to redesign the pattern of seating by moving the desks into curved, rather than straight, rows and elevate the work surface. The goals of an increasingly bright visual environment put the emphasis not only on the light source, but also on the surrounding surfaces. The chalkboard, desktop, wall, and ceiling color were included in these experiments. For the new, smaller chalkboards, a yellow-green was deemed optimal. The desk surface was lightened from a dark oak "school brown" to a natural wood finish with an asymmetrical grain, and ideally, the top was raised to twenty degrees to facilitate correct posture.[44]

Harmon's experiments built upon wartime studies of light and color to increase morale and to decrease fatigue, but in addressing effects on children, he opened up new questions for architects, school planners, and furniture designers, and gave lighting an expanded role in the determination of form. Douglas Haskell, editor of the *Architectural Record*, commented that "if a prize were to be given for the most fundamental single contribution [for the year 1946] it would have to go to no architect but to Dr. Darrell [sic] B. Harmon of the Texas State Department of Health."[45] His research was widely paraphrased and directly affected the way that classrooms were designed throughout the 1950s.[46] Although controlling brightness and temperature were obvious needs in Texas, Harmon's ideas were also adapted for schools in Illinois, Ohio, and Massachusetts.[47] A special "Luminall" light-reflecting indoor paint was developed "according to the Harmon Technique" and marketed nationally.

As the campaign to research and build modern schools for America's children gathered momentum, the profession of school planners gained prominence.[48] "Schoolmen"—a designation given to consultant planners as well as education experts and school superintendents—identified the prevailing ideas and developed model classrooms. In a Westinghouse Lighting advertisement from 1952, two schoolmen contemplate a dollhouse-sized "Progressive Classroom." Moving the miniature desks into curved rows, and pointing approvingly to the colored walls, gleaming under the bright incandescent fixtures, the two figures frame the technological and aesthetic changes in the postwar school environment and the eagerness of manufacturers to sell materials that met the new standards (Figure 9).[49]

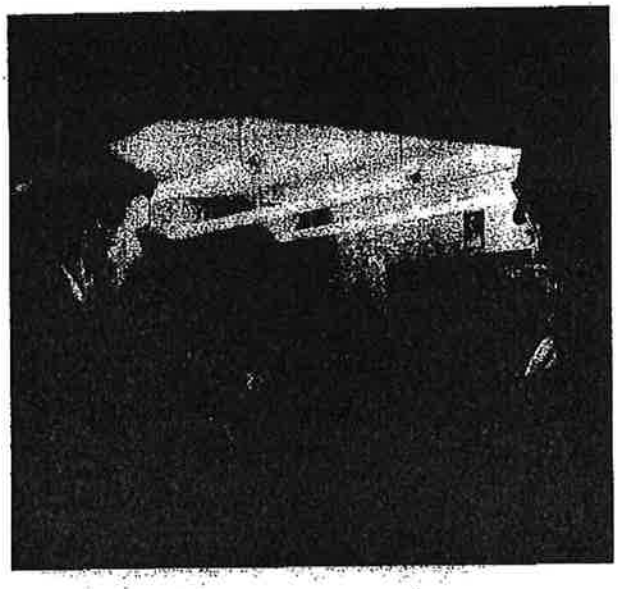


Figure 9 Model Classroom, Westinghouse Lighting advertisement, 1952

A life-size model classroom built with donated products at the University of Michigan in 1954 was also created to demonstrate the new research (Figure 10).[50] In addition to filtered light from the glass block and vision strip, luminous ceiling panels, the reflective floor, and desk surfaces also enhanced the brightness of the environment. The use of contrasting color—greens for the walls and chalkboard, red for end walls—was another aspect of postwar research. Striving for uniform brightness, Harmon initially painted the walls with varying shades of matte white, and woodwork and trim with matte grays to enhance reflectivity. He later argued that color affected the body physiologically and could change the temperature of the classroom by as much as five degrees. Faber Birren, the postwar color expert, praised Harmon's research and recommended a complementary program for color in the classroom: white ceilings with pale blue-green and peach walls, and darker shades at either end or a pearl gray as a complement.[51] Although Harmon, Birren, and others emphasized the scientific importance of color, designers and architects argued that the social, psychological, and aesthetic aspects of the classroom were equally important. William Peña, a partner in the firm

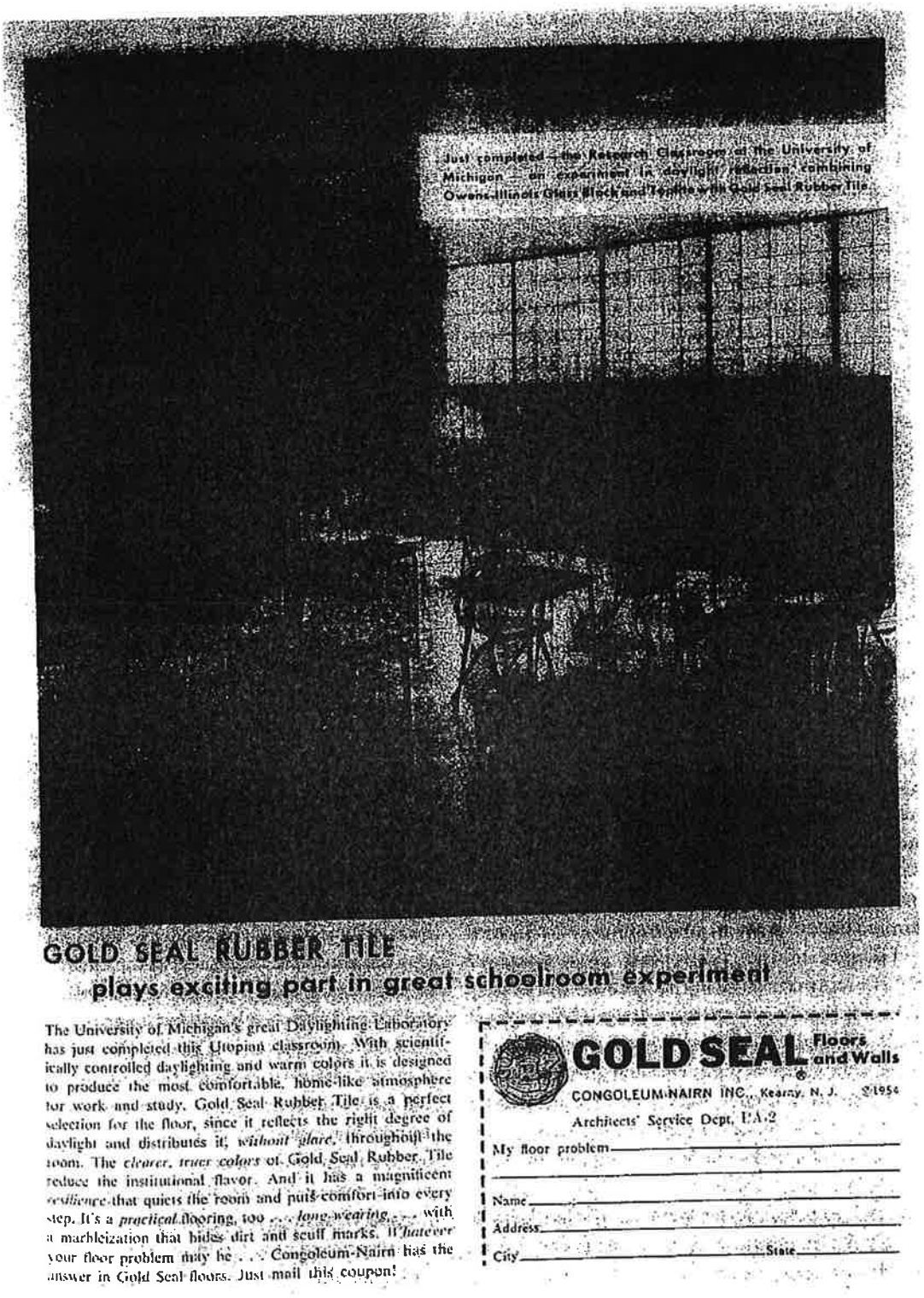


Figure 10 Research Laboratory Classroom, University of Michigan, Gold Seal Rubber advertisement, 1954

Figure 11 Perkins and Will, Heathcote School, Scarsdale, N.Y., 1953, view of a classroom. Hedrich-Blessing, HB-16711-L, Chicago History Museum

of Caudill Rowlett Scott, counseled, "in creating a color environment the danger lies in being guided by some of the scientific principles to an exaggerated degree at the total expense of others." He believed that vivid colors could produce happy, well-behaved children receptive to their environment and suggested that color could recreate "the warm, informal atmosphere of home."[52]

The materials, colors, and arrangement of the Michigan Research Laboratory classroom derived from practical concerns for reflectivity and flexibility, but they also reveal a widespread interest in making the elementary classroom "homelike."[53] The patterned fiberglass curtains, for example, could be pulled into place to create smaller, or darker, spaces for audiovisual equipment, while adding color and an evocation of domesticity. As a transitional institution between family life and formal schooling, postwar elementary schools embraced the progressive idea of encouraging autonomy within a protective space.[54] Perkins and Will and Caudill Rowlett Scott, who were among the most renowned school designers in the postwar era, incorporated fireplaces, casual seating, large windows, and lower ceilings to make the elementary school deliberately resemble the postwar dwelling. "Homelike" schools were distinguished as an innovation in the postwar era: "The modern elementary schools are becoming more child-like and more similar to home, if we understand the term 'home' correctly in contemporary terms."[55] Along with improvements in building technology and "flexible" planning, the modernity of the postwar elementary school was its domesticity.

The Cluster Plan

The ideals of flexibility, domesticity, and economy encouraged clusters as an alternative to the long corridors of Crow Island or Acalanes. Schools built according to a cluster plan, with classrooms in semi-isolated "age-neighborhoods," strongly evoked the postwar house.[56] Although designed to maximize space, many cluster-planned schools claimed both economy and a meaningful spatial experience. In organization and details, the prominent cluster schools of the early and mid-1950s reflected a new sensitivity to the child's perception.

Perkins and Will's Heathcote Elementary School (1953) in Scarsdale, New York, exemplified the educational benefits of the cluster plan. The one-story classrooms grouped in fours around a central space gave each classroom four window walls set at 60-degree angles. Superintendent Archibald B. Shaw described Scarsdale's educational approach as "concern with the pupil—both as an individual and a member of a group."[57] The classroom's nearly circular shape was used pedagogically to bring the children together in a circle and also allow for small group instruction (Figure 11).[58] The wide windows looking onto the rambling hillside also evoked the postwar suburban house with its ubiquitous plate-glass window.[59]

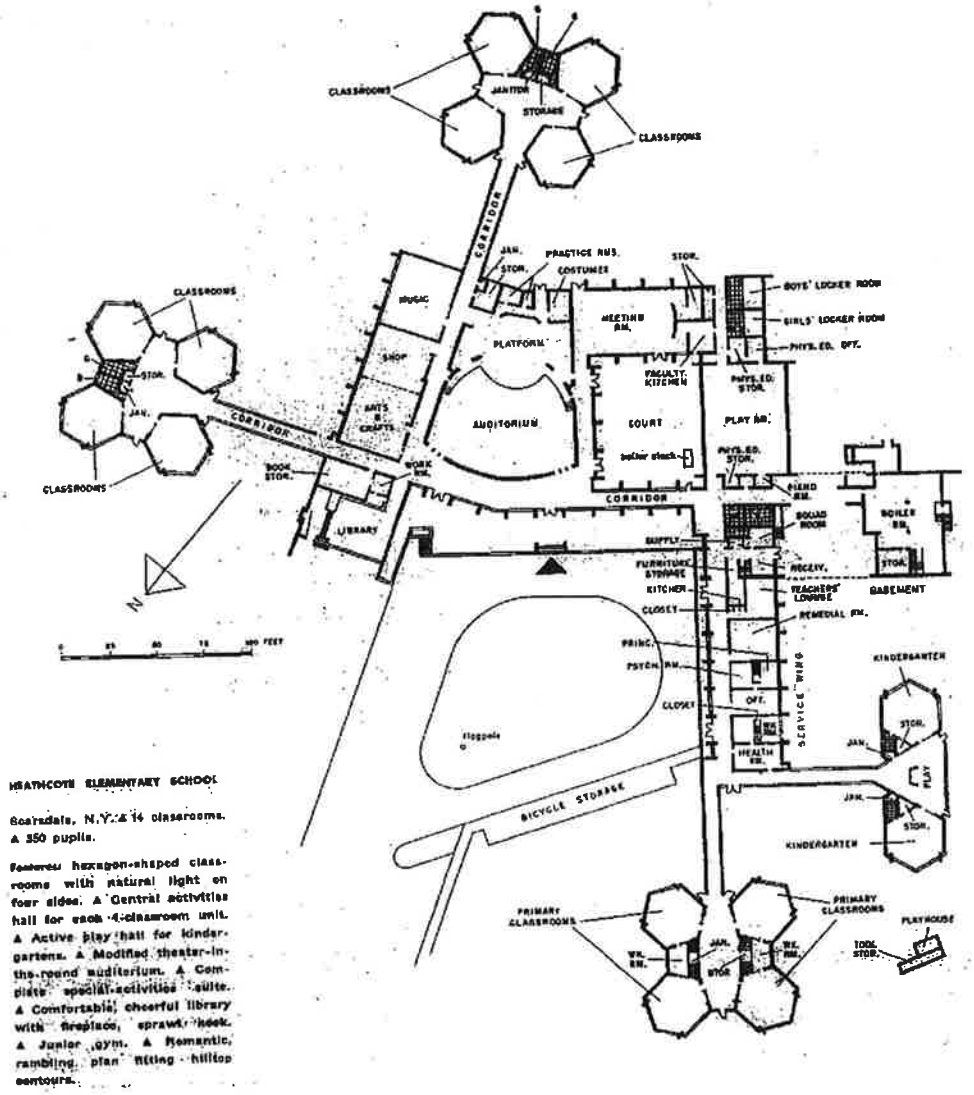


Figure 12 Perkins and Will, Heathcote School, plan

Heathcote was designed to enhance the relationship between children and the natural beauty of the wooded site. With its clusters of hexagonal classrooms, the architects likened the plan to an image of "children under a tree" (Figure 12).[60] As at Crow Island, the firm designed built-in seats next to windows to increase the children's proximity to nature. Heathcote's long glazed corridors had no classrooms strung along them. Instead, they were transparent and followed the rolling topography, connecting each cluster to the administrative center and auditorium. The jewel-colored panes set into the walls cast bright compositions on the floor and provided contrast to the natural palette of wood, stone, and earth.[61] They also invited children, as they made their way down the corridor, to peer out and rediscover the landscape in red, blue, orange, or green (Figure 13). The extensive use of plate glass and pleasurable details—even the gymnasium had expansive windows that looked onto a landscaped rock garden—were designed to instill aesthetic appreciation. Indeed, Perkins valued the child's subjective experience over technical formulas. He described Heathcote as a rebellion against "the current concentration on how to pour air over a child, throw light on his book, fit his contours to the seats. This building is not an exercise in lighting and ventilation."[62]

Expensive and lavishly outfitted, Heathcote reflected the esteem that progressive education held in suburban Scars-

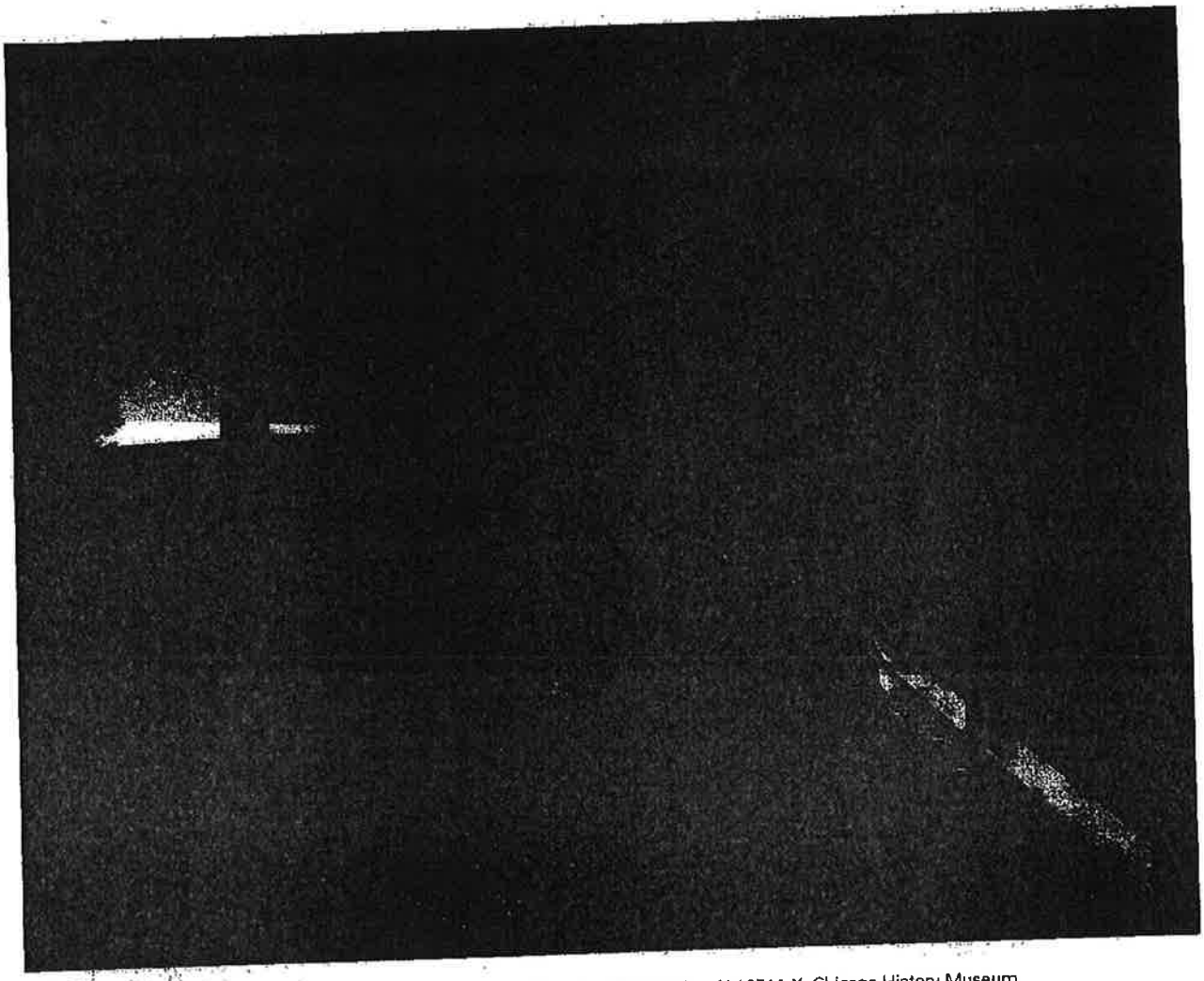


Figure 13 Perkins and Will, Heathcote School, view of a corridor. Hedrich-Blessing, H-16711-X, Chicago History Museum

dale, one of the richest towns in the country at the time. Heathcote gained national attention and images of it were often printed in full color. An article in *McCall's*—"What's Happened to the Little Red Schoolhouse?"—praised the psychological effects of the school environment, with its flexible classroom clusters and colorful and elegant details, on the behavior of the children.[63] The careful attention to aesthetics was admired in the professional press, but in widely read periodicals, such as *Ladies' Home Journal* or *Reader's Digest*, writers charged that taxpayers were being duped into lavish facilities by haughty architects and educators "preying on school boards in thousands of communities."[64]

Although Heathcote's cost per pupil was notoriously high, one point made frequently during the period was how economical modern design was compared to "traditional" prewar schools with masonry construction, multiple stories, large auditoriums, and architectural ornamentation.[65] The cluster plan was especially noted for its economy. Donald Barthelme's West Columbia Elementary School (1952) in Brazoria County, Texas, built around the same time as Heathcote but for a much poorer school district, won an award from school administrators and was featured in MoMA's 1952 *Built in USA* exhibition.[66] Planned around open-air courts, Barthelme's school embraced the metaphor of the neighborhood using the modular grid to save the expense of corridors (Figure 14). The exposed steel frame and expansive plate-glass windows allowed children to see each other across the open play space. The classrooms were sky lit, with a system of louvers to control glare and temperature. Instead of an auditorium, the common room could be used for lunch hours, performances, and community needs. Additional clusters of classrooms around this central

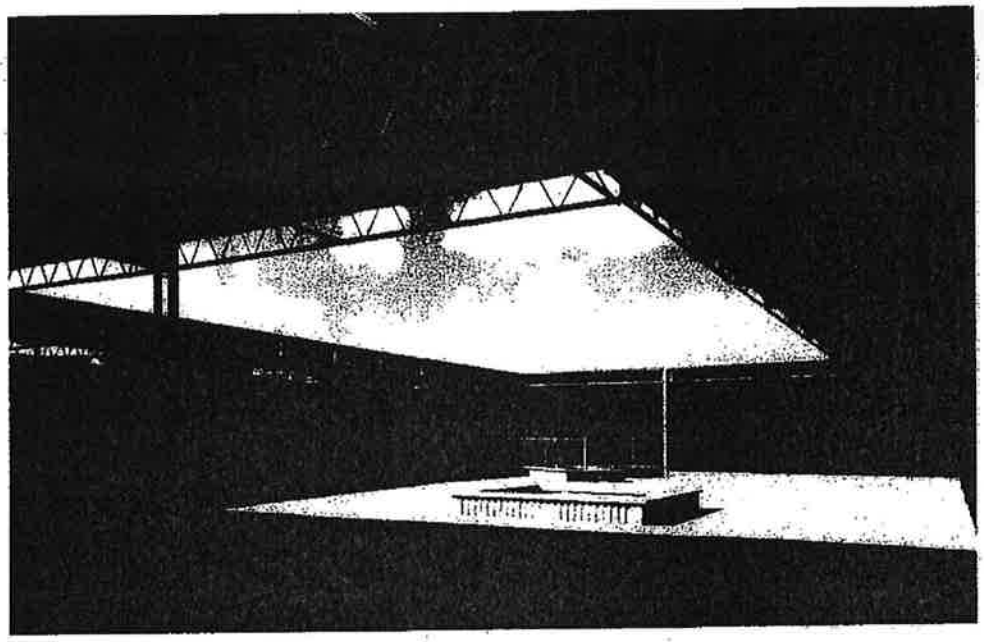


Figure 14 Donald Barthelme, West Columbia Elementary, Brazoria County, Tex., 1952 (demolished)

space were eventually added. Exposed beams and pipes were left unconcealed in classrooms and public areas as a measure of economy, but Vermont marble slabs mounted on the steel frame and open bar joists served as adornment.[67] Praised for economy and forthright structure, West Columbia also gained attention for its sensitivity to the child's experience.

While professional architectural journals regularly covered school building in special annual issues throughout the period, popular magazines such as *Life*, *Parents'*, and *Collier's* devoted entire issues to education, drawing national attention to physical problems of overcrowding and schoolhouse design, as well as questions of curricular content and the future implications for democracy.[68] These publications even commissioned designs that offered unusual solutions for the national dilemma of building evermore classrooms.[69]

The Architects Collaborative (TAC), a Cambridge, Massachusetts, firm founded by Walter Gropius, designed a model school that could be quickly and economically built, allowing for future modification.[70] Published in *Collier's* in 1954, the prototype TAC school featured a cluster plan of individual one-story classrooms grouped around a central administrative structure. A syncopated grid of square classrooms created intimate gardens and "outdoor classrooms" that were interspersed throughout the school grounds (Figure 15). Clusters of four classrooms hugged a common area where group activities could take place. In each classroom, the architects designed moveable self-contained spaces for projects, storage, toilets, and provided skylights along with clerestory windows. Since the building was constructed with steel columns set in concrete piers, the room's walls, freed from load bearing or windows, could be made of inexpensive materials and provide space for exhibiting children's work.[71] The TAC design promised expansion in any direction and according to any topography. It also offered the internal flexibility that purported to make each classroom unique.[72] Although dedicated to economical building using prefabricated materials, TAC also underscored the importance of color and aesthetics. The *Collier's* project and others featured colorful tile murals on the schools' facades. For John C. Harkness, who designed many of TAC's schools, art was essential to the larger project of developing young minds: "the will to understand and appreciate beauty and order must be generated within people. And this must be done during the formative years, which correspond generally to the years of public school education."[73] The cluster schools of the mid-1950s were both technically sophisticated and designed to nurture the individual.

Architecture and the Curriculum

The notion of school as an enchanted experience of discovery, a core belief of progressive education, had implications for both pedagogy and architecture. The progressive values that expanded in the postwar era, especially at the primary level, endowed the material and spatial qualities of the postwar schoolhouse with social and psychological importance. In a 1957 advertisement for Libbey Owens Ford

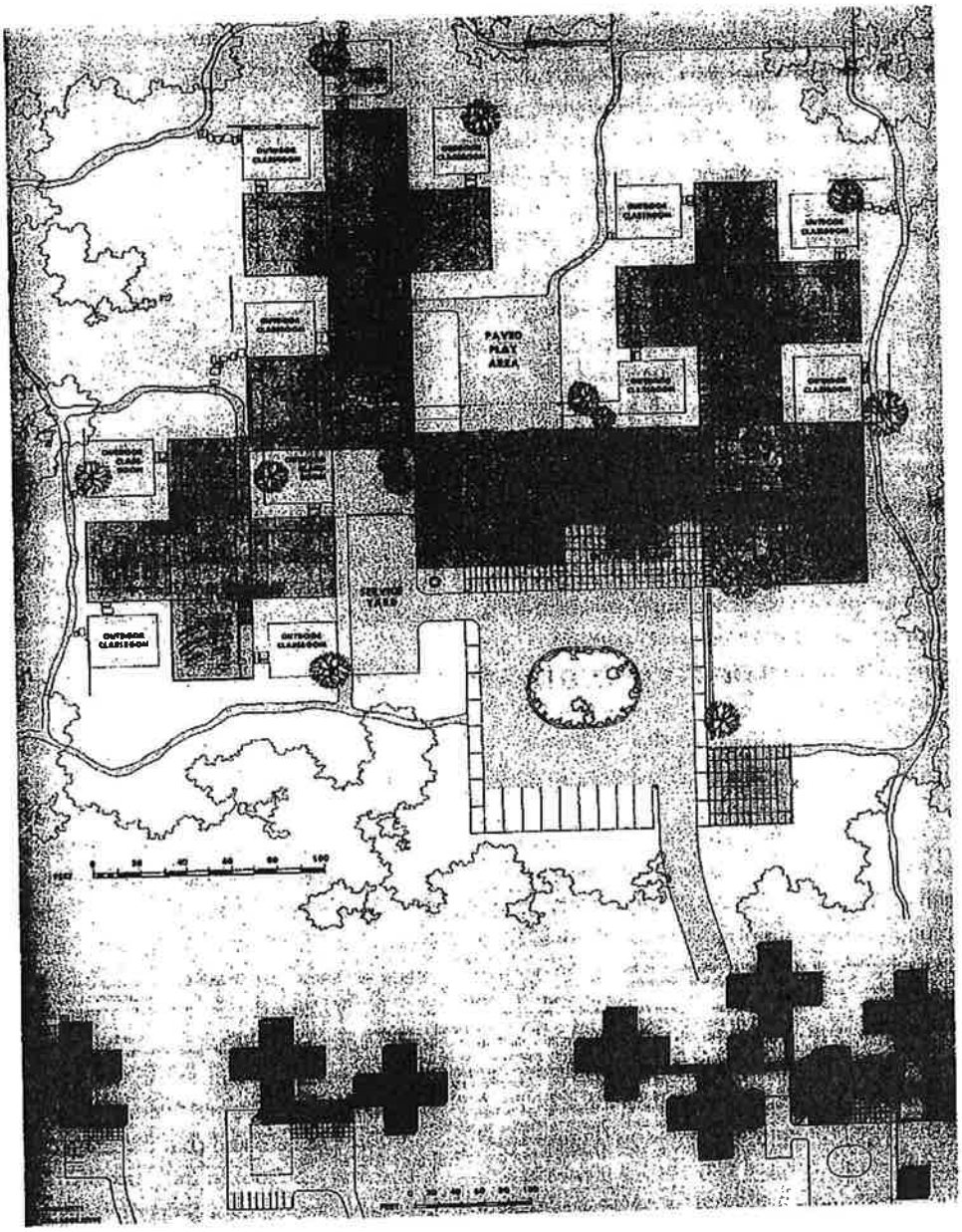


Figure 15 The Architects Collaborative, plan of a model school, *Collier's* magazine, 1954

glass, one architect observed: "the environmental influence of a school building blends into the entire landscape. As a child approaches, he feels a kind of structural welcome. The transparent features of the entrance and rooms seem to beckon. He sees what and who are within, a perception that becomes more interesting with each step. There is an unconscious transition as the child's personality merges psychologically with the school and its visible activities."[74] Giving pedagogy a fundamental role in the design of schools, postwar architects made formal choices, such as self-contained classrooms, indoor–outdoor teaching areas, glass walls, and colorful homelike spaces, because of their educational implications. As Caudill remarked, "The good school is more than a legally constructed shell around a certain amount of space and equipment. It is also a second home for the school child for a good part of his time—an enclosed little world managed by teachers but designed, built, and operated for the child."[75]

Caudill had been interested in educational architecture even before wartime. In *Space for Teaching*, he showed that

rural Texas schools generally lacked electricity, modern toilets, and were housed in outdated structures. Beside the evident need for physical modernization, he argued, many newly built schools were not suitable to modern methods of teaching: "Education has changed profoundly. More changes are expected in the future. No longer is the schoolhouse a mere shelter for the three R's. The scope of the curriculum has broadened. 'Learning by doing' is replacing 'Learning by listening.' Now the school building envelops many and varied activities. Traditional school structures cannot be satisfactorily used. Educators need modern structures, structures that are flexible enough to conform with the changing needs of education."[76] To meet the curricular needs of modern educational methods, Caudill developed a series of architectural requirements for the design of new schools. In the classroom, he pressed for space that could be partitioned, semiprivate areas for individual instruction, large open areas for projects such as model grocery stores, moveable furniture for creating informal reading circles, space for drama and painting, bookshelves and bulletin boards, and rooms designed for film, radio, and phonograph technology. Looking beyond the individual classroom, he also called for conference rooms, health clinics, gymnasiums, and gardens.

After the war, Caudill Rowlett Scott (CRS) put many of these ideas to work in two schools built in Blackwell, Oklahoma, a small conservative wheat-growing town. CRS rejected the monumental forms of an existing school in favor of a single-story building and a sloping roof to maximize breezes and keep out the sun's glare.[77] If residents thought the Huston School (1948) resembled a "cow shed" or a "chicken coop" and puzzled over the open corridor, as reported at the time, they seemed to embrace the logic of economy and the large bilaterally lit classrooms (Figure 16).[78] They also liked Huston's covered play shed, a concrete slab with a roof but no walls, which allowed for outdoor play during rainy months and community use during evenings. Huston's self-contained classrooms were designed to be transformed with minimal effort. To create differentiated space, CRS developed the Teaching Center, a large freestanding unit that combined blackboard, tackboard, pegboard with dowels, and a perforated panel (Figure 17). Designed to replace the traditional wall, the Teaching Center divider could be used for teaching, exhibition, dramatic uses, and storage. Making the classroom larger, well-lit, and hospitable to different activities that could be carried on simultaneously was an overriding concern in CRS's numerous elementary schools of the 1950s and 1960s.[79]

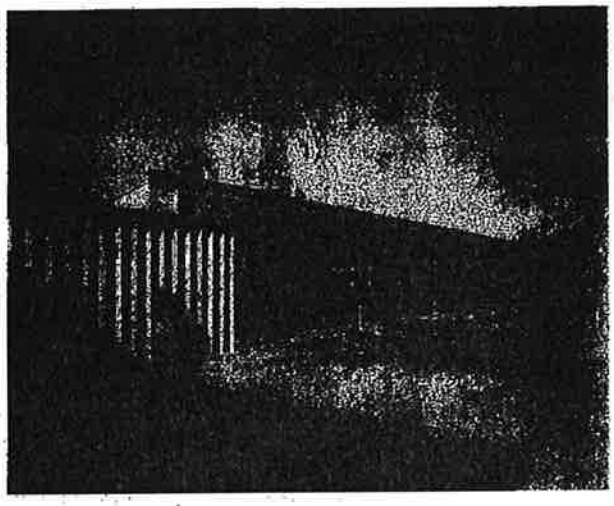


Figure 16 Caudill Rowlett Scott, Huston School, Blackwell, Okla., 1948. © J. Paul Getty Trust. Used with permission. Julius Shulman Photography Archive, Research Library at the Getty Research Institute

The flat roof and thin columns of CRS's 1955 Belaire Elementary School in San Angelo, Texas, created a deep overhang sheltering a polygonal plan that eliminated the

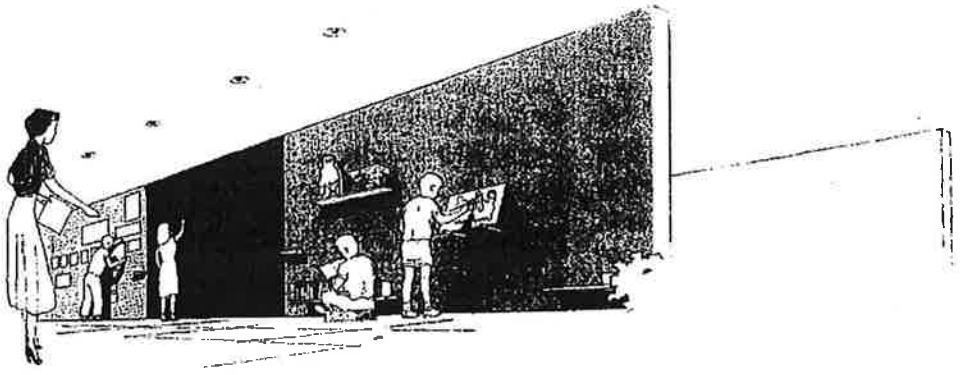


Figure 17 Caudill Rowlett Scott, Teaching Center, ca. 1948

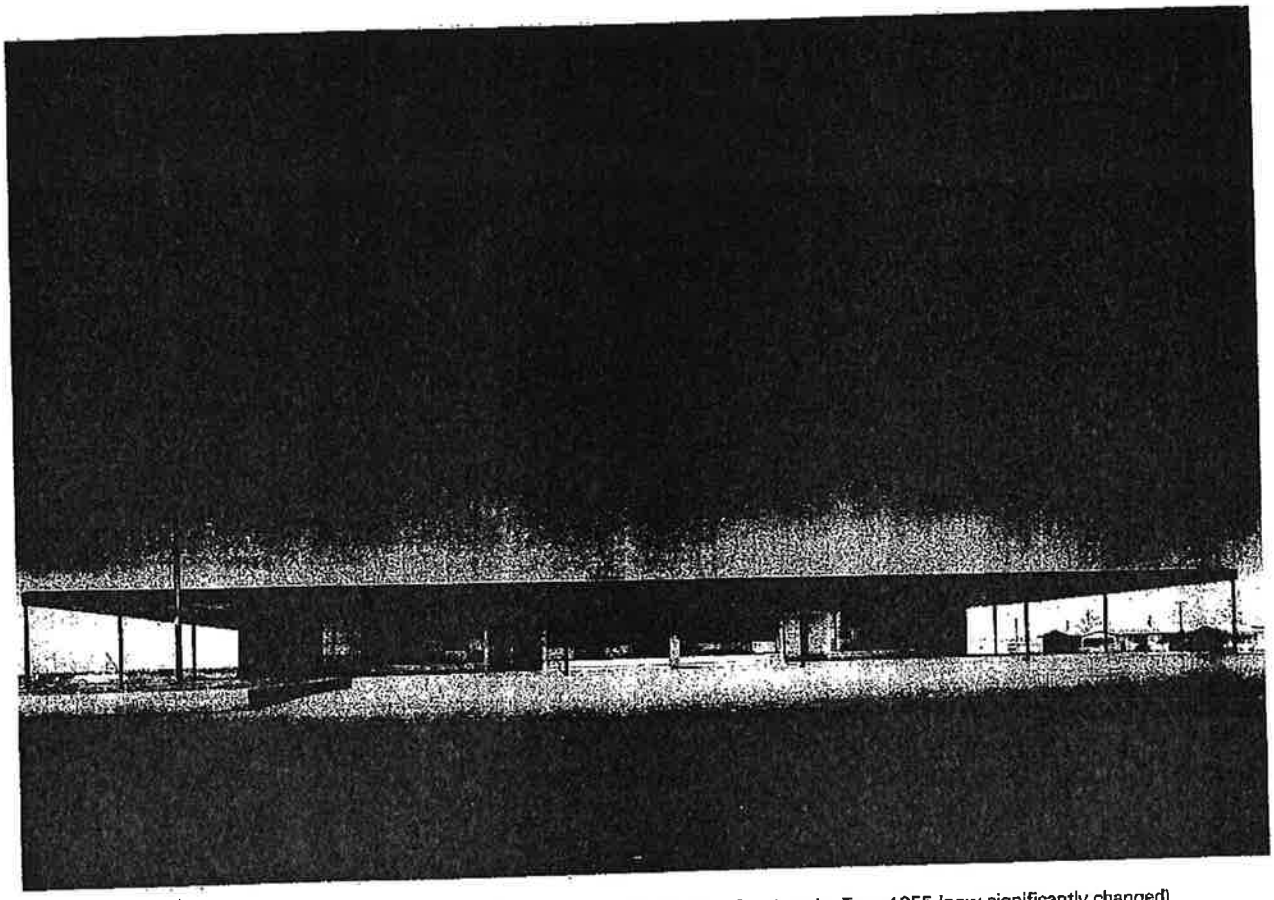


Figure 18 Caudill Rowlett Scott, and Donald R. Goss, Belaire Elementary School, San Angelo, Tex., 1955 (now significantly changed)

need for corridors and focused the classroom inward (Figure 18).[80] Compressing the cluster plan into a single structure, CRS (working with Donald R. Goss) combined economy, technology, and the curricular possibilities of the circular plan. The school was built on reinforced concrete slab and thirty-four slim steel columns supported the long-span steel joists of the roof.[81] The large flat insulated roof provided solar protection while also creating covered outdoor play areas. Belaire was also the first elementary school designed for air-conditioning in the United States. In a reversal of school building norms, and the firm's earlier work, the air-conditioned environment meant few windows and fewer that opened, a strategy dictated by the climate control, but also by the school's location near Goodfellow Air Force Base. Belaire's pie-slice–shaped classrooms had one half-glazed external wall and relied primarily on artificial lighting.

Belaire's small scale, unusual plan, and use of air-conditioning reflected CRS's technological interests and commitment to a progressive model. Designed to hold only 240 pupils, the school was divided up into ten equal wedges with a central elevated platform that could be used for a lunchroom or a stage, which was built over the half-sunken heating and cooling plant. This area opened on to three classrooms with moveable partitions that could form another multipurpose room. In diagrams and photographs, the classroom space was divided into different areas for individual and group work (Figure 19). Furniture determined the classroom layout, and desks at Belaire were designed for two students to sit side by side with shared storage between them, maximizing the surface area but maintaining mobility.[82]

Living Rooms for Learning

Any number of critics, designers, and educators pointed to the image of the oak desk bolted to the floor as the measure of how far American schools had changed in the course of the twentieth century. The old rows of iron-and-wood desks were viewed as a rigid and heartless arrangement compared to the living room–classroom ideal. The grouping of tables for grades above kindergarten reflected newer attitudes about pedagogy.[83] The progressive ideas of John Dewey were sub-

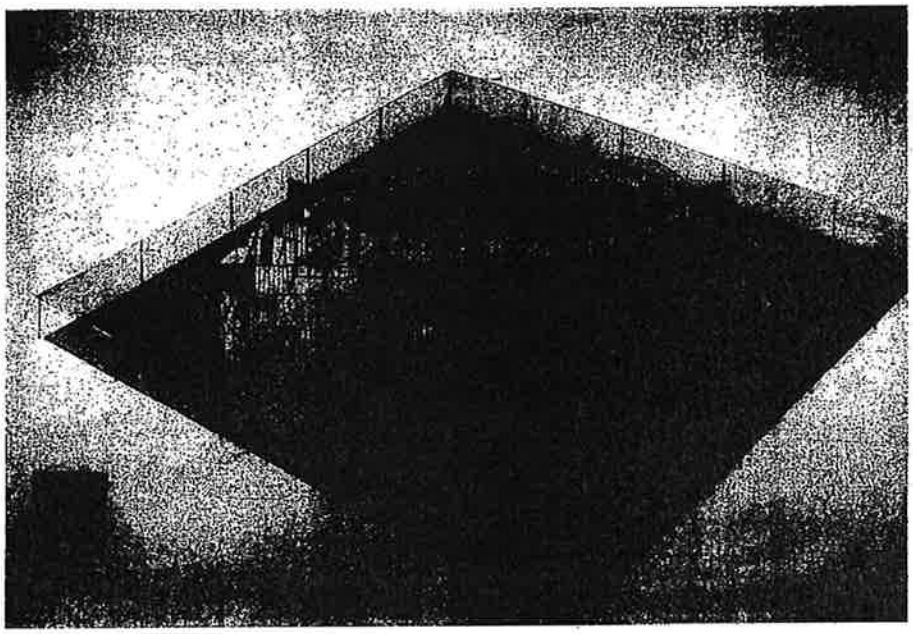


Figure 19 Belaire Elementary School, plan

Figure 20 Universal Desk, American Seating Company advertisement, ca. 1948

sumed into the more generalized practice known as "modern" teaching. In traditional prewar schools the teacher was the authority and his or her desk was placed at the front of the room facing rows of students. New or "modern" methods that were widely adopted after World War II cast the teacher as a guide who constantly moved around the room and kept a desk at the back or side of the classroom, but used it only for recording marks.[84] Just as "flexibility" became the byword among school architects and planners, the flexible classroom was promoted as a fundamental aspect of modern school design and modern pedagogy.

Moveable and stackable chairs, large worktables, informal seating, and open storage were hallmarks of the "flexible classroom."[85] Eero Saarinen's plywood chairs and tables remained an important feature of the Crow Island School.[86] A number of studies examining the arrangement of the classroom concluded that modern teaching methods required different kinds of furniture in the classroom. Instead of providing individual desks for each pupil, planning experts theorized that small groups, group projects, and less formal seatwork would require different kinds of surfaces.[87]

Although an architect could design or specify furniture that was built-in, most loose furniture was the responsibility of the superintendent or district supply department. American Seating's Universal Desk was probably the most widely used combination of pedestal desk and chair for elementary grades (Figure 20).[88] A wooden writing surface and seat were bolted to an adjustable steel frame that held the sitter upright. Although it did not necessarily meet the ideals of "flexibility" called for by education experts, the

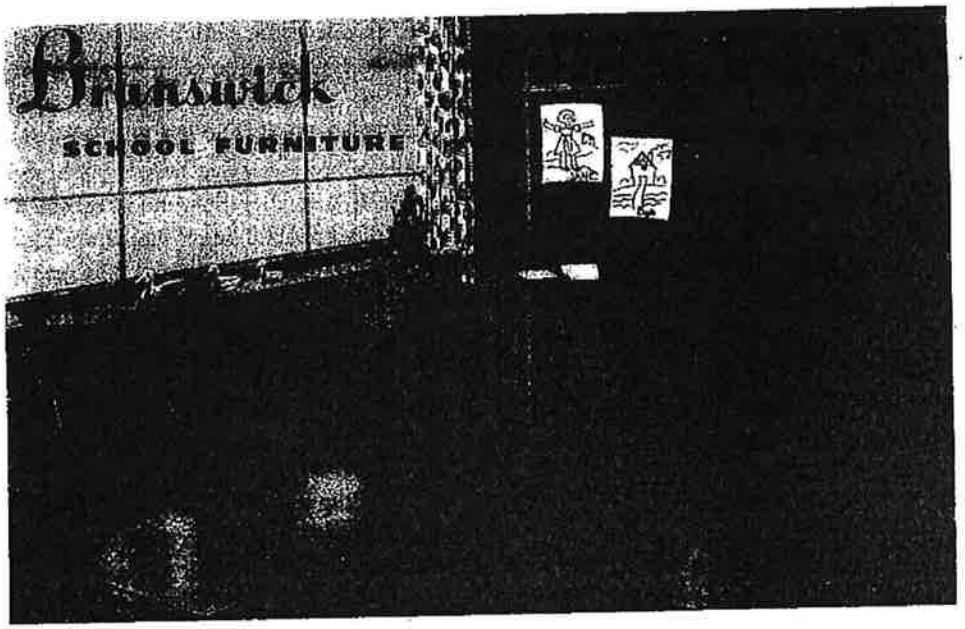


Figure 21 School furniture, Brunswick Corporation, ca. 1954

linked desk-chair combination remained popular because of its small footprint.[89] After the mid-1950s large corporations dominated the school furniture market.[90] David Medd and Mary Crowley, prominent British school architects studying American schools, observed that "only since 1955 has school furniture been made in the quantity, and of the kind, needed to meet the requirements of modern education."[91] When Brunswick-Balke-Collender, a manufacturer of billiards and other sporting equipment, decided to enter the school market in the early 1950s, it invested heavily in research and design.[92] Brunswick promoted ergonomically designed seats and backs, lightweight materials such as plywood, fiberglass, and hard plastic that could be stacked and moved, following the changing formation of the classroom (Figure 21). A molded chair from 1953 that came in both maple plywood and colorful hues was sold as resilient, comfortable, "scientifically" designed, and flexible.[93] In addition, the company promised that their designs could "[turn] your classrooms into *living rooms for learning*" and developed a model schoolroom in Kalamazoo, Michigan, where prospective clients could try out different arrangements.[94] In developing and promoting designs that were easily rearranged and stored, the company (like other materials manufacturers of the period) displayed a mastery of the generalized rhetoric of progressive pedagogy.

A "Cold War of Classrooms"

Longstanding debates over the federal role in funding American schools had left the question of paying for the desperately needed new buildings up to local communities, which raised money through bonds and taxes. Successive attempts to direct revenue to poor states with large school-age populations were introduced throughout the early 1950s. Yet, despite a major government survey indicating that existing school facilities were inadequate, federal investment was limited because of suspicion of government control.[95] After the Soviet launch of Sputnik I and II in October 1957, however, the United States government passed far-reaching legislation in the form of the National Defense Education Act (1958), which provided unprecedented funds for school buildings and equipment, as well as curriculum development in science, mathematics, and foreign languages. The public examination of the state of American education gained urgency in this intense climate, putting new emphasis on domestic policies to win what Senator William Benton of Connecticut had already called a "cold war of classrooms."[96]

Even before Sputnik, nervous questions about the quality of American education and its role in fostering democracy created an enduring debate about the effectiveness of progressive methods. David Riesman, who documented postwar society in the 1950 book *The Lonely Crowd*, argued that the original aims of progressive education to foster individuality were ironically self-defeating. For Riesman, "educational methods that were once liberating may even tend to thwart individuality rather than advance and protect it."[97] He acknowledged that the physical changes in the classroom had a social purpose. Moveable chairs, open shelves, and children's work on the walls all seemed to reflect an encouragement of the child's creativity. However, he maintained, this was paradoxical: "it often hap-

pens that those schools that insist most strongly that the child be original and creative by this very demand make it difficult for him to be so."[98] While individual creativity was an important aim of the progressive ideal, the progressive classroom could act, unwittingly, as a tool of conformity. The more popular critique of progressive education—that it emphasized social adjustment over "the basics"—erupted in the press during the Korean War and again after the launch of Sputnik. Arthur Bestor's *Educational Wastelands* (1953), a scathing and widely read book, questioned the curricular content of American education and its usefulness in cultivating a democratic ideal. Bestor, a professor of history at the University of Illinois, charged that educators were preoccupied with the learning process at the expense of teaching the disciplines.[99] At stake for Bestor and others who extended his argument was a loss of potential intellectual skill, which he believed would be vital to American interests.[100]

Postwar idealism had renewed an older belief that the public schools could nourish democracy, but Cold War anxieties about the ability of Americans to meet future challenges made discourses over all aspects of schooling especially fraught. Arthur Zilversmit has shown that in some areas of the country progressivism was viewed as subversive and in others as an unnecessary extra. Yet, he concludes that the rhetoric of progressivism—more than the practice of it—was highly successful, especially among the educated middle class.[101] Architects and consultant planners envisioned modern well-lit classrooms appointed with suitable furniture that would optimize both teaching and learning, instill an aesthetic sense, and stimulate individual agency. To this degree, progressive rhetoric was readily assimilated into postwar architectural discourse. The denunciation of progressive education has led Diane Ravitch to argue that the progressive education movement died in the mid-1950s.[102] In the debates around the planning and design of elementary schools, however, skepticism about progressive methods similar to that articulated in the popular media was virtually absent. Instead, faith in design and building systems to create spaces to educate and improve postwar citizens became even more visible, and more closely tied to pedagogical models, in the succeeding decades.

Educational Facilities Laboratories and the Open School

Following the ideas of cognitive psychologist Jerome Bruner (who rephrased progressivism by arguing that a child's curiosity was a vital part of the process of education) and a shortage of teachers, reformers of the 1960s emphasized team teaching, non-graded levels, and classroom use of media such as television, which seemed to require another complete reconfiguration of the school plant.[103] In the 1960s and 1970s, Educational Facilities Laboratories, a non-profit corporation funded by the Ford Foundation's Fund for the Advancement of Education, brought together educators, architects, manufacturers, and government officials responsible for school building to encourage new ideas about both curriculum and architecture.[104] In response to the extreme need for new schools, the American Institute of Architects had formed its Committee on School Buildings in 1953. In 1956 this committee joined a group at Teachers College and, with funds from the Ford Foundation, became Educational Facilities Laboratories (EFL) in 1958. Between 1958 and 1976, under the direction of Harold B. Gores, EFL spent 25.5 million dollars toward redesigning American education.[105] EFL hosted conferences, funded studies, and collaborated on projects around the country, but the organization's main interest was the design of the school as a complete environment that responded to the needs of teachers, students, and shifting social conditions.

In 1959 Gores observed, in an essay entitled "Educational Change and Architectural Consequence," that the experimental classroom designs of the early 1950s were no longer useful for current notions about pedagogy. Gores argued, "As instruction turns more and more to the individual, as children are grouped across class and grade lines according to their academic pace, the desire for space that can be divided or multiplied at will and at once increases accordingly. The time is fast approaching when not just a few, but many clients will ask that the design of an elementary school be more than the ingenious arrangement of fixed and uniform quadrilateral boxes."[106] The once-daring school plants with long corridors and classrooms located on one or both sides were now dismissed as hopelessly dull "egg-crates." Even the self-contained classroom, which many believed would bring the school closer to a domestic ideal, was rejected as inflexible and formulaic.

Instead of boxy classrooms with bilateral lighting, open schools were large spaces with few walls or windows, partitioned with folding panels and lit from the ceiling.[107] The ideal of team-teaching, mixing grade levels, and individualized instruction required temporarily larger or smaller areas that could be reconfigured quickly. A growing belief that children could learn most effectively if allowed to explore at their own pace and in differentiated spaces inspired the new openness. Earlier buildings had used glass walls and transoms and moveable, or freestanding, walls to maximize space, but the open schools prized few, if any, walls. According to EFL, "Old walls should not stifle new ideas. Identical boxes must not enforce the same program on all students

and teachers; each is a unique individual. Fixed furnishings must not quash spontaneous inquiry. Dismal, spiritless, and uniform decors must not blight a child's creativity."[108]

Encouraging individual discovery and personal freedom were the pedagogical aims of the open plan schools.[109] EFL's position reflected a wider interest in stimulating creativity for social and economic reasons. Studies on creativity flourished in the late 1950s and throughout the 1960s, and gained the attention of the National Science Foundation, the United States Air Force, and major industrial enterprises. The anthropologist Margaret Mead told parents that creativity was a child's way of making the world his or her own in a 1962 pamphlet, *A Creative Life for Your Children*, published by the U.S. Children's Bureau.[110] While President Eisenhower's education legislation in 1958 stressed preparing pupils for international competition, President Johnson's Elementary and Secondary Education Act of 1965 included money for the Project for the Advancement of Creativity in Education (PACE), which aimed to develop the role of cultural and scientific offerings in the public schools.[111] Turning Cold War fearfulness into idealism, the American Federation of Teachers stated emphatically, "creativity, if not smothered, will be a precious asset to the child as he grows to adulthood. It will serve him, and serve the nation. This impulse towards creativity is in all children."[112]

Eager to promote the adoption of the open system, EFL awarded a large grant to develop an economical, standardized building system they called School Construction Systems Development, or SCSD.[113] SCSD was comprised of standardized components that could be largely prefabricated and quickly installed. A team led by architect Ezra D. Ehrenkrantz with researchers from the Stanford School Planning Laboratory and the Department of Architecture of the University of California at Berkeley devised the project. Begun in 1962, SCSD had the commitment of twelve California school districts to develop and build schools worth 25 million dollars.[114] SCSD aimed to save costs by large-scale purchasing of modular systems that could be erected in many different interchangeable configurations depending on the specific site requirements.[115] In addition to economical construction, the designers of SCSD hoped to create schools to meet the needs of a rapidly changing curriculum with open spans of 60 to 70 feet that could be easily partitioned and modified, without a monotonous row of classrooms along a corridor.

The SCSD project was directly modeled on the British Infant Schools built after World War II in Hertfordshire.[116] Ehrenkrantz spent two years on Fulbright Fellowships in the mid-1950s at Britain's Building Research Station studying modular building and the mathematical patterns that might become the basis of a far-reaching system. The postwar English school building program enjoyed widespread renown for its economical system of building from component parts. In the urgent push to replace war-damaged schools and meet their own booming population needs, British architects, especially those at the Hertfordshire County Council, worked to develop low-cost solutions for specific educational requirements.[117] The centralized national system of education differed significantly from the local administration of American schools. Unlike the British architects, who created the entire design, SCSD hired individual manufacturers to develop the products. And, instead of giving a single manufacturer a contract for all schools built, SCSD solicited open bids.

The manufacturers of SCSD components worked out careful designs to insure economy.[118] To save on shipping, the large-span structural sections were designed to fold flat.[119] Other manufacturers provided roof-mounted air conditioning units, partitions, and lighting fixtures that would work together as part of the SCSD system. The design called for a "service sandwich" in which wiring, air ducts, and plumbing were interlaced between the roof deck and ceiling. Since air ducts could be moved to any line on a five-foot grid, and ceiling lights were embedded in interchangeable panels, rooms or entire departments could be reconfigured in hours (Figure 22).

One of the popular fears about the standardized, prefabricated structures was that they would lead to monotonous design. Although built with identical components, individual architects designed the SCSD schools and local contractors, hired by each district, built the schools. SCSD did not specify any materials or designs for walls, so the schools' external character varied from glass to cast concrete and brick. Furthermore, the schools were configured according to the needs of each institution. Unlike the British postwar schools, the SCSD system allowed for internal flexibility and a variety of room configurations. The structures built encompassed small elementary schools as well as large high schools.[120]

The promotion of the SCSD program reached a national audience and it attracted considerable attention. Although many praised the notion of component systems, the feasibility did not necessarily reduce overall costs. The California districts did not build cheaper schools. However, EFL argued that they received more comprehensive buildings of better quality. Thirteen—rather than the initially projected twenty-two—schools were erected with SCSD components, but aspects of the design were installed in industrial buildings, and similar programs for school building were developed in Canada and Florida through the late 1960s.[121]

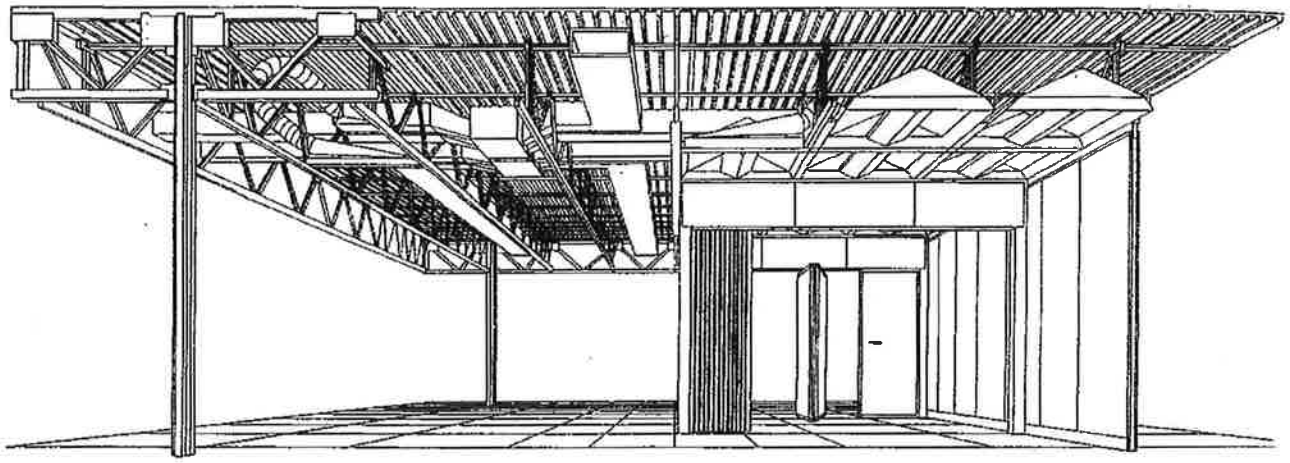


Figure 22 School Construction Systems Development component parts, ca. 1967

The open school ideal relied on long spans and systems of low or demountable walls for internal flexibility. One of the most adventurous examples of the open school was CRS's Paul Klapper School, Public School 219, in Queens, New York (1966; Figure 23). With money from EFL, the firm had developed a huge dome floating on glass walls with no fixed interior walls for a school system in Port Arthur, Texas, in 1960.[122] When a bond issue for the Texas school failed, this model was adapted for several locations, including New York City.[123] As a demonstration school for the City University of New York's Queens College, P.S. 219 was an example of how open schools might work in an urban context. The school was designed for 150 children at kindergarten through second grade levels who, in theory, would be able to move freely with a team of six teachers. CRS believed that the circular form could better enhance the practice of team teaching. According to Caudill, "the uniqueness is that there will be a CONTINUOUS movement of children."[124] Under the dome, the low dividers created four classrooms that could be combined into a single space (Figure 24). A freestanding mezzanine placed just off center made use of the vertical space for a second story research center and created a curtained assembly area beneath. Beyond the dome were four outdoor courts for natural science, gardening, arts and crafts, and math and social science. The sophisticated shell structure, although technologically and pedagogically innovative, reprised the romantic image of the nineteenth-century one-room school.

Throughout the 1960s and early 1970s, examples of open schools along the lines EFL recommended were erected around the country. Yet, despite extensive promotion and endless optimism, the open schools faced problems of practicality and perception. Acoustics, the most notorious criticism of the SCSD buildings, also plagued other open schools.[125] Open schools, which were deliberately designed to omit the conventional walls and doors of older buildings, were theorized as vibrant spaces where individual concentration and wall-to-wall carpeting would make up for ambient noise. However, the acoustical problems from using television and film in rooms without doors, or separated only by thin panels or folding walls, were considerable. Furthermore, the physical openness did not by itself condition teachers to adopt the pedagogical techniques developed for these spaces. This pointed to a larger gap between theory and practice. Larry Cuban has argued that the spread of the movement to use open classrooms with moveable furniture, to teach using individualized instruction and research centers, and to allow students to move freely about the classroom was probably limited, although reliable national data were not collected at the time. A study by John Goodlad in the late 1960s revealed that although teachers expressed enthusiasm for reforms such as individualized instruction, observers found that they actually geared their lessons to the existing "norm," using primarily textbooks and seatwork.[126] While researchers recommended tables and chairs that could be easily rearranged, and suggested that pupils preferred variety in the classroom, they noted that even in

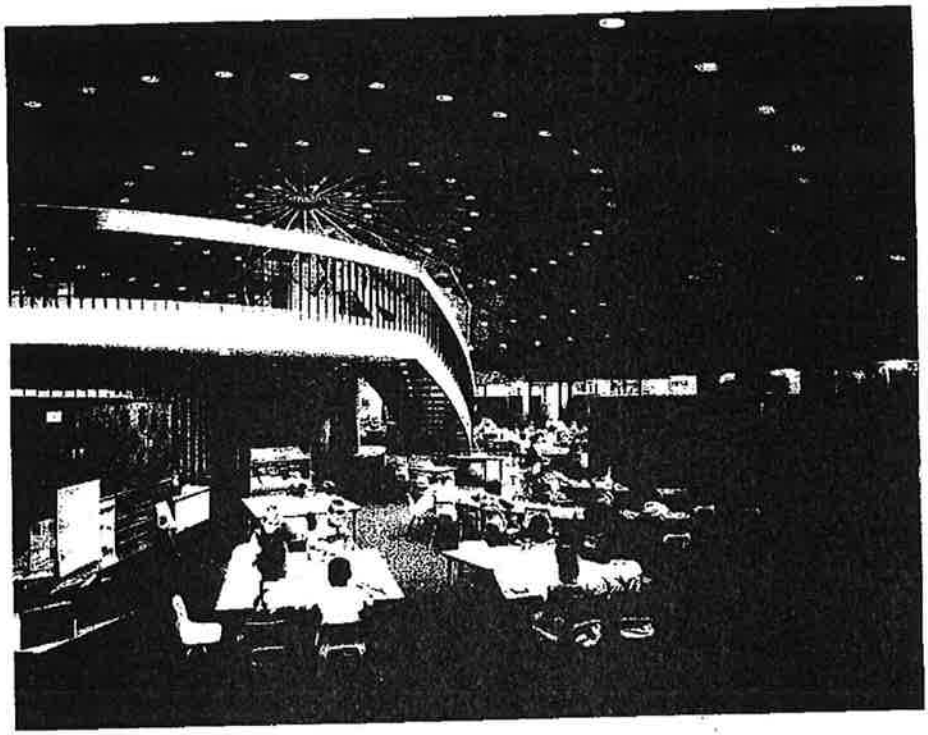
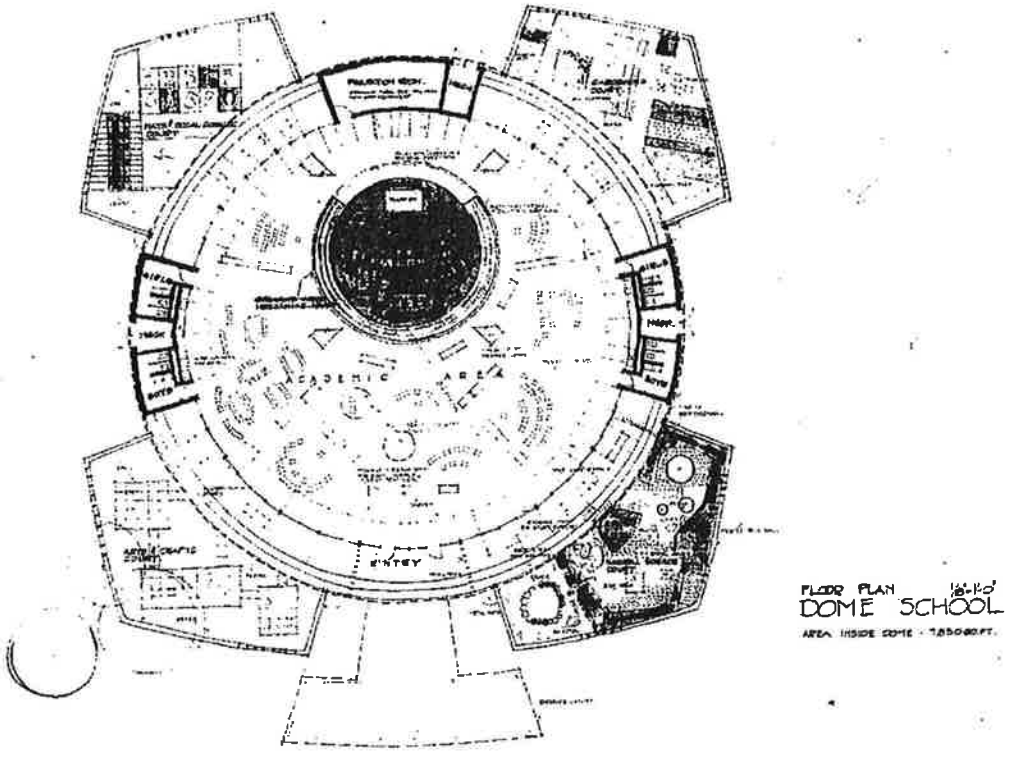


Figure 23 Caudill Rowlett Scott. Paul Klapper School, Public School 219, Queens, N.Y., 1966–67

Figure 24 Paul Klapper School, Public School 219, plan



classrooms with "flexible" furniture, the furniture was seldom actually rearranged.[127]

Unlike the domestic analogy of the 1950s schoolhouse, the closest model to the open schools of the late 1960s was the corporate office. Similar ideas about opening up the office with long-span steel frames preoccupied specialists in organizational behavior and interior design. In the interest of productivity and boosting the flow of paper, businesses expanded offices, omitted walls, and changed the arrangement of desks to form clusters, rather than rectilinear rows. The idea of the open office, or *Bürolandschaft* (office landscape), was developed by the Quickbörner Team of Eberhard and Wolfgang Schnelle of Hamburg, Germany, but it had far-reaching influence in the United States in the 1960s and 1970s. In order to heighten the efficiency of office work, address changes the computer had hastened, and reduce emphasis on management authority, Quickbörner and manufacturers such as Herman Miller proposed that the "open office" could be easily reconfigured to meet the rapid pace of change and encourage a democratic style in which the individual initiative was valued over corporate hierarchy. The same principles of flexibility, democracy, and individualism of the open schools were implied in the arrangement of the open office. Once again, acoustical problems, a lack of practical commitment to the system, and difficulty finding an objective means to evaluate the success of the open plans left the effectiveness of the design uncertain.[128]

Conclusion

The postwar elementary school, like the historical Little Red Schoolhouse, became a recognized type. A succession of books directed at laymen—parents, teachers, administrators, school board members—showed cost benefits, plans, and photographs of prominent schools. Most were written by architects, or published by architectural presses, and consistently recommended the low-rise profile, bilateral lighting, and self-contained classroom.[129] The schools I have discussed won national awards and critical attention, and elements of their design were adapted in school districts around the country.[130]

Architects and educators, hoping to make school seem friendly and appealing to young children, designed colorful, open spaces to activate learning. Although larger social questions were interpreted and debated in built form, school buildings were never a pure reflection of either educational theory or policy. Instead, they reveal how their designers wrestled with creating optimal plans and explored the possibilities of materials, techniques for lighting, cooling, and seating. Furthermore, they show how a wide constituency of designers, planners, and local citizens believed that architecture could affect and improve the lives of those who used school buildings. The growth of postwar school building opened up a vital debate about the meaning of environment to the lives of young children, and to the nation. If, as many argued, the school reflected the state of American society, it was a critical site in the project of making postwar culture.

Notes

This research derives from my book project on creativity and the material culture of postwar American childhood. I thank the Canadian Centre for Architecture in Montreal and the CRS Center at Texas A&M University for support and assistance, administrators and staff at the schools I visited, and the library and archive staffs at the Bard Graduate Center, Columbia University; the National Library of Education; the Henry Ford; and the Museum of Modern Art. I am indebted to colleagues and students at the Bard Graduate Center who read an early draft, and to participants in the education network of the European Social Science History conference in 2006 and the Society of Architectural Historians in 2008. Special thanks go to the two anonymous readers, Hilary Ballon, and to James and Felix Goldwasser who spent school vacations looking at school buildings with me.

1. "Schools," *Architectural Forum* 103 (Oct. 1955), 129.

2. See statistics cited in American Association of School Administrators (AASA), *Planning America's School Buildings: A Report of the AASA School-Building Commission* (Washington, D.C., 1960), 18; and U.S. Department of Education, National Center for Education Statistics.

3. Between 1949 and 1959, 25,000 one-teacher schools were abandoned because of consolidation and unified districts. See AASA, *Planning America's School Buildings*, 19.

4. The population of the state of California more than doubled between 1940 and 1960; see Emilie Stoltzfus, *Citizen, Mother, Worker: Debating Public Responsibility for Child Care after the Second World War* (Chapel Hill, 2003), 139.

5. AASA, *Planning America's School Buildings*, 20.

6. William W. Cutler III, "Cathedral of Culture: The Schoolhouse in American Educational Thought and Practice since 1820," *History of Education Quarterly* 29 (Spring 1989), 4–5; and Amy S. Weisser, "'Little Red School House, What Now?' Two Centuries of American Public School Architecture," *Journal of Planning History* 5 (Aug. 2006), 198.

7. This article builds on the surveys of school architecture by Cutler and Weisser. While Cutler and Weisser have looked at postwar schools through the lens of earlier debates about school design, I examine the form, representation, and implications of elementary school architecture as a particular concern of the postwar era. I am, however, especially indebted to Weisser's discussion of Crow Island in "Institutional Revisions: Modernism and American Public Schools from the Depression to the Second World War" (PhD diss. Yale University, 1995). Robbin M. Rittner-Heir's "What Went Wrong: Detours in the History of School Construction," *American School Board Journal* 190, no. 6 (2003), 39–40, 42, discusses the construction problems of postwar schools, but is not a scholarly history. A new survey of school architecture by Catherine Burke and Ian Grosvenor, *School* (London, 2008), looks broadly at design and educational issues.

8. While these are the basic typologies for postwar school plant design, they do not necessarily represent a neat temporal succession. The finger plan, for example, remained a reliable type in California well into the 1960s. Other postwar planning models included the loft plan, an open space with easily partitioned internal space, and the campus plan, mostly used for middle and high school buildings.

9. Postwar schools therefore exemplify the heterogeneity of architectural ideas and practices that constitute what Sarah Williams Goldhagen has called the "discourse" of modernism. See Goldhagen, "Something to Talk About: Modernism, Discourse, Style," *JSAH* 64, no. 2 (2005), 144–67; and Goldhagen and Réjean Legault, eds., *Anxious Modernisms: Experimentation in Postwar Architectural Culture* (Cambridge, Mass., 2000).

10. Cutler, "Cathedral of Culture," 10.

11. W. W. LaChance, *Schoolhouses and their Equipment with Plans and Illustrations of the Newest Schoolhouse Architecture* (Niagra Falls, N.Y., 1925), 19.

12. See for example, Anne-Marie Châtelet, Dominique Lerche, and Jean-Noël Luc, eds., *L'Ecole de plein air. Une experience pédagogique et architecturale dans l'Europe du XXe siècle* (Paris, 2003).

13. Thomas S. Hines, *Richard Neutra and the Search for Modern Architecture* (Berkeley, 1982), 164–65.

14. See for example, Lawrence A. Cremin, *The Transformation of the School: Progressivism in American Education, 1876–1957* (New York, 1961); Larry Cuban, *How Teachers Taught: Constancy and Change in American Classrooms 1880–1990*, 2nd ed. (New York, 1993); Arthur Zilversmit, *Changing Schools: Progressive Education Theory and Practice 1930–1960* (Chicago, 1993); and William J. Reese, *The American Public School: From the Common School to No Child Left Behind* (Baltimore, 2003).

15. The Perkins, Wheeler, Will firm had received few commissions at this point, but had completed buildings for prominent figures in Winnetka. Perkins, Wheeler, Will expressed interest in the project and arranged for Saarinen to collaborate. Lawrence Perkins describes this collaboration in "Oral History of Lawrence Bradford Perkins," interview by Betty J. Blum, Chicago Architects Oral History Project, The Ernest R. Graham Study Center for Architectural Drawings, Department of Architecture, The Art Institute of Chicago. See also Weisser, "Institutional Revisions," 65–66, 102–5.

16. Frances Pressler, "Letter to the Architects," in "Crow Island School," *Architectural Forum* 75 (Aug. 1941), 80.

17. Pressler, "Letter to the Architects," 81. Weisser cites a letter from Pressler to the Saarinens that is worded slightly differently than the one published in *Architectural Forum*: "Everywhere children and what they can do shall be the adornment of the structure. . . . The beauty should be a background setting kind, and one not too finished, lest children feel it beyond them to make [a] contribution." See Weisser, "Institutional Revisions," 71.

18. The curriculum covered basic subjects such as reading, writing, arithmetic, history, and science, but it allowed for each pupil to advance and master subjects at his or her own rate and without letter grades or fear of failure. One of the distinctive features of the school curriculum was the designated Pioneer Room where the children explored aspects of daily life of the past and experimented with materials. See Weisser, "Institutional Revisions," 69–70.

19. Ibid., 71.

20. Ibid., 74–83.

21. William W. Caudill, *Space for Teaching, Bulletin of the Agricultural and Mechanical College of Texas* 12, no. 9 (1941), 42.

22. After the war, as demand surged, school boards and local superintendents around the country raised taxes and proposed bond measures multiple times for capital building projects. U.S. Department of Health, Education and Welfare, Office of Education, *Local, State, and Federal Funds for Public School Facilities*, circular no. 558 (Washington, D.C., 1959), cited in AASA, *Planning America's School Buildings*, 21 (see n. 2).

23. An illustrated slide talk on the exhibition was also circulated widely; see the Museum of Modern Art Archives, NY, CE11.1.75.2. The exhibition did not have a catalog, but an offprint of Elizabeth and Rudolf Mock's article "Schools are for Children," *The American School and University* (New York, 1943), 37–43, was available. A film, *Design for Learning* (1942), not produced by MoMA, also circulated with the exhibition. In addition to MoMA's *Modern Architecture for the Modern School*, Crow Island was included in Elizabeth Mock, ed., *Built in USA, 1932–1944* (New York, 1944), 74–75. The Crow Island School appeared between two other important examples, Neutra's Corona Avenue School and Franklin and Kump's Acalanes High Union School. The exhibition charted the progress of modernism in the United States since the International Style exhibition of 1932. The advisory committee for this exhibition included Sigfried Gideon, Walter Curt Behrendt, Serge Chermayeff, John Entenza, and Kenneth Reid.

24. In addition to photographs and models of forty-one schools in the U.S., Europe, and Brazil, the exhibition contrasted "modern" educational theories to those of the past. Museum of Modern Art Archives, NY, "Modern Architecture for the Modern School," CE11.1.75 1/1. Modern school architecture had a prominent place in the museum's other postwar architecture exhibitions *Built in USA* (1944) and *Built in USA: Postwar Architecture* (1952).

25. In 1955, *Architectural Forum* revisited the school and remarked: "Crow Island appears, if anything, more significant than it did 15 years ago. Time and use—not only here but in many hundred later schools—have proved out the workability of its innovations to a degree that only the wildest optimism in 1940 could have conjectured. The national debt owed Crow Island for ideas large and small is staggering." See "Crow Island Revisited," *Architectural Forum* 103 (Oct. 1955), 130.

26. John Lyon Reid and Partners designed a Kindergarten classroom, Smith, Powell and Morgridge created an Elementary classroom, Curtis and Davis provided an Industrial Arts classroom, the Office Practice classroom was designed by John Carl Warnecke, and Perkins and Will contributed a Home Economics classroom.

27. Henry Ford Museum and Greenfield Village and *Encyclopedia Americana*, "Schoolroom Progress, U.S.A. Press and Educators Preview," Henry Ford Museum and Greenfield Village Archives, EI 1929-box 89. During the press preview on 19 Sept. 1955 in Washington, children and adults in period costume enlivened the exhibits.

28. Press release, Museum of Modern Art Archives, NY, CE11.1.75 1/1.

29. Perkins, Wheeler, and Will became Perkins and Will after Wheeler left the firm briefly in 1946. Perkins and Will eventually expanded to include offices in Chicago and White Plains, New York. John Lyon Reid was a partner in the San Francisco firm of Bamberger and Reid until 1948. The firm was later called John Lyon Reid and Partners, and Reid and Tarics after 1962. Reid designed numerous schools in the Bay Area. The Caudill Rowlett firm was established in Austin in 1946, moved to College Station in 1947, and was reorganized as Caudill Rowlett Scott in 1948. In the late 1950s, the firm moved from Bryan to Houston, Texas, and practiced throughout the Southwest. Many other architects and firms, including Ketchum, Giná, Sharp; Maynard Lyndon; John Carl Warnecke; Mario Ciampi; Alonzo J. Harriman; and Hugh Stubbins also produced important school buildings in this period.

30. JoAnne Brown argues that civil defense administrators viewed postwar schools as potential bomb shelters, but most single-story postwar schools did not have shelter provisions. See JoAnne Brown, "'A is for Atom, B is for Bomb': Civil Defense in American Public Education, 1948–1963," *Journal of American History* 75, no. 1 (1988), 68–90.

31. Stairs were frequently cited as a source of injuries on the school grounds. National Council on Schoolhouse Construction, *Proceedings of the 22nd Meeting, Part II. Guide for Planning School Plants* (n.p., 1946). This idea was widely repeated; see for example Caudill, *Space for Teaching*, 83 (see n. 21).

32. The 1946 *Guide for Planning School Plants*, published by the National Council on Schoolhouse Construction, emphasized expansion and flexibility as prime considerations. According to the report, a one-story school built with a rigid frame, with classrooms on one or two sides of the corridor, and continuous fenestration along the entire wall, would all enhance a school plant's adaptability to change and expansion. See National Council on Schoolhouse Construction, *Proceedings of the 22nd Meeting, Part II*.

33. Joel Davidson, "Building for War, Preparing for Peace," in *World War II and the American Dream: How Wartime Building Changed a Nation*, ed. Donald Albrecht (Washington, D.C., 1995), 202–5.

34. Montecito Elementary is today the Martinez Adult School. See "Low-Cost School," *Architectural Forum* 91 (Oct. 1949), 111–14.

35. Reid had been associated with the Franklin and Kump practice from 1937. He profiled the work of the firm, including Acalanes Union High School, in John Lyon Reid, "Post-War Schools," *Architect and Engineer* 153, no. 2 (1943), 12–24, 32; and Reid, "Perspectives: He Sees Farther Through a Sieve than Most: Ernest Joseph Kump," *Pencil Points/Progressive Architecture* 26 (Apr. 1945), 87–88.

36. "Growth of an Indoor-Outdoor Unit," *Architectural Record* 115 (Feb. 1954), 172–77.

37. Charles Wesley Bursch and John Lyon Reid, *You Want to Build a School?* (New York, 1947), 7.

38. See, for example, Catherine Burke, "Light: Metaphor and Materiality in the History of Schooling," in *Materialities of Schooling: Design, Technology, Objects, Routines*, ed. Martin Lawn and Ian Grosvenor (Oxford, 2005), 125–43; and Wei Wu and Edward Eng, "A Review of the Development of Daylighting in Schools," *Lighting Research and Technology* 35, no. 2 (2003), 111–24.

39. From 1946 until 1949 Caudill was a researcher on the flow of air and use of natural illumination in school buildings at the Texas Engineering Experiment Station (TEES) at Texas A&M University. The smoke models allowed architects to visualize the flow of air through a model structure. Caudill and the TEES created a short film called *Building for Learning, TEES Research Report* no. 3 (1948), that circulated along with a slide lecture and graphic outline. The script for this project is CRS Archive, docs. 3000.0005 and 4000.1937.2, CRS Archive Center, Texas A&M University. For a description and review, see "Building for Learning," *School Management* (Jan. 1949), 4–5, 18, 30.

40. Charles D. Gibson, from the California State Department of Education, Department of Schoolhouse Construction, advocated for daylight and electric light. See Gibson, "Daylight is Bright Enough Everywhere if We Are," *Architectural Record* 103 (Mar. 1948), 125–30.

41. Darell B. Harmon, "Lighting and the Eye," *Illuminating Engineering* 39 (1944), 481–500; Harmon, "Lighting and Child Development," *Illuminating Engineering* 40 (1945), 199–233; and Harmon, "Eyes and Ears in School: Light on Growing Children," *Architectural Record* 99 (Feb. 1946), 79.

42. Harmon believed that the "whole body tries to center itself on the brightest area affecting the eyes," which led to poor posture and, he suggested, to fatigue, making a child more susceptible to disease, and eventually to an asymmetrical body structure. See Darell B. Harmon, "Lighting, Color, Furnishings," *Nation's Schools* 39, no. 5 (1947), 33–48.

43. Harmon set up four experimental classrooms at the W. M. White School in Mexia, Texas, to study the conditions of lighting, especially brightness, and the design of the school environment.

44. Darell B. Harmon, *The Co-Ordinated Classroom* (Grand Rapids, Mich., 1949), 38. At the Rosedale School, in Austin, Texas, the lateral windows were replaced with glass block and a vision strip to diffuse light, the chalkboards were painted a yellow-green, and special steel racks were installed on each desk to keep books at the optimal angle.

45. Douglas Haskell, "Schools in Transition," *Architectural Record* 101 (Jan. 1947), 79; rpt. in *School Planning: The Architectural Record of a Decade*, ed. Kenneth Reid (New York, 1951), 243.

46. Harmon, "Eyes and Ears in School," 79. The 1946 *Guide for Planning School Plants* (see n. 32) took up Harmon's recommendations, emphasizing the importance of field of vision to a student's perception. Researchers from General Electric (GE) also adopted many of Harmon's ideas; see Carl J. Allen, "Classroom Lighting Techniques," *Progressive Architecture* 29 (Aug. 1948), 76–83. Allen, a researcher for GE, also points out the industrial applications.

47. These included schools in LaGrange and Willamette, Illinois, the John Simpson Junior High School in Mansfield, Ohio, and the Bowditch School in Salem, Massachusetts.

48. In 1952, Harmon established the Stanford School Planning Laboratory to research the psychological and physiological aspects of classroom design and its effect on children's intellectual development. Since Harmon was an educator rather than an engineer, the goals of the Stanford School Planning Laboratory were directed toward educational, rather than structural or aesthetic, knowledge. See C. A. Winkelhake, "Stanford School Planning Laboratory," *Progressive Architecture* 33 (Sept. 1952), 105–10.

49. Throughout the 1940s and 1950s, research conducted by GE and Westinghouse into optimal lighting culminated in new designs for luminous ceilings and continuous fluorescent fixtures.

50. Manufacturers who contributed materials used the Michigan Research Laboratory Classroom in advertisements to sell their products. Congoleum-Nairn provided the asphalt tile floor, Mosaic Tile the tile for the walls, Owens-Illinois the glass block and Toplite ceiling panels, Owens-Corning the fiberglass curtains, and Brunswick provided the furniture.

51. Faber Birren, *New Horizons in Color* (New York, 1955), 84; Birren, "Functionalism with Color," *Nation's Schools* 39, no. 4 (1947), 40–43; Birren, "Functional Color in the Schoolroom," *Magazine of Art* 42, no. 4 (1949), 136–38; and Birren, "Lunchroom Colors Affect Appetite," *School Executive* 72 (May 1953), 126, 128, 130. Aside from luminosity and reflectivity, Birren fixed on these combinations because he felt they were "flattering to human appearance. Blue-green . . . is the direct complement of human complexion." Birren, "Functionalism with Color," 43.

52. William M. Peña, "What a Good Color Environment Can Do," *Childhood Education* 29, no. 4 (1952), 186; and William W. Caudill and William M. Peña, "Colour in the Classroom," *Journal of the Royal Architectural Institute of Canada* 28, no. 2 (1951), 123–24. Robert Forman, a British designer, advocated for special attention to color in nursery schools for cognitive reasons: "In more advanced schools it has been discovered that the correct use of colour greatly assists the children in becoming observant of detail which would otherwise be overlooked." See Forman, *Nursery Furnishing and Decoration* (London, 1950), 70. The use of vibrant color was an important aspect of the British Infant Schools; see John H. Bonnick, "The Post-War School Programme in England," *Journal of the Royal Architectural Institute of Canada* 28, no. 2 (1951), 143–44.

53. "Homeliness in an American School," *Interiors* 109 (Feb. 1950), 14. See also "U.S. is Building Some Fine New Schools: School is Made Gay and Homey," *Life* 29 (16 Oct. 1950), 82–83.

54. Zilversmit, *Changing Schools*, 9 (see n. 14).

55. Heinrich and Elisabeth Waechter, *Schools for the Very Young* (New York, 1951), 152.

56. In 1953, *Architectural Forum* held a debate among the leading school designers. The cluster plan was the "biggest news" for that year in part because it resembled the scale and semi-isolation of the house. See *Architectural Forum* 99 (Oct. 1953), 127.

57. Archibald B. Shaw and Lawrence B. Perkins, "Planning an Elementary School," *School Executive* 73 (July 1954), 59.

58. *Architectural Forum* also suggested that the Yale Clinic of Child Development recommended the 60-degree angles. See "Organic School: Humanist Approach Yields Bold New Ideas for Classrooms and Auditorium," *Architectural Forum* 94 (Oct. 1952), 115.

59. See Sandy Isenstadt, *The Modern American House: Spaciousness and Middle Class Identity* (New York, 2006).

60. "Organic School," *Architectural Forum*, 116. See also, "Heathcote: A Pioneering School in Plan and Atmosphere," *Architectural Forum* 101 (July 1954), 98–105; and Ruth Weinstock, *Heathcote Elementary School, Scarsdale, New York, Profiles of Significant Schools* (New York, 1960).

61. Similar panes were also installed in the walls of the kindergarten playroom. The Heathcote bathrooms were originally brightly tiled with a repeating H motif. Although Perkins and Will used color sparingly, the British architects David Medd and Mary Crowley argued that the use of colored panes "reduces, rather than enhances, the quality of the natural materials which are so generously used." See Medd and Crowley, *Schools in the U.S.A.: A Report, Building Bulletin* 18 (London, 1961), 280.

62. "Organic School," *Architectural Forum*, 114.

63. Elizabeth Pope, "What's Happened to the Little Red Schoolhouse?" *McCall's* 83 (Oct. 1955), 52–60.

64. In the professional press, see, for example, *School Executive* 73 (July 1954), which devoted much of the issue to Heathcote; and Vincent G. Kling, "Beauty in Schools," *School Executive* 78 (Aug. 1959), 21–23. In the popular press, Dorothy Thompson objected to the new schools' lavish recreational facilities and the implications for adult-organized play. See Thompson, "Must Schools be Palaces?" *Ladies' Home Journal* (Aug. 1957), 11, 13, 88. Heathcote (although not named) was an example of excess in a *Reader's Digest* article analyzing a number of recent buildings deemed extravagant. See Holman Harvey, "Do School Pupils Need Costly Palaces?" *Reader's Digest* (Sept. 1957), 39. *Architectural Forum* devoted a long article to refuting the *Reader's Digest* allegations, charging that the *Digest* actually "set back attempts to overcome the school shortage and to aid communities in getting their money's worth for every school dollar spent." See "That 'Reader's Digest' Article," *Architectural Forum* 107 (Nov. 1957), 118–21.

65. See American Association of School Administrators, *Cutting Costs in Schoolhouse Construction* (Washington, D.C., 1952). This pamphlet was based on a manuscript by Caudill. The cost of Heathcote was 1,095,692 dollars, or 3,400 dollars per pupil.

66. West Columbia Elementary School won the 1952 Competition for Better School Design given by *School Executive* magazine and was included in *Built in USA: Post-War Architecture*, ed. Henry-Russell Hitchcock and Arthur Drexler (New York, 1952). Maynard Lyndon's Vista Elementary School and Franklin and Kump's San Jose High School were also featured in this exhibition.

67. "Wirework School," *Architectural Forum* 97 (Oct. 1952), 103–9. See also the extensive discussions of Barthelme's work in Brazoria County in *School Executive* 72 (June 1953), 66–86. West Columbia won critical praise but Barthelme also created similar designs for segregated "Negro schools" in Sweeny, Texas.

68. See *Life* 29 (16 Oct. 1950); *Parents' Magazine* regularly covered educational issues in September and October, but also devoted special issues to schools; see especially *Parents' Magazine* 38 (Feb. 1963) and 40 (Sept. 1965). *Collier's* ran several series of articles on education in the mid-1950s. Adam Benjamin Golub has discussed how popular media enhanced perceptions of "crisis" in American education. See Golub, "Into the Blackboard Jungle: Educational Debate and Cultural Change in 1950s America," (PhD diss., University of Texas, Austin, 2004).

69. "New Schools, Economy Too," *Life* 36 (1 Feb. 1954), 74–80. With flexibility and expansibility as the watchwords, *Life* published a scheme for an elementary school by Caudill Rowlett Scott and a junior high school by Perkins and Will.

70. Tracy Myers is currently working on a dissertation on TAC and schools, which I have not consulted.

71. Sey Cassler, "You Can Build a Better School House," *Collier's* 133 (30 Apr. 1954), 98–101.

72. The firm adopted aspects of this scheme in several other projects. At the West Bridgewater Elementary School (1954) in West Bridgewater, Massachusetts, TAC enlarged the grid to encompass two groups of seven classrooms placed around external courts that were connected by both glazed and open corridors. The rigid frame allowed for non-load-bearing walls and had clerestory windows and Plexiglas skylights. At the John Eliot Elementary School (1956) in Needham, Massachusetts, TAC departed from the cluster arrangement and used corridors for circulation between the segregated grade levels.

73. John C. Harkness, "TAC's Educational Buildings," in Walter Gropius et al., *The Architects Collaborative 1945–1965* (New York, 1966), 29.

74. "The Function of Glass in School Design," Sept. 1957, AIA File no. 26-A-9, CRS Archive, doc. 3000.0109 (see n. 39). The architect mentioned may well be William Caudill, or someone from the CRS firm. See also Thomas A. Bullock, "Design Applications in Modern School Construction," *Glass Digest* 36, no. 11 (1957), 46–47, 89–90. CRS Archive, doc. 3000.0101, "How to Build Glass into a School," *School Management* (1962); CRS Archive, doc.3000.0254.

75. William W. Caudill, *Toward Better School Design* (New York, 1954), 3.

76. Caudill, *Space for Teaching*, 4 (see n. 21). Caudill's short book was well known among California school planners. Charles D. Gibson, of the California State Department of Education, wrote to him in 1946: "Your reputation as an authority on school design is already well established in California. We use your Bulletin 'Space for Teaching' almost as a Bible in this state." William M. Peña Papers, box 1, file 1578.0102, CRS Archive.

77. "Schools that Utilize the Prevailing Breeze," *Architectural Record* 105 (Mar. 1949), 130.

78. Walter McQuade, "The Little Red Schoolhouse Goes Modern," *Collier's* 126 (9 Sept. 1950), 42–43, 65–67.

79. The San Jacinto School in Liberty, Texas, had a covered assembly area; see *Architectural Record* 120 (July 1956), 151–60. For the San Andres Elementary School, and other schools in Andrews, Texas, CRS placed a covered "activity slab" at the entrance; see *Architectural Record* 126 (Aug. 1959), 176.

80. See "Is Cooling Coming for Schools?" *Architectural Forum* 105 (July 1956), 124–27; "Air Conditioned Elementary School," *School Executive* 75 (Nov. 1956), 62–66; Evans Clinchy, *Belaire Elementary School, San Angelo, Texas, Profiles of Significant Schools* (New York, 1960); Alfred Roth, *The New Schoolhouse*, rev. ed. (New York, 1966), 169–74; and Medd and Crowley, *Schools in the U.S.A.*, 54–55 (see n. 61).

81. The circular form was unusual at the time, although possibly indebted to a scheme for an economical circular school (eliminating the need for corridors and thereby cutting expenses) that Matthew Nowicki had published in *Architectural Forum* as a model "school for 1950." See *Architectural Forum* 91 (Oct. 1949).

82. The San Angelo School District designed and manufactured much of its school furniture. See "Staff Designs School-Built Teaching Aids," *Nation's Schools* 62, no. 2 (1958), 31–32.

83. David Tyack and Larry Cuban, *Tinkering Toward Utopia: A Century of Public School Reform* (Cambridge, Mass, 1995), 69.

84. See Diane Ravitch, *The Troubled Crusade: American Education 1945–1980* (New York, 1983); and Larry Cuban, *How Teachers Taught* (see n. 14). Also see the handbook, Merle M. Ohlsen, ed., *Modern Methods in Elementary Education* (New York, 1959).

85. Russell E. Wilson, *Flexible Classrooms: Practical Ideas for Modern Schoolrooms* (Detroit, 1953).

86. However, older children at Crow Island used individual desks with attached seats, which were common in upper-grade classrooms throughout the country.

87. David C. Sanders, *Innovations in Elementary School Classroom Seating* (Austin, 1958). This study was underwritten by the American Desk Manufacturing Company. See also Leroy K. Pinnell, *Functionality of Elementary School Desks* (Austin, 1954); and Pinnell, "Directions in Design and Use of School Furniture," in *American School and University* (Philadelphia, 1960–61).

88. In the late 1950s, American Seating developed several designs similar to the Universal model. See American Seating Company, *The Facts About School Furniture Today* (Grand Rapids, Mich., 1959); and American Seating Company, *American Seating School Furniture* (Grand Rapids, Mich., 1959).

89. American Seating Company, *American Seating School Furniture*, n.p.

90. Even before World War II, about two dozen manufacturers produced roughly 80 percent of all the school furniture used in the U.S. After the war, many smaller businesses were absorbed into larger corporations, such as American Seating and Brunswick. See Pinnell, *Functionality of Elementary School Desks*, 18–22.

91. Medd and Crowley, *Schools in the U.S.A.*, 295 (see n. 61).

92. The company was called the Brunswick-Balke-Collender Company until it officially changed its name to the Brunswick Corporation in 1960.

93. The chair design was by Dave Chapman, who was hired to conduct research for the company. Chapman continued to design Brunswick furniture into the late 1950s. He later created special furniture for classrooms designed for television. See Dave Chapman, *Planning for Schools with Television: Design for ETV* (New York, 1960).

94. Emphasis in the original. See advertisement in *Interiors* 116 (July 1957), 30.

95. Federal Security Agency and Office of Education, *First Progress Report, School Facilities Survey 1951–1952* (Washington, D.C., 1952); and Federal Security Agency and Office of Education, *Second Progress Report, School Facilities Survey* (Washington, D.C., 1952). At the same time, Congress approved legislation to provide money to states experiencing the impact of federal activities, such as military installations. These funds were used to improve and build schools and community centers for the expanding populations in previously rural places.

96. William Benton, "Now the 'Cold War' of the Classrooms," *New York Times*, 1 Apr. 1956, 15, 40, 42, 44, 46. Benton, who represented Connecticut from 1949 to 1953, published *Encyclopedia Britannica* and also wrote *Teachers and the Taught in the U.S.S.R.* (New York, 1966).

97. David Riesman, Nathan Glazer, and Reuel Denney, *The Lonely Crowd*, rev. ed. (1950; New Haven, 1961), 60.

98. Ibid., 62.

99. Bestor did not reject "progressive" education. He had attended the Lincoln School, part of Teacher's College at Columbia University, one of the foremost "progressive" institutions; he declared: "I have not used the term 'progressive education.' I have deliberately refrained from doing so, because the phrase is vague and ambiguous. It is applied to a multitude of different programs, with many of which I am in hearty sympathy. On the other hand, many tendencies in contemporary American education that are labeled progressive can be more accurately described, I believe, as 'regressive education.'" See Arthur Bestor, *Educational Wastelands: The Retreat from Learning in Our Public Schools*, 2nd ed. (1953; Urbana, Ill., 1985), 44.

100. The widespread fearfulness of the American ability to prepare school-age children for future demands led to a senate investigation, in the spring of 1956, into the possible shortage of scientists and engineers. Led by Melvin Price, the Subcommittee for Research and Development of the Joint Committee on Atomic Energy listened to the testimony of esteemed scientists, heads of research institutions, and independent experts on the state of the American educational system in preparing students for careers in engineering and science. See *Shortage of Scientific and Engineering Manpower; Hearings Before the Subcommittee on Research and Development of the Joint Committee on Atomic Energy of the Congress (Apr. and May 1956)* (Washington D.C., 1956).

101. Zilversmit and other historians of education have argued that the popular rejection of progressive education in the 1950s tends to exaggerate the degree to which progressivism had been embraced or sustained in the U.S. In the mid-1950s, for example, even the famously progressive curriculum in Winnetka, Illinois, was redirected toward academic subjects although it maintained individualized instruction. See Zilversmit, *Changing Schools*, 120 (see n. 14). Reese also suggests that American education remained relatively constant despite the polarizing public debates. See Reese, "Guardians of Tradition," in *American Public School*, 251–85 (see n. 14).

102. Ravitch, *Troubled Crusade*, 78–80 (see n. 84). She acknowledges that the more generalized emphasis on projects, individualized instruction, and antipathy for memorization are beholden to progressivism, but uses the demise of the Progressive Education Association in 1955 as an indication of the movement's "death." Cremin also uses the end of the association as a marker, but points out the numerous other factors; see Cremin, *Transformation of the School*, 347–53 (see n. 14).

103. Jerome Bruner, *The Process of Education* (New York, 1960). See also Peter B. Dow, *Schoolhouse Politics: Lessons from the Sputnik Era* (Cambridge, Mass., 1991), 33–71.

104. Government legislation supported the study and development of these technological and curricular innovations, but private foundations, such as the Carnegie Corporation, the Rockefeller Brothers Fund, and especially the Ford Foundation, also provided substantial funding. The Rockefeller Brothers Fund's *The Pursuit of Excellence: Education and the Future of America* (Garden City, N.Y., 1958) was a widely read response to the Sputnik crisis, and the Carnegie Corporation supported James B. Conant's report *The American High School Today: A First Report to Interested Citizens* (New York, 1959).

105. Judy Marks, "A History of Educational Facilities Laboratories," National Clearinghouse for Educational Facilities, http://edfacilities.org/pubs/pubs_html (accessed June 2006). EFL had its headquarters in New York City but established a regional center, the Stanford School Planning Laboratory, at Stanford University in 1959, and in 1962, at the University of Tennessee's School Planning Laboratory. By the 1970s, EFL also had an office in Austin, Texas, and ran project centers in other states. The EFL board of directors initially included industry leaders such as Milton Mumford of Lever Brothers, Thomas J. Watson Jr. of IBM, Clay P. Bedford of Kaiser Aircraft, and Frank Stanton of CBS, as well as the industrial designer Henry Dreyfuss, and education experts.

106. Harold B. Gores, "Educational Change and Architectural Consequence," *Architectural Record* 126 (Aug. 1959), 155. EFL published a pamphlet with nearly the same title in 1968. Gores alluded to J. Lloyd Trump's influential report "Images of the Future," which advocated multiple forms of instruction and use of technology such as television.

107. See Educational Facilities Laboratories and the Institute for Develop-

ment of Educational Activities, *The Open Plan School: Report of a National Seminar* (New York, 1970).

108. Ronald Gross and Judith Murphy, *Educational Change and Architectural Consequences: A Report on Facilities for Individualized Instruction* (New York, 1968), 16.

109. Educational Facilities Laboratories, *Open Plan School*, 6.

110. Margaret Mead, *A Creative Life for Your Children* (Washington, D.C., 1962).

111. This act also included the provision for Head Start, which offered preschool education to poor children who were perceived as "economically and culturally deprived." See Barbara Beatty, *Preschool Education in America* (New Haven, 1995) 192–200; Ravitch, *Troubled Crusade*, 158–60; and Edward Zigler and Susan Muenchow, *Head Start: The Inside Story of America's Most Successful Educational Experiment* (New York, 1992).

112. Frances S. Kornbluth and Bernard Bard, *Creativity and the Teacher; Curricular Viewpoints Series* (Chicago, 1966).

113. The investment was 680,000 dollars; see C. W. Griffin Jr., *Systems: An Approach to School Construction* (New York, 1971), 19.

114. The thirteen school districts along with the SCSD staff as advisors grouped together as the First California Commission on School Construction Systems. A group debate on the question of standardized components, with Gores and Ehrenkrantz, and their implications was hosted by the editors of the *Architectural Forum* in September 1961. The proceedings were published as "New Proposals to Cut School Costs," *Architectural Forum* 115 (Nov. 1961), 111–28.

115. The company estimated that the traditional California school cost 16.74 dollars per square foot to build and hoped to reduce this by 1.50 dollars per square foot through the development of component parts. See "School Component Designs, Costs Revealed," *Architectural Record* 135 (Feb. 1964), 169.

116. See Andrew Saint, *Towards a Social Architecture: The Role of School-Building in Post-War England* (New Haven, 1987); and Nicholas Bullock, *Building the Post-War World: Modern Architecture and Reconstruction in Britain* (London, 2002). Medd and Crowley, two of the most prominent architects and spokespersons for the Hertfordshire project, spent a year on a Harkness Fellowship studying American schools and comparing them to the British examples. See David Medd and Mary Crowley, "British School Architects Examine our Work," *Progressive Architecture* 41 (Mar. 1960), 125–35. Their formal report was published as *Schools in the USA, A Report* (see n. 61). See also Antony Part, "What Can Be Learned from Britain's New Schools?" *Architectural Forum* 94 (Oct. 1952), 126–28; and "Britain's Prefab Schools," *Architectural Forum* 94 (Oct. 1952), 129–33.

117. The first prefabricated Hertfordshire school was realized in 1946, followed by eight in 1946 and two hundred by 1962. CLASP (Consortium of Local Authorities Schools' Programmes), a project begun in Nottinghamshire in 1956, was an extension of this idea and more closely resembled the SCSD system.

118. The bids proposals for the components were submitted by twenty-six different companies who developed the materials based on specifications issued by SCSD. Many of the bids were lower than expected both for the structural parts as well as for the permanent elements. Contracts were issued to Inland Steel Products Co. for structure and the lighting-ceiling; Lennox industries for the heating, cooling, and ventilation; E. F. Hauserman Co. for fixed and moveable partitions; Western Sky Industries for panel partitions; and Hough Manufacturing Corporation for accordion partitions.

119. "Partially Prefabricated Schools Presented," *Progressive Architecture* 46 (Apr. 1965), 66; and William W. Caudill, "The Reasons Behind Innovations in Schoolhouse Design," *Architecture West* 70, no. 3 (1964), 20–28.

120. Many of these schools are discussed in Educational Facilities Laboratories, *SCSD: The Project and the Schools* (New York, 1967).

121. See Griffin, *Systems*, for a discussion of related projects in Toronto, Montreal, and at the University of California.

122. The school was a steel structure with brick facing. The dome, devised by Edward F. Nye, was a lamella-pattern steel form with concrete insulation.

123. "Big Top for Teaching," *Architectural Forum* 114 (May 1961), 97–100; Evans Clinchy, *Schools for Team Teaching: Profiles of Significant Schools* (New York, 1961); "Some Current Answers for Urban Schools," *Architectural Record* 142 (Oct. 1967), 177–79; and "Shells and the Educating Process," Technical Bulletin 105 (Sept. 1963), 59–61, in CRS Archive, doc. 3000.0268 (see n. 39).

124. William W. Caudill, "Eggcrates, Eggheads and Eggshells" (address given at the Sarasota Conference, Sarasota, Florida, 17 Nov.1960), CRS Archives, doc. 1079.0102.

125. In its defense, SCSD countered that recommendations for acoustic ceiling panels were developed, but not purchased.

126. Cuban, *How Teachers Taught*, 198–99 (see n. 14).

127. Sanders, *Innovations in Elementary School Classroom Seating*, 135–36 (see n. 87).

128. John F. Pile, "The Open Office: Does it Work?" *Progressive Architecture* 58 (June 1977), 68–81.

129. See, for example, Caudill, *Toward Better School Design* (see n. 75); Bursch and Reid, *You Want to Build a School?* (see n. 37); N. L. Engelhardt, N. L. Engelhardt Jr., and Stanton Leggett, *Planning Elementary School Buildings* (New York, 1953); Lawrence B. Perkins and Walter D. Cocking, *Schools* (New York, 1949); Frank G. Lopez Jr., *Schools for the New Needs: Educational, Social, Economic* (New York, 1956); Alfred Roth, *The New School House*, rev. ed. (New York, 1966); Waechter and Waechter, *Schools for the Very Young* (see n. 55); and Walter McQuade, ed., *Schoolhouse: A Primer About the Building of the American Public School Plant* (New York, 1958). This last book was published by the Joint School Research Project, which included McQuade, Eggers and Higgins, Architects, and the Aluminum Company of America. See also Educational Facilities Laboratories, *The Cost of a Schoolhouse: A Report from Educational Facilities Laboratories* (New York, 1960). More recent examples of this genre are Ben E. Graves's *School Ways: The Planning and Design of America's Schools* (New York, 1993); and Mark Dudek, *The Architecture of Schools: The New Learning Environments* (Oxford, 2000).

130. The work and ideas of these highly visible firms gained an audience through their own publications, in educational magazines such as *The School Executive* and *The Nation's Schools*, and in special numbers on school plant design that appeared in the *Review of Educational Research*. Reid and several members of the CRS firm also gave numerous speeches before school administrators.

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Figure 7. The Henry Ford, Dearborn, Mich.

Figure 8. Oakland Museum of California; photograph by Roger Sturtevant
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