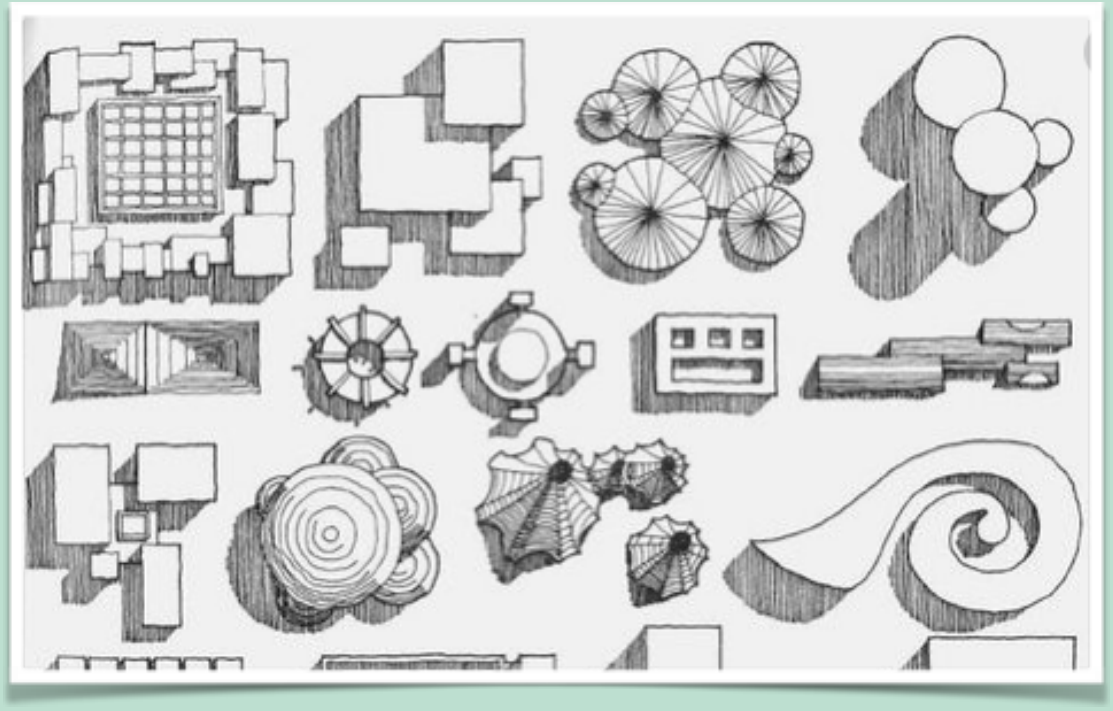
DesignWild/DesignWell

Learning spaces teach, biophilic design connects and student well-being flourishes



An Education Resource

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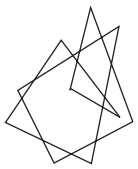


Preface

The Design Wild/Design Well resource aims to introduce and encourage educators and students to contribute to the practice of sustainable systems thinking in schools. Acknowledging that deeply integrated sustainable systems education needs interrelated and varied approaches, and does not consist of a single aspect, this resource can be viewed as piece of a larger practice which focuses specifically on exploring nature and learning spaces for student connection and well-being.

This is an introductory resource which hopes to serve as an entry point for educators in discovering biophilic design and mentoring students in practicing collaborative design thinking. It only scratches the surface of this topic and is not meant to be comprehensive but instead inspiring.

Design Wild/Design Well is meant to be fluid, adaptable and non-prescriptive. It is intended to be interdisciplinary, cyclical and like the topic, a bit wild in its being. Although formatted in a linear document it is meant to be more of a process of practice which fits the collaborative design situation it is being used in. Please note that all charrettes (collaborative design workshop) ideas laid out here specifically lack rigid outlines to offer flexibility, creativity and innovative thought in their personalized direction. This resource encourages students to lead the exploratory design process throughout for authentic connection and creation.

This resource is guided by Stephen Kellert's work in the study of biophilic design and Terrapin Bright Green's 14 elements of biophilic design.

Introduction

The concept of this resource is grounded in exploring how student-led design groups might transform their learning spaces into three dimensional textbooks which invite nature in for deep and dynamic connection. With a focus on student experience, this resource places student voice at the forefront of leading the creative design aspect of the process, and emphasizes participatory design practice to solve problems while encouraging classrooms to go wild (Design Wild) for well-being (Design Well).

Purpose of the resource

- Provide educators a tool to explore the relationship between student, physical learning environment, nature and well-being
- Engage students in connecting their physical learning spaces to nature through design
- Support educators in identifying, highlighting and expanding on the natural elements of their physical learning spaces inspired by student experience
- Facilitate physical learning space transformation inspired by nature for increased classroom community well-being steered by student-led design

Terms

Well-being – a state of being satisfied, content and healthy in a holistic sense

Third Teacher – the physical learning environment

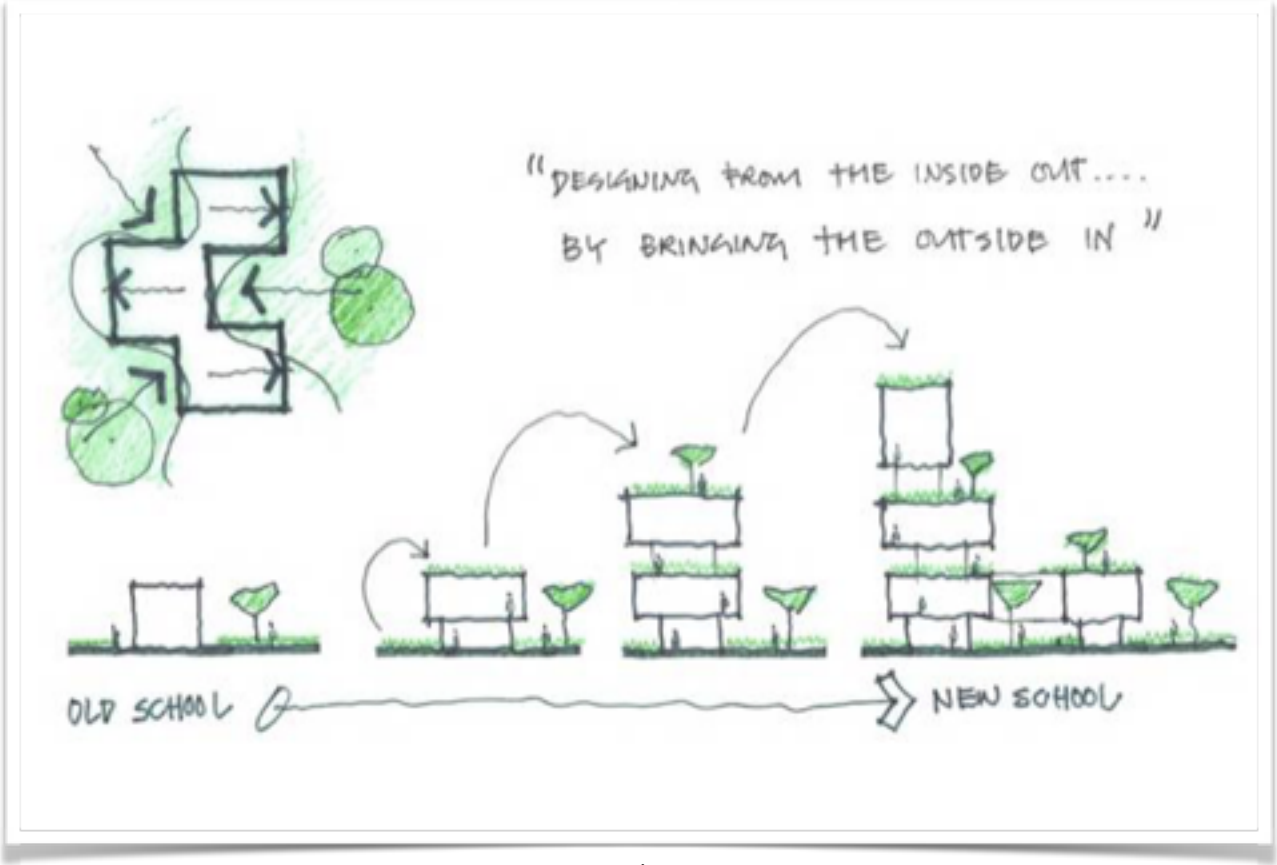
Biophilia – the innate human connection to nature

Design – the process of planning how something will be created

Biophilic Design – the practice of intentionally incorporating nature into the built environment for the purpose of creating connections

Participatory Design Practice – An approach to design that is inclusive of all stakeholders involved in the project through all steps of the process

Charrette – A collaborative design workshop based around architecture and design



Literature Support

It is well known that it is fundamental to human development for children to have experiences with the living systems of the world to connect themselves to these broader systems (Darling-Hammond et al, 2019). Author Richard Louv (2005) coined the term *Nature Deficit Disorder* pointing out that the trajectory of the 21st century sees 'all of us, especially children, spending more time indoors, which makes us feel alienated from nature' (p.7). Specific to school design, nature connection and student well-being, author and professor Stephen Kellert (2015) wrote an article entitled *Build Nature into Education* where he argued that a biophilic design paradigm shift is needed in our schools to 'encourage direct and indirect contact with nature, and an experience of place evoking children's evolved affinities for the natural world' (p. 289). Agreed upon by many in the field, researcher Modi Radhika (2018) notes that in recent times 'due to a lack of opportunity for adequate exposure to natural life, students have experiences with nature that are predominately through secondary or indirect modes such as image representations, and that modern society and its educational methods/spaces have created barriers to children's contact with nature, in particular, fundamental primary nature based experiences' (p. 3).

A significant area of agreement in the literature is the idea that, whether internal or external, physical learning spaces influence students by 'teaching' a silent curriculum alongside more obvious teaching and learning methods. An early voice on the influence of physical learning spaces on learners, Loris Malaguzzi, father of the *Reggio Emilia* education pedagogy stated, 'there are three teachers of children: adults, other children, and their physical environment' (www.thethirdteacherplus.com). Malaguzzi referred to the physical environment teacher as the 'third teacher' and helped to produce theoretical reference to the importance of physical learning spaces and student learning development.

David Orr (1999) helps us to understand the importance of 'rethinking the design of where learning occurs' (p. 16) and how the pedagogy of our third teacher shapes our learning, especially in relation to connection with our place in the natural world. In the section titled *Architecture and Pedagogy* in his curriculum guide he states, 'academic architecture is a kind of crystallized pedagogy and that buildings have their own hidden curriculum that teaches as effectively as any course taught in them' (Orr, 1999, pp. 16-18).

The *International Living Future Institute* showcases a practical example of biophilic design and the third teacher influencing student well-being through the renovated science wing of the Bertschi School in the USA. 'Designed for (and in part by) elementary school children, the project demonstrates how biophilic design can be used to not only connect children with natural processes, but engage them in learning' (https://living-future.org/biophilic/case-studies/the-bertschi-school-science-wing/).

Design Wild/Design Well aims to contribute practical application of the above literature through the acknowledgment that learning spaces teach, biophilic design connects and student well-being flourishes.

Using the Resource

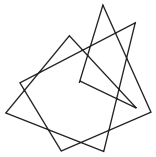
Through a series of 4 guided exploratory biophilic-centred design charrette ideas (collaborative design workshops) this resource aims to acknowledge the third teacher, explore classroom hidden curricula, discover natural elements within current learning spaces, collaborate for connection to these natural elements and reimagine design aspects of the classrooms for continued connection and learner well-being.

The term charrette, originating in the field of architecture, refers to an intense period of design activity among stakeholders. Charretting then, is a planning and design process where participants work collaboratively to find solutions with a heavy emphasis on the voice of the end users of the space. Linking up the design process with the end user's needs, aspirations and behaviours is vital to the process.

Charrettes are meant to take shape in practice so the following will offer guiding questions and activities to get students started in the trajectory of the process of learning through visual thinking, problem solving, creative thought, group interaction, presentation and communication skills.

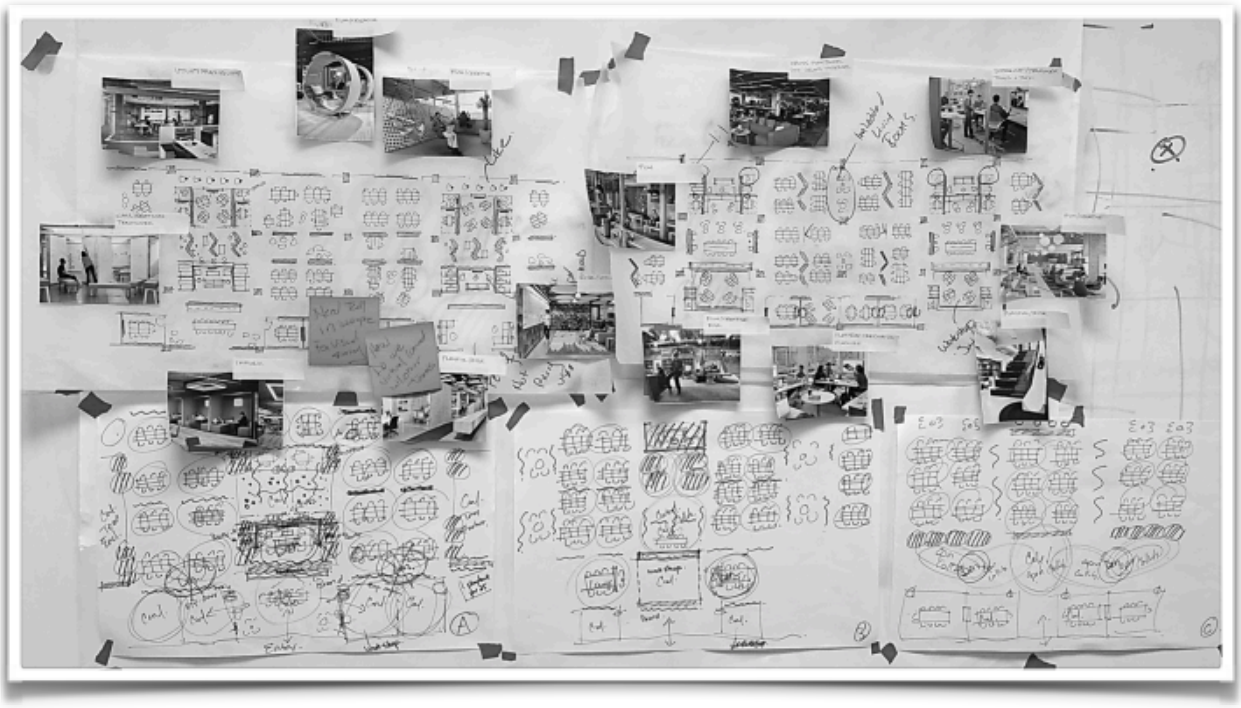
An example of a 60 minute charrette schedule is outlined here for use in guiding the following 4 charrette design challenges.

Activity	Time (minutes)	Total (time)
1. Introduction & problem solving	5	:05
2. Brainstorming around the design challenge	10	:15
3. Identifying needs and exploring the place	10	:25
4. Writing scenarios	5	:30
5. Sketching and designing	15	:45
6. Presenting results	10	:55
7. Wrapping up	5	:60



The Design Wild/Design Well resource has been intentionally left free of age group, grade level and curricular ties so that navigating it will allow for customization based on the user's unique circumstances. The focus, pace and direction should come from the interest of the students and the parameters of the place. The 4 charrettes can be explored back to back and elaborated upon in an interdisciplinary way or can be explored individually at different times fitting into already solidified curriculum. The resource can be utilized in a single day or within an undetermined amount of time depending on the context of the learning scenario.

The following charrettes provide space to foster connection, rigorous thought, curiosity, independent and collaborative expression, inquiry and design action. Enjoy the process!



Charrette 1: Exploring the Humanized Classroom

Often the traditional education spaces we have designed for students to explore and learn cut them off from nurturing an important connection to nature. Most built classroom spaces are heavily humanized with human made shapes and sounds, following human based rhythms and focus, promoting the world as primarily human-centered (Weston, 2004). This leads to limited direct and spontaneous exposure of students to the natural world and hinders the opportunity for students to experiment in understanding and connecting to the broader systems of the living world in their formal learning experience.

Materials: paper, pencils, whiteboard, whiteboard markers, sticky notes, markers, group table or collaborative working space, access to all aspects of the classroom.

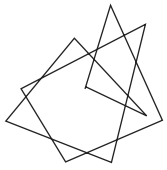
Share: Have students find a spot in the classroom where they are comfortable. Ask them to sketch their favourite space/the type of space or place that makes them feel the most well. After a few moments ask them to draw their ideal classroom next to the first sketch. Keep these sketches to discuss within the charrette process.

Note: Biophilic design architect Amanda Sturgeon states that 'when kids are asked to draw their absolute favourite space 96% will draw a space in nature.'

Design challenge:

Students are given a design challenge based around getting to know their classroom space by acknowledging their third teacher. They are asked to spend time observing the classroom environment throughout different periods of the day and unpacking what it might be teaching them.

- Discuss the human-made, as well as the natural materials, that make up the classroom or third teacher. List the materials; what colours are they, where are the windows, what is the floor made out of, what is the lighting like, how is the furniture set up, can you move things around easily etc ?
- Walk around, sketch and note what you see in the classroom that stands out; what you hear, what you feel etc.
- Brainstorm and storyboard a group picture of what the classroom is reiterating. Highlight/enlarge what stands out the most in the classroom.
- Write scenarios showcasing how the classroom emphasizes that we are apart of nature or a part from nature.
- Discuss how and why the classroom is/is not providing the kind of space the students each identified within their introductory individual sketches.
- Referencing their ideal classroom sketches, as a group, design a single large image of what you would like your classroom to look, sound and feel like.



Charrette 2: Discovering Natural Patterns and Systems

Keeping student perspective of space in mind as we think about learning environments, educator and researcher Indira Dutt (cited as Zandvliet, 2013) notes that 'a school occupant's experience of being inside their school building extends beyond the physical boundaries of the structure' (p. 103). This highlights one of the main findings of her research, and an important piece to consider, which is that students do not often easily distinguish the inside of their learning spaces from the outside of their school grounds (Dutt, n.d).

Materials: paper, pencils, cameras, whiteboard, whiteboard markers, sticky notes, markers, group table or collaborative working space, access to all aspects of the classroom.

Share: Biophilic design is based on Edward O Wilson and Stephen Kellert's 'biophilia hypothesis' which proposes that humans have an innate connection with the natural world (Wilson, 1993). Professor and author Stephen Kellert was a key thinker in the translation of biophilia as a hypothesis into a design focus. He argued that the intent of creating and interacting with spaces should stem from a 'love of life' (Kellert, 2015, p. 289) which allows people to lean into their desire to connect with nature and its systems. Biophilic design helps us connect ourselves to the way the world works through systems.

Design challenge:

Students are given a design challenge based around better understanding the organizational principles of design in nature and linking them to the patterns of biophilic design. Students are asked to explore and consider the direct, indirect and symbolic experiences with nature and space.

- As a group explore examples of the organizational principles of design from nature and architecture. Use the image attached as Appendix I, as well as the list below, and have students match up some of the principles and some examples from nature and the built environment:
  - spiral (nautilus shell or fiddle head; spiral staircase etc.)
  - radial (sunflower or starfish; ceiling dome etc.)
  - linear
  - symmetry
  - rhythm and repetition
  - branching
  - grid
  - positive form/negative space

- Explore the classroom with your sketchbooks/cameras and draw or shoot which areas of the room showcase organizational principles of design. Consider which are made of natural or human-made materials.

- Brainstorm, storyboard and showcase examples of organizational design principles in nature that might be found in your region (ie, shells, leaves, cones, flowers, water features) exploring patterns and discussing the which connect with you.

- Do some research online and identify how school design can be inspired by natural patterns and systems.

- As a group design and sketch a single large image indicating how your classroom could be reimagined to incorporate more patterns and systems based on natural design.

Charrette 3: Re-imagining Biophilic Connections

Educator Indira Dutt (n.d) offers insight into the types of biophilic design aspects which connect students to their third teacher and to increased well-being including 'indoor-outdoor interfaces which facilitate indoor-outdoor relationships. These interfaces are points, areas or surfaces that serve as a juncture between the inside and outside of a building. They include features that provide connection to the outdoors such as windows, skylights, natural building materials, aquariums, plants, interior living walls and porches' (Dutt, n.d, p. 24). Students often have trouble delineating experiences inside the classroom from outside the classroom. They often discuss experiences outside (school grounds) the classroom when asked about experiences inside the classroom. The fluidity of these experiences and spaces is important to movement, interaction and connection.

Materials: paper, pencils, camera, whiteboard, whiteboard markers, sticky notes, markers, group table or collaborative working space, access to all aspects of the classroom.

Share: Terrapin Bright Green is a design firm that has compiled 14 patterns of biophilic design which lay out the specific categories of what biophilic design includes, as well as a framework for implementation in different settings, including schools. They state that, 'biophilic design can be organized into three categories':

- Nature in the Space (direct, physical and ephemeral presence of nature in a space or place) ie. green walls made of indoor plants
- Natural Analogues (organic, non-living and indirect evocations of nature in a place)' ie. natural patterns used in wallpaper
- Nature of the Space (spatial configurations in nature allowing for wonder) ie. unblocked views of the outdoors while inside

(Browning et al, 2014, p. 9)

Design challenge:

As a group read over Terrapin Bright Green's 14 Patterns of Biophilic Design. Use the document attached as appendix II to discuss which of the patterns you notice in the classroom and which you think are absent.

- Explore the classroom with your sketchbooks/cameras and locate as many of the 14 patterns of biophilic design as possible.

- Spend time directly outside the classroom/school. Explore these areas with your sketchbooks/cameras and locate as many of the 14 patterns of biophilic design as possible. Think about points of engagement with the outdoors from within the structure of the classroom. Where do they take place? Are they intentional?

- Identify what you consider indoor/outdoor interfaces or hybrid spaces.

- Brainstorm, storyboard and showcase examples of meaningful and intentional ideas of indoor/outdoor relationships. Consider how we can be inside the classroom while experiencing elements typically found outside the classroom.

- As a group create a concept board of the patterns of biophilic design in and around your classroom as inspiration to develop your own classroom biophilic design record. Use the photos or sketches of your classroom to create a digital or physical reference guide based on the 14 patterns of biophilic design. Which patterns are prominent in your space and which are not? How can you invite more biophilic patterns into your classroom?

Charrette 4: Wilding Classrooms for Well-being

A collaborative research study asked of 'the fundamental school design problem', 'what type of environment optimizes cognitive function – learning, memory, emotion, communication, and social intelligence – in a developing child?' (Determan, Akers, Albright, Browning, Dunlop, Archibald, Caruolo, 2019, p. 3). Foreshadowing the emerging practice of biophilic design, author Anthony Weston (2004) argues that it is an environment that it conscious of its human-centredness and is allowed to be 'wild' (Weston, 2004, p. 39).

Materials: paper, pencils, whiteboard, whiteboard markers, sticky notes, markers, group table or collaborative working space, access to all aspects of the classroom.

Share: On average, most of us spend about 20 hours per day inside. These indoor spaces shape our behaviour, interaction, communication and relationships. They can enhance or limit activity and influence our well-being as much as our performance. The impact of the built environment on us is enormous and to a large degree we subconsciously react to our surroundings. As adults we have some control over our environment, which to some extent we can alter, adjust or improve to make more suitable for our personal needs. Young people, most of the time, have by far less influence to shape the surroundings in which they spend their days. They have to rely on the spaces, like classrooms, provided for them. Yet they are the ones that would benefit the most from well-designed classrooms that are wild or self-willed.

Design challenge:

What if classrooms went wild? Students are given a design challenge to plan a learning space that has gone wild by respectfully inviting nature in and actively engaging in connecting nature to their learning.

- As a group discuss how you can invite nature into your classroom always. Think about how you can make your classroom more permeable with the local geography.

- Brainstorm what it means for a classroom to go wild. What would that teach us? How would that shape us? How would we connect to that classroom and how would we shape it?

- Come up with ideas of how your classroom tells the story of where you are learning and how you are connected to that place.

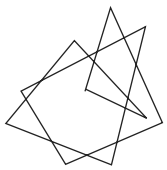
- Search out schools and classrooms using the 14 elements of biophilic design and observe carefully. What was considered in the design process? What are the nuances of the place?

- As a group develop a design concept based in wilding your classroom. Dig into understanding the attributes of the site/place before redesigning. What is there? What is missing? What are the native plants/animals/natural features/climate etc. of the area? What are the dominant shapes of the place (sharp, round)? What are the dominant colours? What are the smells and feels? Cedar, salt water, rain etc.

- If appropriate collect materials from nature in your local place and bring them into the built environment to re-enforce a connection to place (soil, rock, timber etc). Work as a team to create unique biophilic elements for your classroom (woven cedar wall paper, a native plant wall etc). Make a plan to open up the classroom to the outdoors as much as possible (let natural light in all day, keep windows open to listen to the sounds and feel the natural temperature etc). Allow for random and temporary connections to nature through different interfaces (sky lights, windows, decks, outdoor classroom wild space access). Invite the presence of water to be noticeable (water walls, natural aquariums, ponds). Bring in objects with organic shapes, natural colours, spirals fractals and curves (driftwood, dried plants, sand etc).

- Where possible redesign classroom furniture and fittings with biophilic patterns in mind (wooden furniture, clay, natural fibres, repetitive and symmetrical shapes, natural colours etc). Create spaces with views of nature, cozy refuge areas, spaces up high and down low to study, labyrinths and windings paths with hidden views to explore etc. Incorporate heights, gravity, and spaces that feel somewhat risky etc.

Go wild!



Conclusion

Please keep the connection going! The Design Wild/Design Well resource is meant to inspire a community of learners to connect authentic knowledge creation with real life problem solving to create relationships with our natural systems. It gives learners the tools and support to understand that while they are connecting deeply with their learning it is also connecting deeply with them, and that their learning is being created with every interaction, intention and connection they are a part of. The practice of student-led biophilic design allows students to understand their place in the context of the systems of the living world and offer them real opportunity to create sustainable change for all in the future.

Consider awe, wonder, feeling and well-being and continue to ask: Can our classrooms teach us to be sustainably minded, to think creatively about solutions to provide well-being for all, and to naturally consider the more-than-human world in our decisions and actions? What if we really questioned what we want our classrooms to be teaching our students? What questions would we ask? What would we design?

References

Browning, W.D., Ryan, C.O., & Clancy, J.O (2014). 14 Patterns of Biophilic Design. New, NY, York, USA. Terrapin Bright Green llc. Retrieved from: https://www.terrapinbrightgreen.com/reports/14-patterns/

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D (2019). Implications for educational practice of the science of learning and development. Applied Developmental Science. DOI: 10.1080/10888691.2018.1537791

Determan, J., Akers, M. A., Albright, T., Browning, B., Martin-Dunlop, C., Archibald, P., & Caruolo, V. (2019). The impact of biophilic learning spaces on student success. Retrieved from: Spaces-on-Student-Success.pdf

Dutt, I (n.d.). Turning the classroom inside out: Students' lived experience. Pathways: the Ontario journal of outdoor education is the property of Council of Outdoor Educators of Ontario.

The International Living Futures Institute. Retrieved from: https://living-future.org/ biophilic/case-studies/ the-bertschi-school-science-wing/

Kellert, S (2015). *Build nature into education. Nature, 523*. Macmillan Publishers Limited. New York, NY, USA. Retrieved from:

https://www.researchgate.net/publication/ 281067835_Build_Nature_into_Education

Louv, Richard (2005). *Last child in the woods*: saving our children from nature-deficit disorder. Chapel Hill, NC : Algonquin Books Of Chapel Hill. Print.

Orr, D. (1999). Architecture and Pedagogy. Greening the College Curriculum. Washington D.C, USA. Island Press.

Sturgeon, A. (2019). Using biophilic design to heal body, mind and soul. TEDMED. Retrieved from: https://www.youtube.com/watch?v=uAmbZCtNC9U

Weston, A. (2004). *What if Teaching Went Wild? Canadian Journal of Environmental Education, 9,* 33-39.

Wilson, E. O & Kellert, S (Ed) (1993). *The biophilia hypothesis.* Washington, D.C, USA: Island Press.

Zandvliet, D (2013). *The Ecology of School, 4.* Boston, MA, USA. Springer. DOI 10.1007/978-94-6209-221-1

Images

Cover image/appendix I: Edward T. White, Concept Source - A vocabulary of Architectural Forms: https://www.pinterest.de/pin/325455510570839487/

Page 4: https://www.australiandesignreview.com/architecture/nature-new-school-design-evolving-concept/

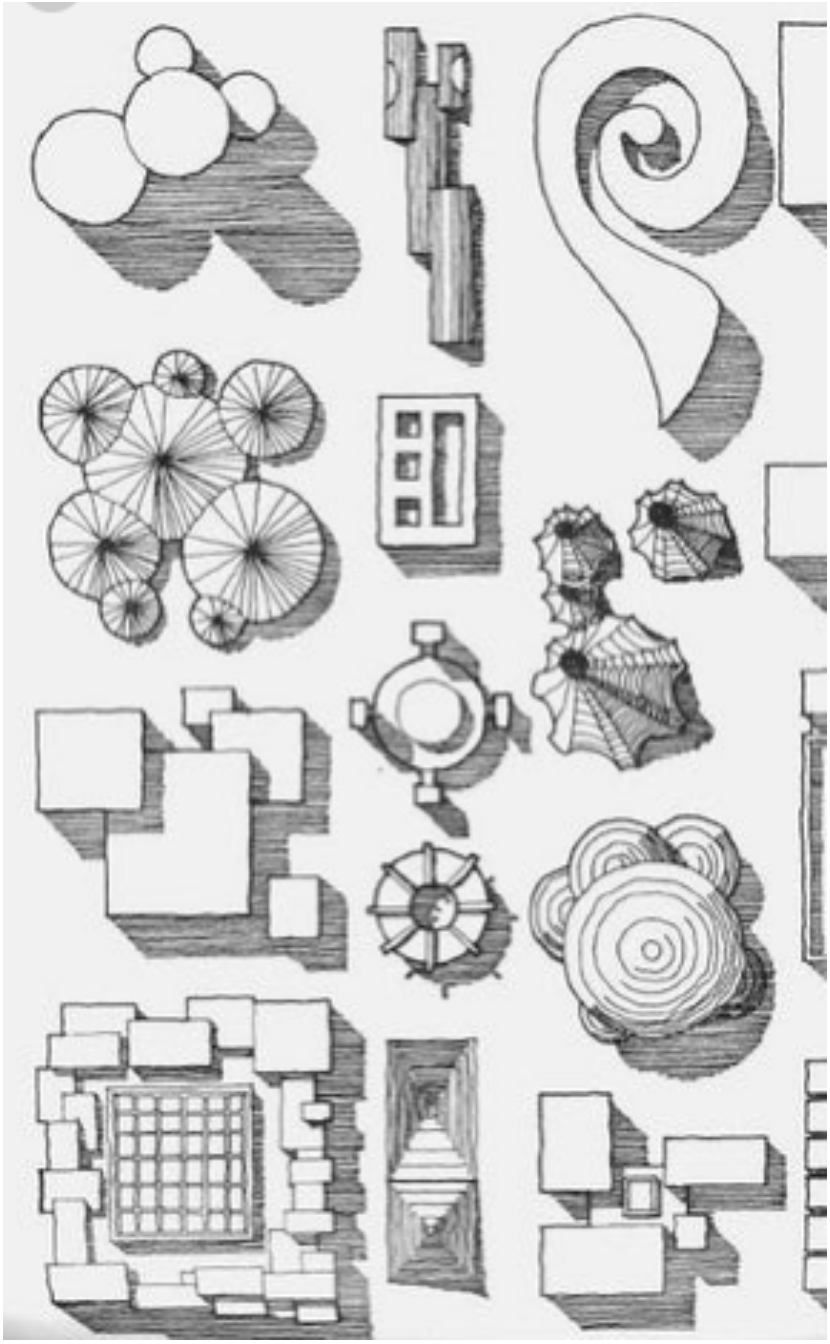
Page 7: https://www.workdesign.com/2017/10/charretting-for-results/

Page 19: https://www.australiandesignreview.com/architecture/nature-new-school-design-evolving-concept/

Appendix II: https://www.terrapinbrightgreen.com/report/14-patterns/

Appendices

Appendix II



14 PATTERNS OF BIOPHILIC DESIGN

Improving Health and Well-Being in the Built Environment

NATURE IN THE SPACE

1. **Visual Connection with Nature**
   A view to elements of nature, living systems and natural processes.
2. **Non-Visual Connection with Nature**
   Auditory, haptic, olfactory, or gustatory stimuli that engender a deliberate and positive reference to nature, living systems or natural processes.
3. **Non-Rhythmic Sensory Stimuli**
   Stochastic and ephemeral connections with nature that may be analyzed statistically but may not be predicted precisely.
4. **Thermal & Airflow Variability**
   Subtle changes in air temperature, relative humidity, airflow across the skin, and surface temperatures that mimic natural environments.
5. **Presence of Water**
   A condition that enhances the experience of a place through the seeing, hearing or touching of water.

NATURAL ANALOGUES

8. **Biomorphic Forms & Patterns**
   Symbolic references to contoured, patterned, textured or numerical arrangements that persist in nature.
9. **Material Connection with Nature**
   Material and elements from nature that, through minimal processing, reflect the local ecology or geology to create a distinct sense of place.
10. **Complexity & Order**
    Rich sensory information that adheres to a spatial hierarchy similar to those encountered in nature.

NATURE OF THE SPACE

11. **Prospect**
    An unimpeded view over a distance for surveillance and planning.
12. **Refuge**
    A place for withdrawal, from environmental conditions or the main flow of activity, in which the individual is protected from behind and overhead.
13. **Mystery**
    The promise of more information achieved through partially obscured views or other sensory devices that entice the individual to travel deeper into the environment.
14. **Risk/Peril**
    An identifiable threat coupled with a reliable safeguard.

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