White Paper

For the Association for
Learning Environments

The Design of Learning Environments

To Promote Student Health & Well-being

by Parul Minhas
with Prakash Nair, AIA

ASSOCIATION FOR LEARNING ENVIRONMENTS
Enhancing the Educational Experience

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The Design of Learning Environments to
Promote Student Health & Well-being

$14 ARCHITECTURE, LANDSCAPE ARCHITECTURE, EDUCATION, SCHOOL REFORM

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Table of Contents

Abstract 7

Introduction 8

Child Health and Built School Environment 10

- Built School Environment 11
- Salutogenic Design and the School Environment 12

Comprehensible School Environment 13

Manageable School Environment 14

Meaningful School Environments 15

Twenty-Seven Design Guidelines for Salutogenic Learning Environments .. 16

Healthy School Assessment Tool 18

Conclusion 32

A Pictorial Essay 33

References 52

Abstract

Extensive research shows there is a strong correlation between the health of children and the primary environments in which they spend most of their time: home, school, and neighbourhood. Yet, when it comes to designing and constructing schools, architects and planners are rarely asked to employ design strategies that promote the mental and physical health of children. All too often, the holistic health of the child is not prioritized when devoting resources to the design of a school. The concept of salutogenesis—building design that seeks to enhance health and well-being—is relatively new and, as such, lacks guidelines that would otherwise assist architects when designing or renovating schools. This paper proposes a comprehensive set of 27 design guidelines and an accompanying assessment tool to help architects map out the steps necessary to create salutogenic learning environments that enhance the well-being and resilience of children.

Keywords: holistic health, school environment, salutogenic design

> *“All too often, the holistic health of the child is not prioritized when devoting resources to the design of a school.*

Introduction

The U.N. World Health Organization defines health (1948) as a "state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity". This holistic concept of health recognises the impact of social, economic, political, and environmental influences on health involving the well-being of the whole person. It is also critical to note that it is within human capacity to influence and modify the environment (Morandi et al., 2011).

The notion of holistic well-being cuts across cultures. Ayurveda (one of the world's oldest holistic healing systems) describes health as 'swasthya'; a Sanskrit term meaning 'stability in the true self' that is a state of complete, balanced, physical, mental, and spiritual well-being (Sharma et al., 2007). This approach of Ayurveda is in sync with WHOs definition of health as mentioned earlier. The concept of salutogenesis, as described by Antonovsky (1979), has a striking resemblance and correlation with the abovementioned approaches towards health (Shivam S. Gupta and Satyam S. Gupta, 2019). Ayurveda and salutogenesis are both interculturally and universally applicable beyond cultural or ethnic backgrounds (Morandi et al., 2011). Ayurveda goes into depth, revealing the inner coherence of the system through observation (Morandi et al., 2011).

> *"The notion of holistic well-being cuts across cultures.*

> *"Salutogenesis aims to prevent disease and promote health.*

Like Ayurveda, salutogenesis aims to prevent disease and promote health. "Health promotion is the process which enables people to gain control over their health determinants in order to improve their health and thereby be able to live an active and productive life" (WHO, 1986). In a global world, characterised by rapid social changes, the ability to manage stress that is related to change is crucial for the maintenance and development of health and quality of life.

Holistic health may, therefore, be defined as the ability to maintain a state of equilibrium and balance between genetic factors and environmental conditions, mental-spiritual and bodily functions along with the interaction between individual and community together, leading to the attainment of full human potential (self-actualisation) and building of a sound coping mechanism (resilience).

FIGURE 1

A model of holistic health with self-actualisation and resilience as the ultimate goals to be achieved through mind-body-spirit balance in the presence and under the influence of physical and social environmental conditions. From Parul Minhas, created in Word, 11-21-21.

This paper is primarily based on the theory of salutogenic design that aims to promote holistic health in learning environments with an intention of guiding architects and school planners in the design process. Salutogenic design theory has been derived from Antonovsky's studies and, specifically, his in-depth study of environmental factors that promote health. His key conclusion was that relatively unstressed people had much more resistance to illness than those who were more stressed. Antonovsky, who coined the term salutogenesis, proposed that the experience of well-being is based on a 'sense of coherence' (SOC). Sense of coherence is a pervasive, long-lasting, and dynamic feeling of confidence that one's internal and external environments are predictable and that there is a high probability that things will work out as well as can be expected (Antonovsky, 1979). Research carried out in the past few decades has confirmed that SOC has strong positive correlations to perceived health, mental health, and quality of life. The SOC has three components:

i) Comprehensibility based on cognition ("My world is understandable")
ii) Manageability based on coping ability ("My world is manageable")
iii) Meaningfulness, which gives motivation ("My world has meaning").

Thus, an environment that helps in enhancing these three components of SOC can be classified as a salutogenic or a health promoting environment.

> *"Sense of coherence is a pervasive, long-lasting, and dynamic feeling of confidence that one's internal and external environments are predictable*

Child Health and Built School Environment

Because children spend nearly half of their waking hours in school, the school environment plays a critical role in a child's holistic health. "Health problems developed in young children typically affect the child's social, behavioral, cognitive, and physical processes and have the tendency to be compounded through aging. . .. How the child contends with internal health factors, external environmental factors and issues of self-identity play a key role in holistic health development." (Hembree & Sholder, 2013). This study calls for the development of a child's holistic health by recognizing the needs of the mind, body, and spirit. These three pillars of good health should be addressed in any building designed to serve children and help enhance a child's self-image.

In order to frame salutogenic design guidelines for learning environments, it is important to decipher the holistic health needs of children that must be met in their social and physical environment in order for them to attain a high SOC. To determine this, a variety of studies in children's health, child psychology, and environmental psychology were consulted, including Maslow's hierarchy of needs (1943), India Child Well-Being Report (2019), self-determination theory by Deci & Ryan (1985), and /Hughes, Willis, & Franz (2015).

Maslow's hierarchy of needs (Maslow, 1998) states that people must have their basic physiological and psychological needs met to pave way for higher goals like self-actualisation. Deci & Ryan (1985) stated, "conceptualised basic psychological needs for autonomy, competence, and feeling connected as innate and must be fulfilled for overall health and well-being."

Table 1. What Children 'Need' to be Healthy?

Holistic Health Needs Of Children
Habitable environment (Clean air, water, shelter, thermal comfort, natural light, etc.)
Safety & Security
Self-esteem/ Personal growth/ Self-acceptance
Autonomy/ psychological freedom
Positive relationships with people and places
Rich experiences leading to positive emotions/Joy/Empathy/Compassion/Enthusiasm
Competence/ Capability/ Accomplishment/ Mastery
Engagement/ Purpose in life

What children need to be healthy? From Parul Minhas (2021)

Built School Environment

Spatial cues from the envisioned learning environment of some renowned educators, architects, and psychologists can greatly help to decipher the design considerations of a healthy school design. Table 2 mentions the prominent keywords from their education design philosophy:

Table 2. Attributes of an Ideal School Environment

Educator/Architect/ Psychologist	Spatial cues from their envisioned learning environment for children
Mahatma Gandhi (Singh, 2019)	Naturalistic setting, flexible spaces, autonomy, sense of belonging, experiential learning, self-esteem, holistic approach
Rabindra Nath Tagore (Tirath, 2017)	Connect between man and nature, autonomy, harmony with environment, holistic approach
Krishnamurthi (Lichtenberg, 2010)	Connect with nature, space for self- introspection, sense of belonging
Montessori (Gutek, 2004)	Self-exploration, interaction with environment, flexible spaces, relevance of second plane of development (6–12 years)
John Dewey (1907)	School as a miniature community, social interaction
Froebel (Roszak, 2018)	Freedom with guidance, social interaction, connection with nature and space for self-activity and reflection
Rudolf Steiner (Bjørnholt, 2014)	Influence of aesthetics and architectural forms, developmental stages
Piaget (1969)	Developmental stages, interaction with environment, sense of ownership
Lev Vygotsky (Ivic, 1994)	Social interaction, mixing of age groups
Loris Malaguzzi (Ellis, 2007)	Socialisation, interaction with environment, natural light, multiple modes of learning
Urie Bronfenbrenner (Darragh, 2006)	Stimulation of senses, flexibility, interaction with environment
Carl Rogers (Morgan, 1977)	Positive school climate, autonomy, holistic approach
Herman Hertzberger (2008)	Stimulating environment, social interaction, flexible spaces,
Howard Gardner (1993)	Self-esteem, flexibility to accommodate multiple modes of learning
Mark Dudek (2008)	Autonomy, social interaction, school as community
Henry Sanoff (2001)	Sense of belonging, aesthetics, community participation
Christopher Day (2007)	Self-esteem, stages of development, sense of belonging
Nair & Fielding (2009)	School as a small learning community
Walden(2015)	Social interaction, child's (user) perspective, stages of development

Attributes of an Ideal School Environment. From Parul Minhas (2021).

Salutogenic Design and the School Environment

Dilani (2008) conceived the idea of salutogenic design, or what he called "Psychosocially Supportive Design" to promote health. He maintained that salutogenic design not only defined the causes of stress but also introduced wellness factors that could strengthen health. The theory suggested that salutogenic design considerations could help create designs that not only reduced stress but focused on salutary (health promoting) factors. Salutogenic design in an educational context must aim at identifying the elements of physical school design that can contribute towards the development of a strong SOC, leading to improved holistic health of children. Dilani (2008) created a list of architectural characteristics that he argued could strengthen an individual's SOC.

Addressing the SOC in the context of school design, we can elaborate on the three attributes of SOC in Figure 2.0.

Translating Salutogenic Theory into Environmental Design Factors

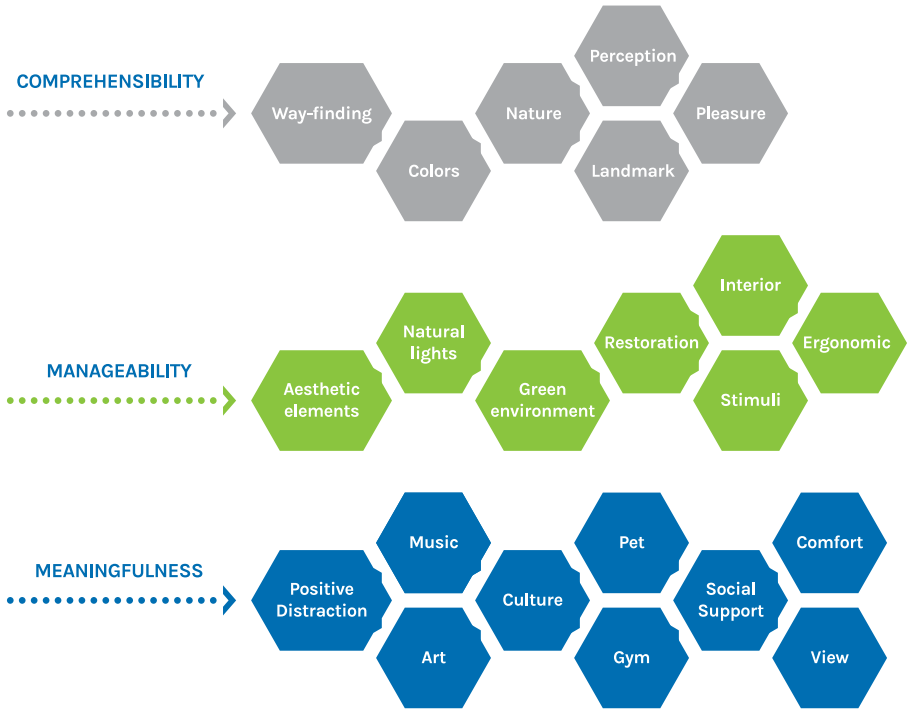

FIGURE 2

Design factors in relation to sense of coherence. Adapted from "Psychosocially Supportive Design: A Salutogenic Approach to the Design of the Physical Environment," by Alan Dilani, 2008, Design and Health Scientific Review, 1(2), pp. 47–55. (https://www.researchgate.net/publication/265349464_Psychosocially_Supportive_Design_A_Salutogenic_Approach_to_the_Design_of_the_Physical_Environment)

> *"Salutogenic design considerations could help create designs that not only reduced stress but focused on salutary (health promoting) factors.*

Comprehensible School Environment

According to Krause (2011), experiences of consistency are the basis for the development of comprehensibility. In positive cases, children have feelings of security and acceptance in social relations. Consistency in experiences comes when most events in daily lives are predictable. Though it is neither possible nor desirable to predict every experience as it may lead to monotony, human beings flourish when most of their experiences are consistent so that they can spare more time to pursue what they want to rather than adjusting to unpredictable events/experiences. When translated to a built school environment, experiencing consistency would mean being able to comprehend the connection between the various spaces and having confidence that they all connect to form a unified whole, leading to a sense of security and coherence. A secure environment must, therefore, possess the qualities of being decipherable (Day, 2007) and transparent (Nair, Fielding, & Lackney, 2009). These environments orient and reassure children by using familiar elements and special features that may assist wayfinding and legibility (Dilani, 2008). It requires an optimum organization of space to control density and assure personal space for everyone. Comprehensible environments are authentic, genuine, and honest, and these qualities may be conveyed through the use of natural materials and construction methods, usually avoiding superfluous decoration and detailing (Hughes, Wills, & Franz, 2019). According to Ken Yeang (mentioned in Hughes, Willis, & Franz, 2019), '"environmental comprehensibility" requires environmental orderliness, predictability, and legibility. This includes, for instance, the importance of visual order in the built environment with legibility, intuitive wayfinding and elimination of visual chaos, etc.' (Dilani, 2015). The following design cues for the derivation of 'comprehensible' design guidelines for a salutogenic learning environment are listed by combining the holistic health needs (Table 1) and attributes of ideal learning environment (Table 2) with comprehensibility considerations as previously discussed.

> *"These environments orient and reassure children by using familiar elements and special features that may assist wayfinding and legibility*

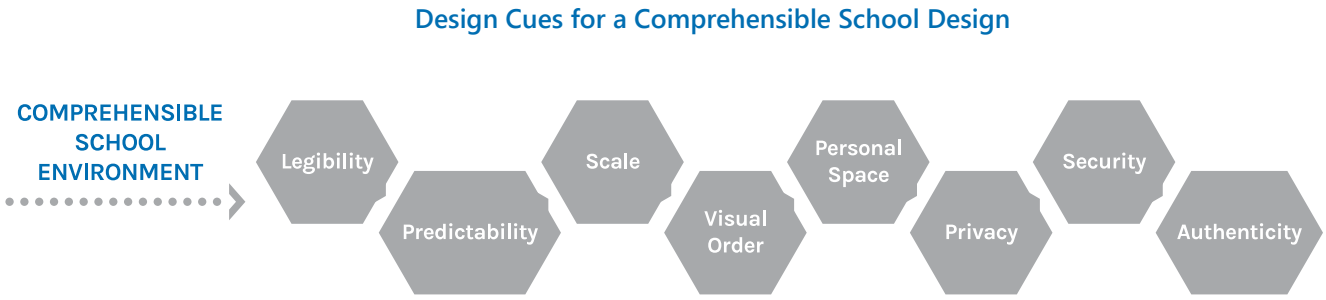

FIGURE 3

Design Cues for a Comprehensible School Design Source: Parul Minhas, The Design of Learning Environments to Promote Student Health & Well-Being (PhD thesis, 2021).

Manageable School Environment

Krause (2011) insisted that experiences of self-efficacy are the basis for the development of manageability. This component grows if the requirements for children are available to their developmental level and if they experience the acceptance of their progress. According to Hughes, Wills, & Franz (2019), manageable school environments are those that aim to build competence by being well resourced, enhancing the ability to cope, develop further capabilities, and undertake required/desired activities. These resources could also be the environments that allow students to exercise control and support activities by being safe, comfortable, and accessible. Inclusive design also forms a part of a manageable environment where students with special needs are taken into consideration. Research on inclusive and universal design provides further support (Myerson & Lee, 2010; Khare, Mullick, & Raheja, 2011). It is also crucial for a manageable environment to be flexible and responsive to change and to encourage participatory planning. Dilani (2008) suggested that environmental components that foster manageability are aesthetics, natural light, green environments, restoration, stimuli, and ergonomics. Comprehensibility is a pre-condition for effective manageability. The following design cues for the derivation of 'manageable' design guidelines for a salutogenic learning environment are listed by combining the holistic health needs (Table 1) and attributes of ideal learning environment (Table 2) with manageability considerations discussed above.

> *"It is also crucial for a manageable environment to be flexible and responsive to change and to encourage participatory planning.*

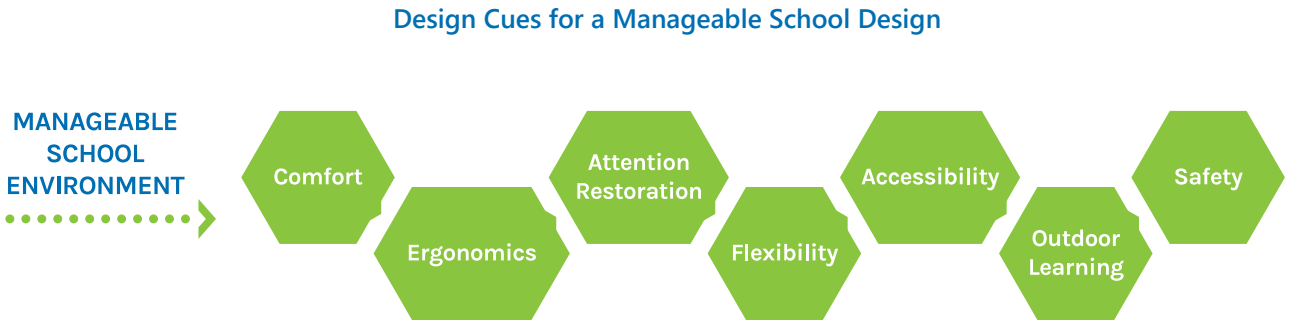

FIGURE 4

From Parul Minhas The Design of Learning Environments to Promote Student Health & Well-Being (PhD thesis, 2021).

Meaningful School Environments

Krause (2011) observed that the motivational and emotional component increases when children can influence and participate in social decision-making processes (sense of purpose). Children need to feel that they belong to the school and school belongs to them. Based on research data from neurobiology and resilience studies, it can be stated that experiencing a minimal amount of empathic resonance is a fundamental biological need without which the human being could not survive (Krause, 2011). If a child feels accepted and acknowledged, he/she feels recognized and gets feedback, which strengthens the self-worth. According to Hughes, Willis, & Franz (2019), an environment that motivates children's desire for a SOC is perceived to be meaningful. Such environments are 'inspiring, engaging, restoring, challenging, and aesthetically rich' (Krause, 2011). Natural and built environments that engage the senses through material qualities of 'color, texture and pattern' and through atmospheric qualities of 'light, temperature and sound' are particularly important in this context. Alongside natural elements, several other additions can make an environment meaningful—for example: music, art, culture, gym, spaces for social support, opportunity to interact with other species i.e., pets and other positive distractions (Dilani, 2008).

A meaningful environment must, therefore, be able to evoke feelings of belonging (self-worth) and engage people positively so that they experience a sense of purpose. The following design cues for the derivation of 'meaningful' design guidelines for a salutogenic learning environment are listed by combining the holistic health needs (Table 1) and attributes of an ideal learning environment (Table 2) with meaningfulness considerations as previously discussed.

> *"A meaningful environment must, therefore, be able to evoke feelings of belonging (self-worth) and engage people positively so that they experience a sense of purpose.*

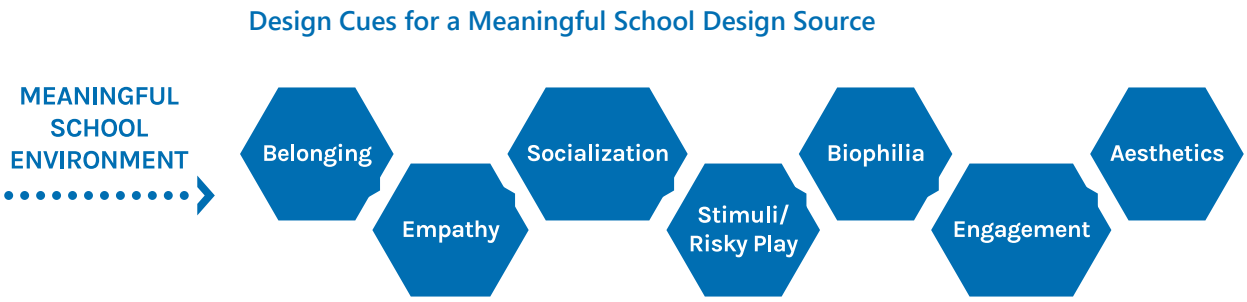

FIGURE 5

Design cues for a Meaningful School Design From Parul Minhas, The Design of Learning Environments to Promote Student Health & Well-Being (PhD thesis, 2021).

Twenty-Seven Design Guidelines for Salutogenic Learning Environments

The three components of salutogenic design, as discussed above, are not mutually exclusive but closely knit and interdependent. Each one of the following guidelines may help in enhancing one or more components of salutogenic learning environment. These guidelines are a broad and generalized set of instructions and are intended to guide the architects through the design process. The guidelines must be contextualized before their application. Physical design of a facility for various age groups (ex. Piaget's stages of development) may vary considerably under the same design guideline. Similarly, the variations in school size, budget constraints, cultural values, and other factors may lead to a variable physical manifestation of the same guideline. The salutogenic approach of health promotion, however, remains the same.

The guidelines in Table 3 are for salutogenic learning environments and can also be categorized as macro (1–14) and micro (15–30). The impact of macro guidelines is more visible and direct while the impact of micro guidelines is more subtle and experiential. However, they are equally relevant.

Table 3. Twenty-Seven Design Guidelines for Salutogenic (Health Promoting) Learning Environments

Twenty-Seven Design Guidelines for Salutogenic (Health Promoting) Learning Environments
1. Use effective wayfinding strategies to improve legibility and build assurance.
2. Ensure safe community involvement and access control for enhancing competence.
3. Consider appropriate scale & developmental needs to foster autonomy and self-esteem.
4. Apply ergonomic considerations to improve posture and increase efficiency.
5. Use colors carefully to avoid visual fatigue and enhance psychological comfort.
6. Provide outdoor spaces to augment collateral learning and social connections.
7. Manage density & crowding to improve self-worth and ensure social distance.
8. Apply universal design principles to improve accessibility and build self-esteem.
9. Ensure ample natural light for enhancing overall health and efficiency.
10. Facilitate multiple modalities of learning by designing flexible spaces.
11. Provide common spaces for peer/ teacher interaction to enhance a sense of community/belonging.
12. Provide a variety of spaces that enhance engagement and initiate a state of flow.
13. Ensure effective noise reduction to combat stress and improve efficiency.
14. Maximize natural ventilation and thermal comfort to improve efficiency and overall health.
15. Create a welcoming entry and signature elements to help children comprehend the environment better and feel connected.
16. Ensure safety and security through natural surveillance and other design interventions.
17. Allow personalization of spaces to encourage ownership/territoriality
18. Use sensory aesthetics and active design elements for optimum stimulation (physical & psychological.
19. Provide spaces for self-reflection (privacy) and small group activities to enhance autonomy, competence, and relatedness.
20. Maximize authenticity and psychological comfort through the use of appropriate materials.
21. Create homelike environments with familiar elements to enhance the feeling of security and psychological freedom.
22. Promote agentic learning and environmental stewardship through visible green/sustainable architecture features.
23. Apply biophilic design principles to counter nature deficit and for effective attention restoration.
24. Provide spaces for pets in school in order to inculcate responsibility and empathy.
25. Allow student participation in planning and design of new facilities as well as maintenance/renovation projects.
26. Provide stimulating playgrounds to build risk competence and to experience a sense of adventure.
27. Enhance overall sense of coherence (SOC) by splitting bigger schools into small learning communities.

Source: Parul Minhas The Design of Learning Environments to Promote Student Health & Well-Being (PhD thesis, 2021).

Healthy School Assessment Tool

The guidelines can greatly help in the creation of new learning environments, but it is equally significant to create an assessment tool for conducting a post occupancy evaluation (POE) to determine the health status of existing facilities in order to make the required interventions wherever required. For this purpose, a school assessment tool has been formulated on the basis of the above guidelines. The score under each category can rightly direct the resources of renovation projects that aim towards health promotion of schoolchildren. This checklist is purely for guiding design decisions and does not, however, include building condition assessment that must be carried out separately for renovation projects. The following tool has been approved and validated by school design expert Ar. Prakash Nair (Author of Language of School Design, 2009) and Ar. Alan Dilani (Pioneer of Salutogenic Design). The established school assessment methods by Sanoff (2001) and Tanner (2009) have been the major references for the creation of this tool. The average score in each of the 27 categories indicates the extent to which the school satisfies the given health consideration (1 is very poor and 5 is excellent). The sum of all the average scores indicates the overall health status of the school where a score of 1–26 is very poor, 27–53 is poor, 54–80 is satisfactory, 81–107 is good and 108–135 is excellent.

> *“The score under each category can rightly direct the resources of renovation projects that aim towards health promotion of schoolchildren.*

School Details

Name of the school	
Location/Address	
Site area	
Built up area	
No of students	
No of teachers	
Average class size	
Average no. of students/class	
Other details	

Code assigned

Healthy School Assessment Tool (HSAT)

1. Legibility and wayfinding	0	1	2	n/a
1.1 A unique identity is created for each location				
1.2 Use of landmarks as visual cues				
1.3 Well-structured paths with goals				
1.4 Limited navigational choices				
1.5 Sightlines are used to show what is ahead				
1.6 Covered pathways among buildings within the campus				
1.7 Colour coded indoor pathways				
1.8 Clear and well-lit pathways to activity areas				
1.9 The main building has an obvious point of reference among the school's buildings in which paths and buildings connect				
1.10 Distinction between various areas is made obvious by the use of colours, textures, forms, heights, etc.				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

2. Community involvement and access control	0	1	2	n/a
2.1 Well placed windows to get a clear view of the entrance				
2.2 Dedicated areas for community interaction near the entrance				
2.3 Signage and pavements to define accessible areas for visitors				
2.4 Clearly defined limits to ensure access control				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

3. Child scale and developmental needs	0	1	2	n/a
3.1 Variation in ceiling heights acc. to the intended use of space				
3.2 Spaces and furniture considering child scale				
3.3 Whiteboard and other equipment respecting child scale				
3.4 Soft classrooms with curvilinear shapes, pillows, rugs, etc.				
3.5 Accessible material storage				
3.6 Door handles, switches, etc. at child's scale				
3.7 Variety of sizes of spaces				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

4. Ergonomic considerations for posture correction	0	1	2	n/a
4.1 Variety of furniture that is flexible and easy to use.				
4.2 The furniture improves posture and is in good repair.				
4.3Workstations are designed to accommodate information technology.				
4.4 Floor seating and opportunity for reclining provided at a corner of the classroom.				
4.5 Popliteal heights, elbow angle, and other anthropometric considerations are taken care of.				
4.6 Footrest is provided for shorter children.				
4.7 Tables and built-in shelves have rounded edges.				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

5. Careful use of colour	0	1	2	n/a
5.1 Variety of colours used while being careful about overstimulation				
5.2 Contrast between the board and the back wall just appropriate				
5.3 Colour and lighting are considered together				
5.4 Colourful displays on the walls and doors				
5.5 Warmer tones are preferred for younger children and cooler tones for older children				
5.6 Physical activity areas like gyms, yoga halls, etc. are painted in cooler colours				
5.7 Privacy niches and other areas for withdrawal are painted in cooler colours				
5.8 Stage area in auditorium is in contrast with surroundings and is painted in relaxing colours like beige, peach, or pastel green				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

6. Outdoor learning spaces	0	1	2	n/a
6.1 Provision of an accessible green/open space immediately outside most classrooms				
6.2 An amphitheater readily available for outdoor plays, performances, and presentations.				
6.3 Provision of temporary structures and benches to facilitate outdoor learning activities				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

7. Density and crowding	0	1	2	n/a
7.1 Ample space to move around in the classroom o learning studio				
7.2 Gross Area provision per child is at least 7- 10 sq.m.				
7.3 Children divided into smaller groups/cohorts				
7.4 Uncluttered rooms as well as walls				
7.5 No. of students per class is between 17-25				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

8. Accessibility and universal design	0	1	2	n/a
8.1 Simple, clear circulation with clearly defined paths, doorways, etc.				
8.2 Provision of handrails as necessary and material textures considered as tactile means of way finding.				
8.3 Power doors to improve accessibility for all users.				
8.4 Provision of ramps/lifts for barrier free access				
8.5 "Maze" entrances to washrooms improve access for all users and reduce hygiene issues associated with door knobs/levers.				
8.6 Circulation routes are of appropriate width (min. 1.5m wheelchair turning diameter) and are kept clear of obstacles.				
8.7 Hardware and controls are located within reach of users and ensure ease of operation.				
8.8 Special consideration of acoustics for the visually impaired: buildings and rooms are designed to reduce echo, reverberation, and extraneous background noise.				
8.9 Provision of appropriate lighting (natural and artificial) for circulation. Glare is avoided though.				
8.10 Large flat panel light switches, which can be used with either hand, closed fist, elbow, etc. are provided.				
8.11 Rough or textured borders, which contrast with smooth walking surfaces and indicate a change in grade or material, are used.				
8.12 Door lever does not require grip strength and can be operated by a closed fist or elbow.				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

9. Natural light for overall health and efficiency	0	1	2	n/a
9.1 Diffused (glare-free), usable daylight in every space where children spend long periods of time.				
9.2 Smaller windows at eye level are installed for views along with skylights or clerestory windows high in the wall deliver glare-free light deep into the space.				
9.3 Unrestricted views (when glare is not a problem) provide a perspective to ease eyestrain and bring the outside and inside worlds together.				
9.4 Daylight is supplemented with electric light. An acceptable design includes artificial light plus natural light from the outside.				
9.5 Direct view of bright light sources like the sun, a bright sky, or an electric lamp that may create glare and visual discomfort is avoided.				
9.6 Diffused daylight enters from multiple directions and minimizes shadows, balancing the light across the room.				
9.7 For every 10 square meter of classroom floor space, at least 2.5 square meter of window space is provided.				
9.8 Windows have some form of glare control, but are in use (when glare is not a problem), and are without painted obstructions.				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

10. Flexible spaces to facilitate multiple modalities of learning	0	1	2	n/a
10.1 Space can be made larger/ smaller or of a varying shape with a few changes in furniture arrangement				
10.2 The spatial layout allows the use of multiple learning modalities				
10.3 Movable and flexible partitions that can be operated easily				
10.4 Possibility for expansion/change is present				
10.5 Adjustable furniture to support both technology use and writing/drawing, etc. by hand				
10.6 Curtains/blinds, etc. to allow the usage of projector, SMART Board®, etc.				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

11. Variety of engaging spaces that initiate a state of flow	0	1	2	n/a
11.1 Engaging library with vibrant furniture, furnishings, colours, etc.				
11.2 Reading areas are well-lit with spaces for group work				
11.3 Acoustically well designed and well-lit music and dance areas				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

12. Common spaces for peer/teacher interaction	0	1	2	n/a
12.1 Enough space/opportunities for 4 or more children, in more than 3 locations in visible/safe locations is provided				
12.2 Space for having a meal together with peers and teachers				
12.3 Presence of auditorium, amphitheater, etc. in school				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

13. Natural ventilation and thermal comfort	0	1	2	n/a
13.1 Passive techniques for thermal insulation in extreme climates				
13.2 Provision for windows at various levels to be used during varied weather conditions				
13.3 Less noisy mechanical systems, if any				
13.4 Mechanical systems with a capacity to draw significant amount of outside air into the building				
13.5 Use of natural airflow patterns to circulate fresh air				
13.6 Higher ceiling heights wherever possible				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

14. Effective noise reduction	0	1	2	n/a
14.1 Site located in a peaceful area with low noise and air pollution				
14.2 Barriers and buffers are provided to counter traffic noise				
14.3 Landscaping is used as a dampener				
14.4 Toilets, storerooms, etc. are used as buffer zones				
14.5 Hard materials that cause echo are avoided				
14.6 Appropriate sound absorbing materials are used				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

15. Welcoming entry and signature elements emphasizing the cultural context	0	1	2	n/a
15.1 An inviting and highly visible entrance with well-defined architectural features, signs, lighting, artwork, landscaping, and other landmarks such as flags				
15.2 Scale of the entrance is not intimidating for the child				
15.3 Motivational signs that send positive messages and invite children to school are used				
15.4 Landscaping features or small play areas are visible from the entrance				
15.5 Covered entrance that provides shelter from bad weather and facilitates transition				
15.6 Safe drop off/pick up				
15.7 Separate access for students and visitors				
15.8 Signature elements emphasizing the local/cultural context				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

16. Safety and security through natural surveillance	0	1	2	n/a
16.1 Centrally located administrative offices to enhance student safety				
16.2 Parking areas are delineated for staff and visitors				
16.3 Entrances and exits are easily and effectively monitored				
16.4 All student/pedestrian pathways are passively monitored				
16.5 No hiding spaces created by landscaping, fencing, etc.				
16.6 Separate age-level playgrounds for various age cohorts with developmentally appropriate and safe playground equipment				
16.7 Extensive use of windows and glazed doors to enhance natural surveillance of entrances, pathways, etc.				
16.8 No unattractive barriers such as barbed wire on the school grounds				
16.9 Toilets are attached to classrooms, if not then they have auditory connections with adjoining areas				
16.10 Security devices are unimposing				
16.11 Security system (alarms, lights, locks) provides elevated levels of security				
16.12 The site and learning environments are free of excessive non pedestrian traffic, hazards, and noise				
16.13 There are no high voltage power lines in the close proximity of the school				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

17. Ownership/territoriality through personalization of spaces	0	1	2	n/a
17.1 Personal workspace with lockers for each student				
17.2 Spaces for personal artifacts				
17.3 Personal storage for books, stationary, etc.				
17.4 Distinctive design elements and display spaces for student works				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

18. Sensory aesthetics and active design elements	0	1	2	n/a
18.1 Attractive and plenty of well-maintained landscape areas				
18.2 Highly articulated fenestrations for framing of views				
18.3 Visually pleasing staircases and other movement pathways to encourage walking				
18.4 Age-appropriate design of walking routes				
18.5 Avoidance of long narrow corridors and use of nature connected pathways instead				
18.6 Provision of dedicated indoor spaces for physical activities				
18.7 Provision of sensory gardens with various activity spaces to suit the needs of children with varied temperaments				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

19. Self-reflection (privacy) and small group activities	0	1	2	n/a
19.1 Social spaces where a small group of children may go to be alone (i.e., reading areas, quiet places, reflection areas, listening areas, etc.)				
19.2 Space and furniture in classroom and other learning areas that provide 2–3 spaces for children to feel a sense of privacy and to control their interaction with others.				
19.3 Inviting yet supervised cave spaces where students can take a deep breath, albeit momentarily, from their hectic lives.				
19.4 Classrooms have clear breakout zones or breakout rooms attached to them. Breakout zones within corridors and separate from the classroom are avoided.				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

20. Use of appropriate materials and textures	0	1	2	n/a
20.1 Use of natural materials and visible details				
20.2 Multisensory materials are used that impart qualities like smoothness, roughness, brightness, opacity, transparency, etc. to the surfaces				
20.3 Use of materials that exude warmth				
20.4 Use of glass to connect inside to outside yet making children feel secure				
20.5 Overuse of cold and hard materials is avoided				
20.6 Use of curvilinear shapes wherever possible				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

21. Homelike environments with familiar elements	0	1	2	n/a
21.1 Soft furniture, such as a couch or large armchair				
21.2 Nontoxic indoor plants are used				
21.3 Soft and comforting elements like pillows, plants, soft furnishings to add warmth and security of being home				
21.4 Other decorative touches, such as area rugs or repurposed furniture				
21.5 Provision to hang children's artwork and their pictures on the walls				
21.6 Pastel paint colours with less stimulating displays (not visually overwhelming)				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

22. Agentic learning and green/sustainable architecture	0	1	2	n/a
22.1 Spaces to learn from natural processes like sun orientation, wind flow patterns, etc.				
22.2 Visible energy conservation/sustainable measures like rainwater harvesting, solar panels, etc.				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

23. Biophilic design to counter nature deficit & attention restoration	0	1	2	n/a
23.1 Ample availability of green and natural spaces in the school campus				
23.2 Views of nature from inside of the classroom				
23.3 Possibility of going out in the natural environment during breaks				
23.4 Use of biomorphic patterns in the interior environment				
23.5 Views of parking lots, roads, etc. area are avoided				
23.6 Restorative spaces with items such as soft furnishings, plants, animals, window seat or aquarium are generously available				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

24. School pets and empathy	0	1	2	n/a
24.1 Outdoor spaces conducive for pets along with safety concerns of children				
24.2 Presence of farm area for children to tend to				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

25. Student participation in planning and design	0	1	2	n/a
25.1 Students maintain their own green patch				
25.2 Students volunteer for renovations and refurbishments in school				
25.3 Student participation was considered during design and planning process				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

26. Stimulating playgrounds and sense of adventure	0	1	2	n/a
26.1 Opportunities for tree climbing and innovative play with movable parts				
26.2Ample space for running, jumping and other age-appropriate activities				
26.3 Presence of safety nets and other safety measures to avoid injury				
26.4 Proximity of school infirmary from play areas				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

27. School configuration and smaller learning communities	0	1	2	n/a
27.1 The school is split into small learning communities through blocks or levels				
27.2 Each learning community has its own open spaces and other indoor areas for socialisation				
27.3 Each community has sufficient transparency to allow constant passive supervision				
SCORE				

0 = Inadequate, 1 = Adequate, 2 = Excellent

TOTAL SCORE	
PERCENTAGE SCORE	

SCORE RULES	
86 % - 100 %	Excellent
71 % - 85 %	Very Good
51 % - 70 %	Acceptable
31 % - 50 %	Unacceptable — Needs Work
0 % - 30 %	Poor — Needs Substantial Changes

Score rules and three point rating scale adapted from: The classroom rating scale in Lorraine Maxwell, "Competency in Child Care Settings: The Role of the Physical Environment," *Environment and Behavior* 20, no. 10 (2006); and the EDA SPACE app by Education Design International

Conclusion

The COVID-19 pandemic underscores the need to place a high priority on the mental and physical health and well-being of children in the school setting. A salutogenic design approach to the planning of school environments aims to go beyond the traditional architectural considerations of aesthetics and academics to the more subtle but equally critical goals of achieving a built environment that promotes good holistic health: lowering stress and anxiety in children, reinforcing their sense of self-worth, and promoting individual self-actualisation—all while creating a vibrant educational community that meets the needs of mind, body, and spirit. The design guidelines and the assessment checklist as outlined above call for resources to be directed towards the construction of salutogenic learning environments for children as they prepare for the daunting challenges of the 21st century.

“The COVID-19 pandemic underscores the need to place a high priority on the mental and physical health and well-being of children in the school setting.

A Pictorial Essay

As evidenced from the HSAT (Healthy School Assessment Checklist) detailed in this White Paper, a comprehensive approach is needed to ensure that learning environments support children's health and well-being.

In this section of the White Paper, we have included a number of images that illustrate various ways in which healthy environments can be created for children of all ages. The purpose of these images is not to provide specific design solutions as much as it is to demonstrate qualities like aesthetics, good daylighting, the proper use of color, age-appropriate furnishings, personal space, comfort, connections to nature and so on.

It is not enough to create well-designed spaces for learning. It is also important to be intentional about its qualities that will directly contribute to student health and well-being.

BANYAN

parables
FABLE
LEGEND
Mythology

EXIT

EMERALD ELEMENTARY SCHOOL

Ciao
Hoi

NEST

PHOTO CREDITS:

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Fielding Nair International
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Marissa Moss Photography

For more information about the projects featured in this pictorial essay, please visit EducationDesign.com

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Architecture, Landscape Architecture, Education, School Reform

When it comes to designing and constructing schools, architects and planners are rarely asked to employ design that promote the mental and physical health of children. This paper proposes a comprehensive set of 27 design guidelines and an accompanying assessment tool to help architects map out the steps necessary to create learning environments that enhance the well-being and resilience of children.

Extensive research shows there is a strong correlation between the health of children and the primary environments in which they spend most of their time: home, school and neighborhood.

Authors

Parul Minhas is a research scholar in the Department of Architecture, Guru Nanak Dev University, Amritsar, India. Through her expertise in salutogenic design, Parul has created a series of guidelines and assessment tools that educational architects can benefit from as they develop new schools and renovate existing facilities in ways that best serve children's holistic health and well-being.

Prakash Nair is a world-renowned architect, futurist and the Founding President & CEO of Education Design International. Over the past 20 years, Prakash has helped build EDI into the global leader for school design with innovative work in 54 countries on six continents. Prakash has written dozens of articles in leading education journals, and he has written three books including ***Blueprint for Tomorrow: Redesigning Schools for Student-Centered Learning*** published by Harvard Education Press.

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