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Critical Questions – Contemporary Practice

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Critical Questions – Contemporary Practice

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INTRODUCTION

Heritages 2025

Critical Questions – Contemporary Practice

A little over 25 years ago, the site of this conference, Maritime Greenwich, London, was inscribed on the UNESCO World Heritage List. Home to the first Palladian building in England, the Royal Naval College by Sir Christopher Wren, the National Maritime Museum, the Old Royal Observatory and the University of Greenwich, it is one of the UK's most important historical sites. It is home to groundbreaking projects in digital heritage, the Laban Conservatoire of Music and Dance, and a variety of major arts and cultural events annually. It is promoted by its 'state-of-the-art' visitor centre and ardently protected by the UK's Listed Buildings and Conservation Acts. It is a quintessential site of world heritage.

However, as a site located in the city of London, it feels the pressures of economic and urban development. It is threatened by the strains of mass tourism and can be at risk of over exposure. It is located near areas of social deprivation and its buildings and parks are in need of continual, and costly, maintenance. Managing the site for local residents, the heritage community and visitors is complex and can be contested. In this regard, Maritime Greenwich is also the epitome of the difficulties faced across the heritage sector, the world over.

Using the World Heritage Site of Maritime Greenwich as a point of departure, this conference sought to explore the critical questions for the heritage sector today from various disciplinary perspectives. This conference proceedings publication thus contains a range of case studies and theoretical readings that cross disciplinary fields, with this volume focused on issues related to the design, planning and management of the built environment.

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The book included the project of a boarding school for the General German Trade Union (ADGB) in Bernau near Berlin, designed by the German Bauhaus under the directorship of Hannes Meyer (fig. 1). Being under construction, Giedion attested that it had a “decisive influence on the German school development.”⁴ The following text intends to unpack how this building employed daylighting, that is the theory and practice of creating spaces with sufficient, program-supporting, and inspiring illumination through direct and diffused light (sunlight and daylight), lighting contrasts, and considerate inside-outside relationships.

The UNESCO declared the Bauhaus movement a World Heritage in 1996 stating that it “revolutionized architectural and aesthetic thinking and practice in the 20th century.”⁵ The ADGB School, designed and built between 1928 and 1930, was added to the World Heritage listing in 2017. It is the Bauhaus’ most advanced project with respect to integrating daylight in architecture, with daylighting as the underlying strategy to link design, engineering, and social reform.

The Bauhaus’ architecture program officially started in 1927, eight years after the school’s founding. Architects Hannes Meyer and Hans Wittwer, both hired in this year, immediately implemented attempts toward a scientific- and engineering-based daylighting design process by publishing their design for the St. Petersschule alongside daylighting calculations in the April 1927 issue of the Bauhaus journal. This publication seemed to serve as an introduction of their teaching agenda that “our new forms that arise with functional building have to be building-scientifically justified as much as possible.”⁶ Calculations for a classroom, a gymnasium, and an art room were presented under the title “calculated evidence of the illuminance of all school spaces” and showed state-of-the-art expertise in calculating interior illuminance levels.⁷

In 1928, Meyer, with Wittwer and Bauhaus students, won the architecture competition for the ADGB School. From early design investigations to the building’s completion in May 1930, knowledge on daylight and solar geometry was adopted, the envelope revised, and new products for windows, glass, and light-reflecting surfaces utilized. In the following, three foci intend to show how daylighting unfolded in the ADGB School: first, the building’s overall layout, volumes, and orientations; second, the facade and roof design; and third, window and glass products.

OVERALL LAYOUT, VOLUMES, AND ORIENTATIONS

The competition board with the site plan (fig. 2) shows the entire complex arranged in a 45° angle toward the cardinal directions (north is at the top of the board). Each of the program’s functional elements is expressed in a separate volumetric unit. The entrance and community unit is located in the south-west, followed toward the north-east by five volumes with bedrooms connected by a long corridor, which then ends at a north-eastern unit with gymnasium, library, and seminar rooms. The teacher housing is staggered from the main entrance toward the south-east.

The right side of the competition board presents three geometrically-constructed solar paths for June 21 at the top, March/September 21 in the middle, and December 21 at the bottom. Three adjacent tables list the altitude and azimuth angles for the day’s sunshine hours. Showing solar geometries and the site plan side-by-side in a design competition was quite unique, as if to make the argument that the site plan is directly derived from the solar studies. The building layout proposed that workers who came here to attend a four-week workshop lived with the sun: They arrived at the school in the afternoon when the sun highlighted the entrance, they woke up in their beds with the sun rising between north-east and south-east, they did sports to the cooler orientation of north-east, and they learned in the classrooms facing south-west.

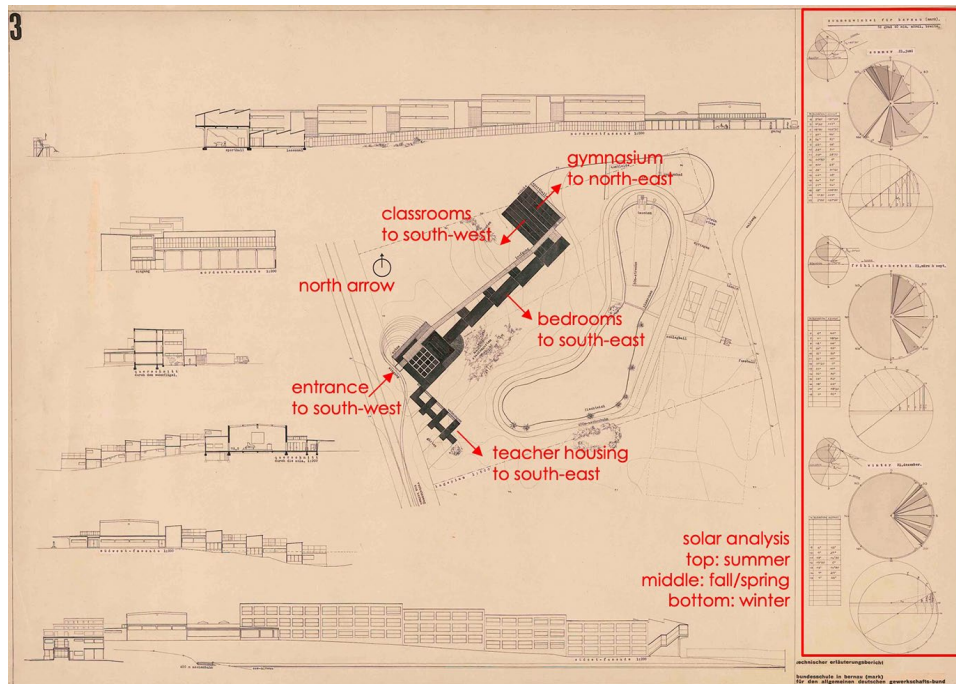


Figure 2. ADGB School. Analysis of the Competition Board (1928). Center: Site Plan. Right: Solar Paths. Bottom: South-East Elevation. Red: Author Notes. Source: Stiftung Bauhaus Dessau

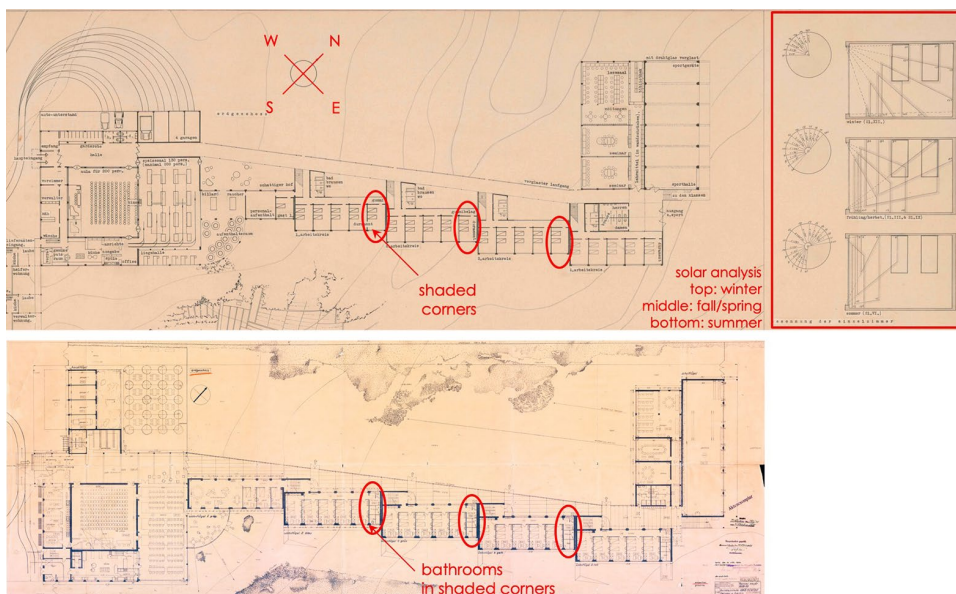


Figure 3. Top: Competition Board Detail with First Floor Plan and Solar Entry Studies, 1928. Bottom: First Floor Plan as Built, 1930. Red: Author Notes. Sources: Stiftung Bauhaus Dessau (top), Stadtarchiv Bernau (bottom).

Another competition board included an analysis of the solar entry through the window into a bedroom (fig. 3 top). It exemplified that in winter, the sun would reach the bedroom’s back wall, which would likely be appreciated in the cold weather. In summer, the sun would shine about half into the room and quickly disappear. The competition report described that the “position and arrangement of the housing area was determined by the intention to achieve an optimum of insolation of all 60 bedrooms. [...] The position of the beds is calculated based on the most favorable sun diagrams. [...] Never did he [the course participant, UP] sleep so hygienically, did he live so surrounded by daylight.”⁸

However, the staggering of the bedroom wings would have been disadvantageous for one room in each block: The room directly adjacent to the next step was not hit by the sun when rising between north-east and east, which translated to the six months between March and September. This arrangement, seemingly contradicting with the design intention, was later resolved by moving the shared bathrooms to these locations (fig. 3 bottom).

A third solar study from the competition phase related to the classrooms, for which saw-tooth roofs with glazing facing south-west were proposed. Here, the same method of overlaying a floorplan and solar patches for the equinoxes and solstices was utilized. The analysis, however, revealed a sub-ideal orientation, showing that the sun hit the blackboards and instructors were potentially glared. Two main improvements were introduced between the competition and building phases (fig. 4): First, the classrooms turned 90° so that the blackboards would be less prone to direct solar patches. Through this change, the desks received light from the side rather than from behind the students' backs, thus avoiding that students shade the desks with their own bodies. Second, the roof was changed into a butterfly ceiling reflecting direct sunlight and diffused daylight through the clerestories downwards.

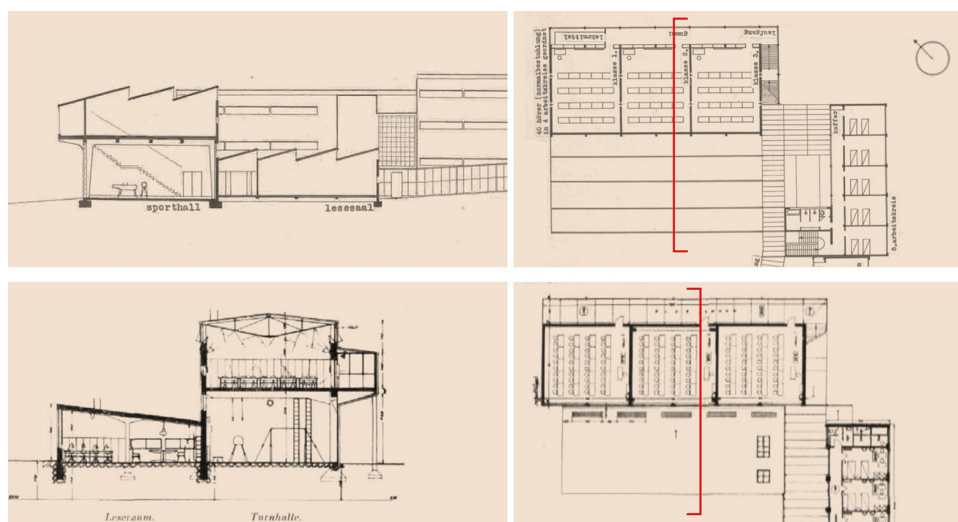


Figure 4. Comparison of Classroom Drawings. Top: Competition Phase, 1928. Bottom: As Built, 1930. (Note that sections point in opposite directions.) Sources: Stiftung Bauhaus Dessau (top), Stadtarchiv Bernau (bottom)

A 1930 photo provides additional information on the carefully selected finishes of the interior surfaces (fig. 6 left). The lower wall area had wood panels, likely good for acoustics, leaving the higher wall area for light reflection. An additional black curtain allowed complete darkening of the room, needed for the projector shown in the photo. Electrical luminaires oriented light to the ceiling, which in turn reflected it indirectly onto the desks.

FAÇADE AND ROOF DESIGN: APERTURE SIZING AND PLACEMENT

The ADGB School fully employed the modernist repertoire of apertures, including horizontal strip windows, large glass walls, glass corners, and skylights, all carefully located depending on program and orientation. The classrooms' long, two-sided clerestories to reflect light from the butterfly ceiling, as described above, worked hand in hand with a horizontal strip window in eye height of sitting people (fig. 4 and 6). The “high sidelight on both sides ensures 50-100 lux day-illuminance on all tables' work surfaces”; the “unusual room covering [...] can mnemotechnically help remember the teaching content heard in this room”; and the “one-sided slit-windows” allowed “modified

accommodation of the worker eye, tired of unusual studying, from the writing surface through the distant view to forest edge.”⁹

The careful crafting of the envelope is most apparent in the cafeteria with large glazing on three walls and the roof (fig. 5). Glass-concrete arrays, diffusing the light from the sky, span between four of the six structural roof bays,¹⁰ those farthest away from the glass facades. Each of the three glass walls appears differently: The facade opposite the entrance consists of operable windows in steel framing, connected in four horizontal rows by an industrial pivoting mechanism (fig. 5 left and right). This façade contrasts with the large fixed glazing on the left (north-east wall), which draws our unobstructed view into the socializing room (winter garden) and, from there, into the woods. Standing in the cafeteria and turning toward the entrance, we see two layers of glass walls: the first, made of transparent glass, forms an almost invisible boundary between the cafeteria and the corridor; the second, made of translucent view-limiting glass bricks, creates a bright ending of the flowing space (fig. 5 middle). This layering, supported by the diffused light entering through the corridor’s glass bricks, provides an even stronger space-merging effect than toward the winter garden. The fourth wall, altered today, had glazing toward the kitchen. The different transparencies, light entries, and light-dark-gradations result in complex overlapping spaces.

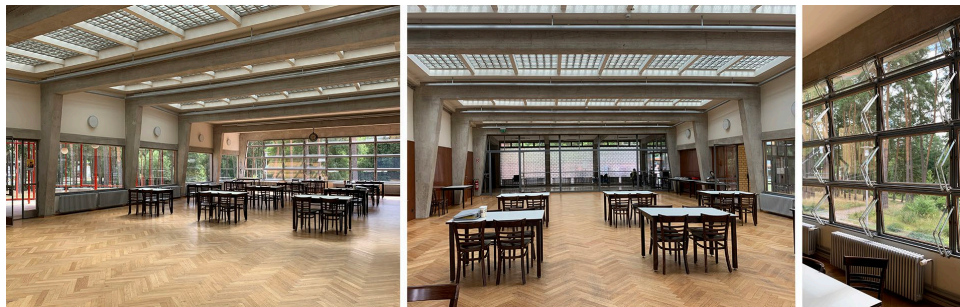


Figure 5. Cafeteria. Views from/toward the Entrance, Detail of Operable Windows. Source: Author



Figure 6. Left to Right: Classroom Interior, Auditorium, Silver Fabric. Source: Walter Peterhans in Zentralblatt der Bauverwaltung 51 (1931) 14: 212-222

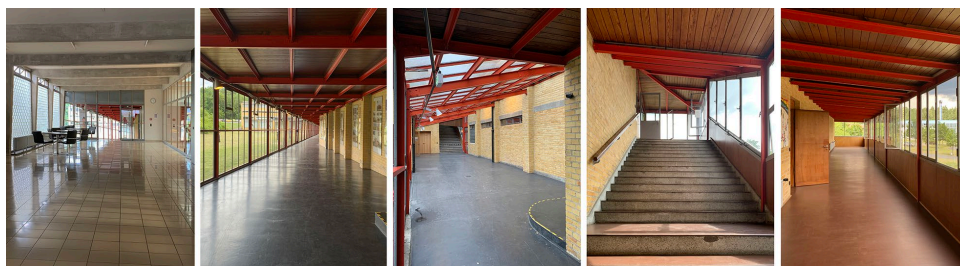


Figure 7. Left to Right: Corridor from Entrance to Seminar Rooms. Source: Author.

In juxtaposition to the cafeteria’s complex openness, the adjacent auditorium was designed to be introverted (fig. 6 middle). Although a large north-west facing clerestory provided even daylight,¹¹

Bauhaus weaving student Anni Albers was charged to develop a light-reflecting and sound-absorbing fabric for the walls (fig. 6 right). While the fabric is lost, recladding the room and studying its effect on illumination, acoustics, and spatial perception would be a rewarding undertaking.

Another important element is the main corridor that runs like a spine through the entire building to connect all major spaces (figs. 2, 3, and 7). At the entrance, where a large canopy adapted the eye for a lower interior illuminance, bright daylight in the background made the visitor anticipate the main circulation. The corridor's floor-to-ceiling, north-west-facing glass facade allowed for clear orientation inside the building and to the landscape.¹² The red color of the steel structure, also used in the winter garden, marked the threshold between inside and outside.



Figure 8. Teacher Housing. Entrance Glass Bricks, Dining Room, Bedroom. Source: Author

One of the most powerful design strategies in the building is the daylighting of spaces from more than one direction. Aside from the examples shown above, more of these exist, such as the gymnasium and library, and several rooms in the teacher housing wing. In the latter, the living room juxtaposes a large glass wall toward the garden with a clerestory to the street; the dining room contrasts a large window to the outside with an interior glass wall owing daylight from the entrance hall (fig. 8 middle); and a bedroom with a corner window references the staggering configuration of the entire complex (fig. 8 right). The daylight qualities of all of these rooms are exceptional, as they allow varying light atmospheres in the course of a day.

WINDOW AND GLASS PRODUCTS

The architects took the first opportunity, the competition, to express their interest in new building products, including “we-de-“ or “wee-dee-sliding windows” (fig. 9 left and middle). While they did not further explain this selection, referencing sliding windows and doors was ubiquitous in the 1920s. They were used in trains and other motorized vehicles and praised by architects, including those at the Bauhaus, for their space-efficiency.¹³ Another potential argument referred to the ratio of the frame area to the overall size of the opening: the chosen window had a relatively small frame area, which in turn resulted in more glass and therefore increased sun- and daylight entry.¹⁴ In addition, the main elevation (fig. 2 bottom) shows that the two panels of the sliding window could be moved in a centered position, which optimized air circulation through air entry at the bottom and air exit at the top. Finally, the patented “we-de window,” produced by the firm Wender & Dürholt since 1907, provided a smart tilting mechanism for cleaning (fig. 10).¹⁵

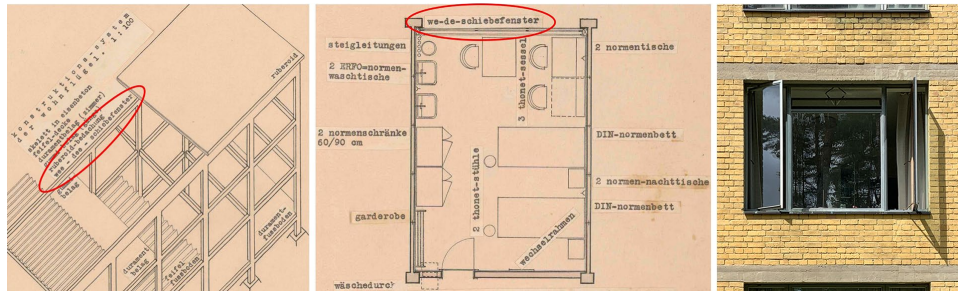


Figure 9. Bedroom “we-de-sliding window” in the Competition Drawings. Left: Built Window (Restored). Sources: Stiftung Bauhaus Dessau, Author.



Figure 10. “We-De-Sliding Window.” Source: *Der Baumeister* 28 (1930) 2: Plate 1/2 and 1: B14

In the end, however, pivoting and hopper windows were employed for many rooms. The bedroom windows had fixed glazing in the center, with vertically pivoting windows at the sides and a horizontal hopper mechanism at the top (fig. 9 right). Windows pivoting around a vertical middle axis were specifically justified as being advantageous for balancing the weight of the glass and for standing into the room with only half of its width.¹⁶

In addition, the bedroom’s pivoting side wings used a special glass with the product name “ultravit” that allowed the transmission of ultra-violet radiation. UV-glass was originally developed under the name “vita glass” in the UK in 1927.¹⁷ Building on research that UV-radiation was germicidal and thus beneficial for plant growth and human health, marketing campaigns for UV-glass specifically targeted architects designing green houses, schools, hospitals, and sanatoria. UV-glass was popular for about a decade, even leading to Aldous Huxley mentioning “vita-glass” in his 1932 *Brave New World* as, in John S. Sadar’s words, “both a proxy for technological development and integral to a future culture obsessed with youth and health.”¹⁸

The Bauhaus discovered “vita glass” as early as 1927, reporting about the health-supporting effect of UV-rays in its journal. In 1928, when the ADGB School was already under contract, Bauhaus student Ernst Göhl included “vita glass,” along with sliding windows, in his design of a primary school.¹⁹ The use of “ultravit” was mentioned in articles on the ADGB School, seemingly evidencing the high hygienic standard of the school. “Ultravit” was also considered for the ADGB School’s quarter-circle winter garden. However, likely because of its higher costs, it was used only selectively.²⁰

Publications on the ADGB School also emphasized that the glass blocks for the glass-concrete-roof constructions were produced by the globally-operating Luxfer company. Employed in the cafeteria, lobby and library corridor for their “unrivaled brightness effect and light diffusion,”²¹ they seemed to quickly face problems of water leakage and condensation.²² For the walls, two different types of glass bricks, produced by Siemens, were utilized, one with a plain, the other with a textured surface. While both were translucent, thus allowing diffused light transmission while restricting the view, the textured glass bricks were used in higher-privacy zones, such as bathrooms, or to emphasize a space

boundary, such as described above for the corridor zone (fig. 5 middle, fig. 7 left). Plain glass bricks were used in the teacher houses' entrance halls allowing a little more transparency (fig. 8 left).

EMPLOYING SCIENCE, DESIGNING SOCIAL ENGAGEMENT, CRAFTING SPACES

When the ADGB School was designed, knowledge on the benefits of daylight for health and hygiene was well established. In addition, the Bauhaus teachers and students, with Hans Wittwer at the forefront, developed advanced skills in illuminance calculations and solar orientation derivations.²³ With this knowledge at hand, the Bauhaus designed the winner scheme in the ADGB School competition, relating daylight with the social agenda of building a school for workers. This design strategy of emphasizing the social programs through daylighting became continuously stronger during the revision and construction processes. From investigations of solar orientations to nuanced window sizing and placement, to the selection of window types (fixed/operable, transparent/translucent), and to the definition of interior surfaces (light-reflecting/-absorbing, colors), the ADGB School presents the versatility of this design strategy.

The project exemplifies the UNESCO's general definition of Bauhaus buildings as standing "for an architectural quality that derives from the scientifically-based design methodology and the functional-economic design with social objectives."²⁴ In the ADGB School, illumination studies were related to specific functions within a larger program, thus making daylighting become part of the functionalist discourse.²⁵ This functional approach, however, goes far beyond orientation studies and definitions of optimal illuminance levels. The ADGB School's unique spaces show that such design methodology was multi-faceted and also atmosphere-oriented. It included considerate inside-outside relationships; juxtaposing the open and the closed; gradual transparencies and light transmissions by increasing the amount of window frames or selecting different glass products; ad reflection methods through geometry (tilted ceilings) and surfaces (woven fabrics, colors).

Giedion's book related "light air opening" not only to hygienic/medical discourses, fuel savings, visual tasks (reading in schools), or worker efficiency in factories, but also to "freedom" and "the world." Similarly, the ADGB School reveals a much broader understanding of this discourse by crafting spatial choices and moments to experience the day rhythm. As Behne put it already in 1928, the ADGB School presented the "possibility of a life [...] rich for all senses and organs."²⁶ Meyer's definition of the project as "a school of sun therapy"²⁷ can be read in the same way, as a building responding not only to the dynamic characters of the sun, daylight, and landscape, but also to the dynamic needs of the human beings in it.

NOTES

¹ Sigfried Giedion, *Befreites Wohnen* (Zürich/Leipzig: Füssli, 1929), 5, 12, 14, 15, and captions 11, 83, 85, among others. Here and in the following, all translations are by the author.

² Giedion, *Befreites Wohnen*, 5, and captions 81 and 57.

³ Reto Geiser, in the introduction for the 2019 facsimile edition of *Befreites Wohnen*, points out that Giedion trimmed the original photo to increase the contrast between the cover's dark frame and the bright window (cp. Sigfried Giedion, *Befreites Wohnen* (Zürich: Lars Müller, 2019), 14).

⁴ Giedion, *Befreites Wohnen*, figure 55.

⁵ <https://whc.unesco.org/en/list/729>

⁶ Letter Meyer to Gropius 28 March 1927 (German). Bauhaus Dessau Archive.

⁷ The calculations are based on publications by Henry Harold Higbie (1882–1947), engineering professor at the University of Michigan and president of the Illuminating Engineering Society. Cp. Ute Poerschke, “Aspiring Scientific Design: Hannes Meyer and Hans Wittwer’s Petersschule Project and Daylighting Scholarship” ACSA 110th Annual Meeting 2022, 61–66. In the Bauhaus journal, the architects also published their competition entry for the League of Nations building in Geneva, Switzerland, which is organized in the cardinal directions with a strict east-west orientation of the office wing. They claimed that the office floors’ height was “calculated based on the illuminance coefficient achieved on the work plane. [...] Even the buildings’ configuration on site is only derivation of the traffic diagrams, lighting diagrams, insolation diagrams” (*Bauhaus*, 1 (1927) 4: 6). Daylighting calculations and diagramming were mentioned here as tools for design, but have seemingly not survived in the archives. However, based on the time proximity to the St. Peterschule, they were likely similar to those.

⁸ Hannes Meyer, “erläuterungen zum schulprojekt,” *bauhaus* 2 (1928) 2/3: 15.

⁹ Archiv Deutsches Architekturmuseum DAM IV. 4 (2) 164-304-004 (German).

¹⁰ In the competition phase, the cafeteria roof had two glass strips running the length of the room.

¹¹ A letter from Meyer (Bünzel) to Bauhütte Berlin, dated 24 May 1929, stated that “luxfer-oberteile,” planned for the auditorium roof, “become unnecessary because of the large window front at the north side.” Bundesarchiv, signature RY_23_25_0207 (German). www.bundesarchiv.de, accessed 1 July 2025.

¹² Cp. *bauhaus* 2 (1928) 2/3: 15, stating that the corridor allows “the newcomer quickest orientation and (without wrong-going) access to each building element: apartment, sports, school.” (German)

¹³ Georg Muche proposed in 1927 that doors and windows produced for trains could be used in buildings (*bauhaus*, 1 (1927) 2: 4). Max Müller, “Fensterkonstruktionen. Die Funktionen der zeitgemäßen Fenster.” *Deutsche Bauzeitung* 66 (1932) 31: 613-618.

¹⁴ A diagram, published in 1939 after the ADGB School’s completion, compared such ratios for different windows, and while it cannot serve as the source for the school’s façade design, its most light-efficient configuration was the same as the one used in the ADGB School competition. Cp. Otto Völckers, *Glas und Fenster. Ihr Wesen, ihre Geschichte und ihre Bedeutung in der Gegenwart* (Berlin: Bauwelt, 1939), 88. In addition, steel windows, when compared to wood, allowed for thinner frames and thus more glass area. However, the ADGB School competition drawings do not indicate, if the selected we-de-sliding windows were thought to be in wood or steel.

¹⁵ cp. <https://www.lennep.eu/die-firma-wender-durholt-in-lennep-eine-reminiszenz-teil-ii/>;

Müller, “Fensterkonstruktionen,” 616.

¹⁶ Cp. Müller, “Fensterkonstruktionen,” 617. The bedroom windows were originally produced by the firm Norddraht (Nordische Eisen- und Drahtindustrie, Rostock), which had also produced part of the windows of the Dessau Bauhaus building (*bauhaus* 1 (1927) 4: 3.). Norddraht also produced windows for the classroom wing. Other steel windows were produced by the firms Repal (Reinhold Patzschke, Leipzig) for the teacher housing, parts of the classroom wing, auditorium, and gymnasium; and Höntsch & Co, Dresden, for the main corridor, stair, and classroom corridor. Bundesarchiv, signature RY_23_25 (German), access: www.bundesarchiv.de.

¹⁷ Cp. John Stanislav Sadar, *Through the Looking Glass. Shaping the Modern Body through Glass Architecture 1925-1935* (New York/London: Routledge, 2016). According to Sadar, “vita glass,” produced by Chance Bros., was installed in Kew Gardens’ Palm House in 1927 (160). Similar products followed with names such as Sanalux, Sun Ray, Viorary, or Helioglass.

¹⁸ Aldous Huxley, *Brave New World* (London: Chatto & Windus, 1932), 189. Sadar, *Looking Glass*, 2016: 178.

¹⁹ “vita-glass.” *bauhaus* 1 (1927) 2: 6. “studienarbeit.” *bauhaus*, 2 (1928) 4: 11. In addition, Ernst Neufert, former Bauhaus student, mentioned vita-glass in his *Bauentwurfslehre* (Berlin: Bauwelt 1936: 25 and 148).

²⁰ A letter from 20 July 1929 referred to “ultrafix-glas” (presumably meaning “ultravit”) for the bedroom windows. For the potential use of “vita- oder ultravitglas” in the socializing room, cp. letter from 6 June 1929. Bundesarchiv,

signatures RY_23_25_0045 and RY_23_24_0011 (German), access: www.bundesarchiv.de. For a contemporary discussion of UV-glass, see also Völckers 1944: 90.

²¹ Paul Liese, “Luxfer-Prismen.” In: Arthur Korn, *Glas im Bau und als Gebrauchsgegenstand*, (Berlin: Pollak, 1929), 68. For the history of the Luxfer company, cp. Dietrich Neumann, “‘The Century’s Triumph in Lighting’: The Luxfer Prism Companies and Their Contribution to Early Modern Architecture.” *Journal of the Society of Architectural Historians* 54 (1995) 1: 24–53.

Two window firms advertised in the Bauhaus journal: Fenestra Crittall and Luxfer. Fenestra Crittall advertised in the later issues of 1928 and the first issue of 1929, potentially hoping for a commission at the ADGB School, which didn’t realize because of its insufficient unionization (cp. Bundesarchiv RY_23_25_0020). Luxfer advertised in the last issue of 1928 and throughout 1929, which aligns with the ADGB School’s construction phase.

²² In a letter from 5 January 1931, Hessler complaint about the air draft in the classrooms and the bedrooms, problems with the cafeteria roof, and too much heat entry in the south-west-facing offices. In a letter from 14 October 1931, Wittwer argued that repairing the roof was less costly than reconstructing it. Bundesarchiv, signatures RY_23_26_0013, RY_23_26_0014, RY_23_26_0203, and RY_23_26_0204.

²³ Cp. also Hannes Meyer, “bauen,” *bauhaus* 2 (1928) 4: 13: “We calculate the sun incidence angle in the course of the year and related to the latitude of the construction site, and we construct from it the house’s shadow fan in the garden and the sunlight fan of the window in the bedroom. We calculate the daylight illuminance of the working surface in the interior [...]. where color seems psychically indispensable for us, we co-calculate its light reflection value.”

²⁴ <https://whc.unesco.org/en/list/729>

²⁵ The project can also serve to show the limitations of calculations and orientation studies. In a letter from 5 January 1931, Hessler complaint about the air draft in the classrooms and the bedrooms, problems with the cafeteria roof, and too much heat entry in the south-west-facing offices. Bundesarchiv, signatures RY_23_26_0013 and RY_23_26_0014 (German), access: www.bundesarchiv.de.

²⁶ Adolf Behne, “die bundesschule des ADGB in bernau bei berlin.” *bauhaus* 2 (1928) 2/3: 12.

²⁷ “Lectures in Vienna 22.4.1929 and Basel 3.5.1929,” in: Hannes Meyer, *Bauen und Gesellschaft. Schriften, Briefe, Projekte* (Dresden: VEB, 1980), 59. Sadar points out that heliotherapy, according to “Sir Henry Gauvain in an April 1927 article in *The Lancet*” targets “changing conditions [...] rather than exposure to the singular ideal wavelength of artificial sunlight. [...] a normal, healthy life has a fundamentally dynamic condition.” (Sadar, *Looking Glass*, 2016: 161)

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