



Bridging Evolution and Education:

A Neurobiological Approach to Learning Spaces



A4LE LearningSCAPES
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PORTLAND



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Presentation Framework

1. Introduction to Education Design International
2. Understanding Evolutionary and Neurobiological Framework
3. The NASAT Framework: **What** is it?
4. The Imperative: **Why** Does NASAT Matter?
5. Application: Integrating Concepts into Design (**How?**)
6. A Before & After Recalibration Project
7. Conclusion
8. Activity: Mindful Design Learning Environment Scavenger Hunt
9. Questions

Who is Education Design International (EDI)?



We are Architects
We are Educators



EDI is a global team of architects and educators dedicated to planning and designing school facilities for today and tomorrow with one primary goal in mind:

To Improve Learning



Education Design International

Bridging Evolution and Education: A Neurobiological Approach to Learning Spaces

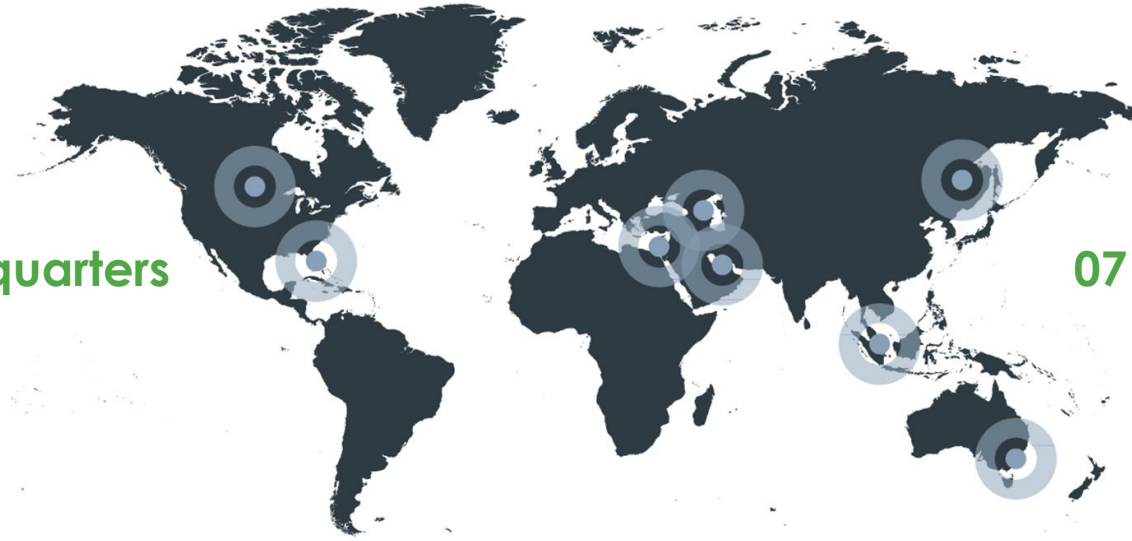
EDI's Specialty Offerings



Education Design International offers complete Visioning, Master Planning & Campus Design, District Planning, Architectural Design, Facilities Planning, Professional Development, Curriculum Development, and Change Management services to schools and school districts in the United States and across the world.

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Bridging Evolution and Education: A Neurobiological Approach to Learning Spaces

EDI's Most Recent Publications:



Ideas Backed By Research



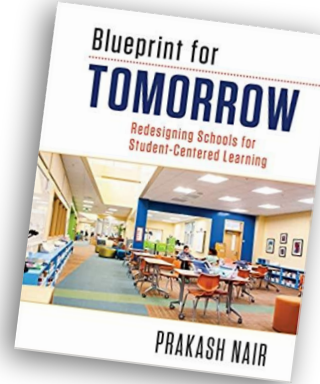
Learning by Design
Prakash Nair,
Roni Zimmer



The Language of School Design
Prakash Nair,
Randy Fielding



A NEW Language of School Design
Prakash Nair,
Parul Minhas



Blueprint for Tomorrow
Prakash Nair



Building Minds
Prakash Nair,
Parul Minhas

Drawing on Expertise from 59 Countries

The Best Ideas from Around the World





Understanding Evolutionary and Neurobiological Framework

Evolutionary Biology in Education

When it comes to our evolutionary biology, how humans learned for thousands of years shaped how our brain functions and how we learn best. In modern times how we learn is heavily efficiency based rather than focusing on a more effective approach which focuses on basic yet effective approaches such as the below:

Hands-On Learning



Oral Communication and Storytelling



Trial and Error



Observation and Imitation



Bridging the Gap: Evolution and Modern Environments

In our rapidly evolving world, the disconnect is growing between our evolutionary biology and modern lifestyles of more passive activities. This has profound implications on our well-being, particularly for children whose development is keenly influenced by how they take in the world around them. Examples of Passive Activities:

**Video
Games**



**Scrolling on Social
Media**



**Watching Streaming
Services**



**Browsing the Internet
(YouTube Videos)**



Bridging the Gap: Evolution and Modern Environments

Children's development is also heavily influenced by their surroundings. In modern times we have taken to designing spaces and environments around efficiency and an ever expanding range of passive activities.



E-Sports Arena: A windowless room where students learn through activities and lessons formed around the video game industry.

Recalibrating Educational Spaces for Human Development

While spaces such as an e-sports arena are a hit with students it adds to the divide we are creating. There is a pressing need to recalibrate educational settings with neurobiological and evolutionary principles in mind.



Learning environments that nurture their innate capacities for collaboration, empathy, and exploration.



Learning environments that are in nature or utilize biophilic design principles.

Learning Spaces for a Modern World

In this presentation we will illuminate pathways towards educational environments that truly support the holistic development of children while also preparing them for the complexities of the modern world.



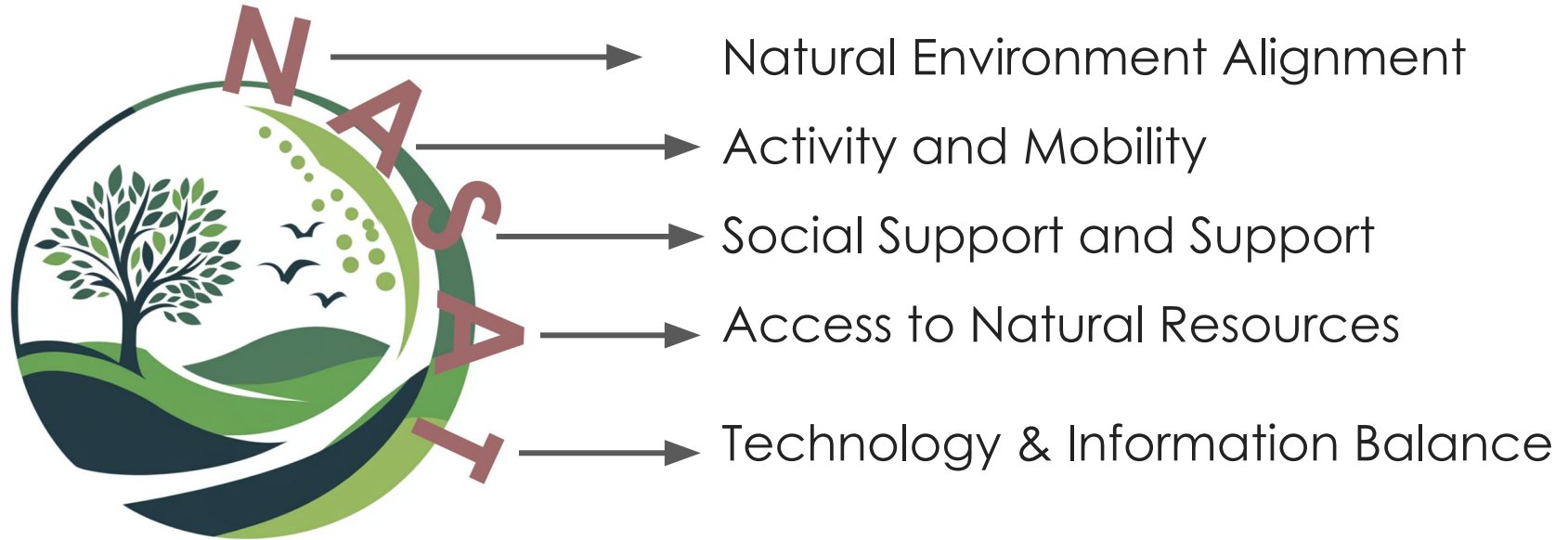
Outdoor Learning Deck:
connects the indoors
directly with a useable
learning space outdoors.



The NASAT Framework: What is it?

A Concept to Guide Recalibration

At the heart of addressing these challenges is the **NASAT Framework** that proposes an integrated model for reimagining educational spaces in alignment with children's neurobiological and evolutionary needs.



N: Natural Environment Alignment



Responds to children's innate affinity for nature. Spaces that incorporate biophilic design or expose students to natural elements reduce stress and enhance cognitive functioning.



Indirect Biophilic Elements: Colors & Nature like feelings integrated into learning spaces.



Direct Biophilic Elements: Water, Greenery, integrated into learning spaces.

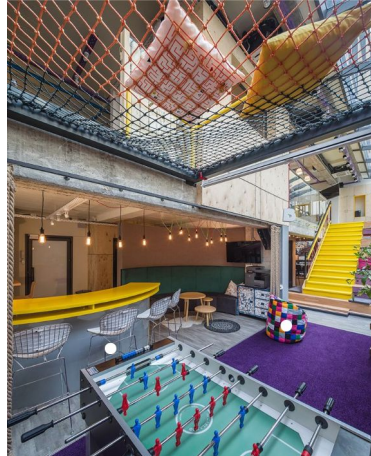
A: Activity and Mobility



Addresses the critical need for physical movement and exploration which are essential for cognitive development and physical health, reflecting our evolutionary predisposition towards activity.



Early years spaces typically already do most of these things!



For Students in Elementary School - High School spaces should be provided beyond a typical gymnasium such as a game room, sensory lab, outdoor learning spaces, etc.



S: Social Structures and Support



Meets the evolutionary need for social interaction and collaboration, crucial for emotional intelligence and the development of social skills.



Spaces for small - medium sized groups to meet in an acoustically separated room



A learning commons room allows for social interactions in a more casual setting. Learning commons have multiple areas / furnitures for students to select from.

A: Access to Natural Resources



Caters to the sensory engagement and experiential learning rooted in our evolutionary history, promoting ecological stewardship and connection with the environment.



Outdoor spaces for informal learning, gathering, small and large groups.



A water retention pond offers an opportunity for students to research local insects and amphibians in an outdoor biology lab.

T: Technology and Information Balance



Balances technology use with the need for natural, unstructured learning experiences, acknowledging the importance of mitigating technology's impact on cognitive and physical well-being.

A Balanced Learning Experience



Experiences using learning with non-technology centric tools & elements.



Experiences using screen technology and learning about technology.

Yes, It is as simple as that!

This seems quite simple, yet time and time again new and renovated schools pop up where the primary learning space is the home room / classroom. This one space type is 60%+ of the area in any given traditional school.



Why is the trend to treat every student the exact same way? We all learn in different ways, so why doesn't our environment reflect that?

Modern Learning Space Design Activity



Apply the NASAT principles by designing a modern learning space

PART 1: How you would integrate the components of NASAT into a modern learning space? *Think beyond a classroom...*

Take 5 minutes to write a framework of your plan in words and if you have time sketch your ideal learning environment.

Examples:

- *Add natural elements*
- *Provide space for movement*
- *Prioritize collaborative and social areas*
- *Learning outside the classroom*

PART 2: Pair up with those around you.

Take 5 minutes to explain your ideas and connect them to the NASAT framework's principles.

Natural Environment
Activity
Social Support
Access to Resources
Technology Balance



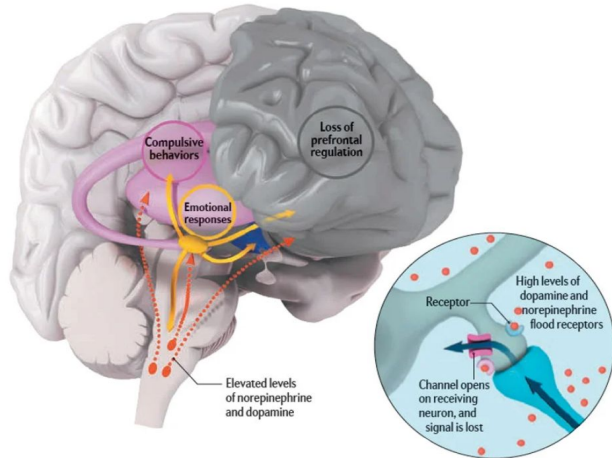
The Imperative: Why Does NASAT Matter?

Neurobiological Basis of Learning

If environments shape our cognitive functions, it's crucial to design them to promote positive outcomes. We should avoid elements that create stress or distraction, such as clutter, poor lighting, excessive noise, or an over-reliance on technology. We should instead focus on adding features that support cognitive growth and emotional health.

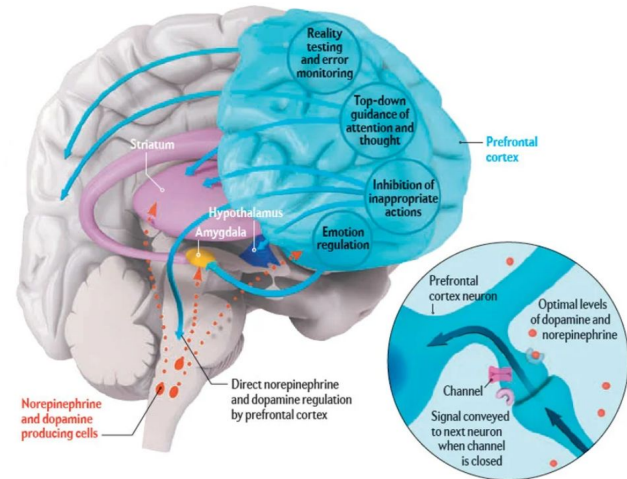
A Poorly Designed Environment

“Stress, Anxiety, Lack of Focus”



A Well Designed Environment

“Stress reduction and enhanced focus.”



Promoting the Creative Essence of Childhood

Children are naturally curious and creative, modern environments should provide opportunities for students to explore both their environment and in their learning. When students have these opportunities they are more likely to develop critical thinking skills, problem-solving abilities, and a deeper understanding of the world around them.



Outdoor Environments



Art Based Activity Zones



Project Based Activity Zones

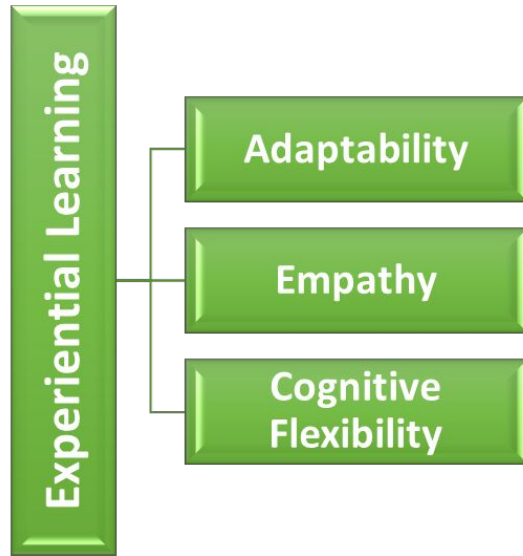
Nurturing Emotional and Cognitive Well-Being

Nature-centric environments are more than just aesthetically pleasing spaces; they are pivotal in activating brain regions linked to relaxation and mental rejuvenation. Today's high stress levels in children can be mitigated by integrating these nature-centric environments



Fostering Experiential Learning

By engaging in hands-on experiences, students encounter real-world challenges that require them to think critically and adjust their strategies as situations evolve. This process fosters adaptability, as learners learn to navigate uncertainties and develop resilience in the face of change.



Preparing Students for an Evolving World

The top skills employers look for evolve over time. It is important to connect these skills back to learning environments which play a crucial role in fostering these skills. As the demands of the modern workforce shift towards new skills, learning environments should be designed to nurture these abilities or be flexible enough to support them.

1900

Agricultural Skills
Manual Labor & Craftsmanship
Mechanical Aptitude
Basic Literacy & Arithmetic
Entrepreneurial Skills



1940

Physical Labor
Mechanical & Technical Skills
Basic Literacy & Numeracy
Teamwork & Discipline
Resourcefulness



2024

Digital Literacy & Tech Proficiency
Emotional Intelligence (EQ)
Adaptability & Agility
Critical Thinking & Problem-Solving
Cultural Competency



2050

?
?
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The Importance of Relational Anchors

Focusing on real-world social interactions and community-building is essential in today's context of increasing social isolation, particularly in an age where digital communication often replaces face-to-face connections. Many children and adolescents are spending more time online, which, while providing some opportunities for interaction, often lacks the depth and authenticity of in-person relationships.





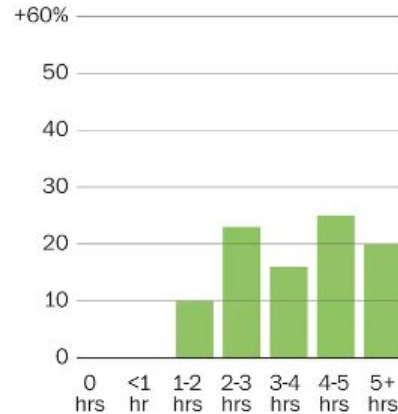
Application: Integrating Concepts into Design (How?)

Nature in Education and Design

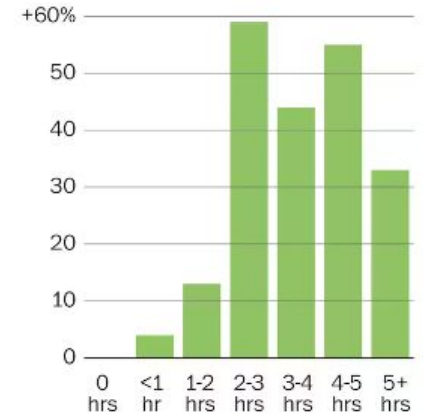
The neurobiological impacts of nature-based elements in learning environments are profound. Exposure to natural elements like plants, natural materials, and outdoor views can reduce stress, enhance cognitive function, and improve emotional well-being. Nature-based designs also promote a sense of calm and connectedness, helping to regulate emotions and boost mental clarity, which are essential for both learning and overall development.



Happiness



Good health



Nature in Education and Design

Studies show that being in nature triggers brain regions associated with relaxation and attention restoration, leading to better focus and creativity. No wonder why outdoor makers / project labs are such a success!



Biophilic Architecture

Incorporating a nature based aesthetic into any design including natural light is vital for many compelling reasons, each contributing to the overall well-being and development of students.



Dynamic Play Areas

Designing spaces for physical activity and exploration stimulates neurotransmitters like dopamine and endorphins, improving mood, focus, and cognitive function.



Interactive Installations

Blending physical activity with learning opportunities, these installations encourage curiosity, exploration, and a deeper understanding of educational concepts.



Communal Spaces & Emotionally Supportive Design

The Learning Commons type space has recently become a buzzword for schools all over the world but what exactly is a learning commons and what does it support from the NASAT concept?



Physical

Easy to access connections to the outdoors



Mental

Ability to meet 1 on 1 with peers allows for improved mental state



Emotional

Colors, Materials, Acoustics, Lighting all affect students emotional state



Social

Furnishings that help promote group projects & social emotional learning

Resource-Based Learning & Natural Learning Tools

Students may learn from the sustainable features of a building both seen and unseen. Gardens and ecological zones serve as tools for teaching about ecosystems and conservation, stimulating cognitive development through hands-on activities or observation.



Technological and Information Balance

Merging technology and nature, such as digital displays in garden settings, activates brain regions involved in sensory processing and learning. Promoting tech-free natural zones enhances cognitive abilities like attention, memory, and creativity by allowing students to disconnect from digital devices and engage in quiet reflection



Mindful Design Mapping Activity



Let's revisit your designs and ideas from the last activity. You should have some resemblance of a space or ideas for a space.

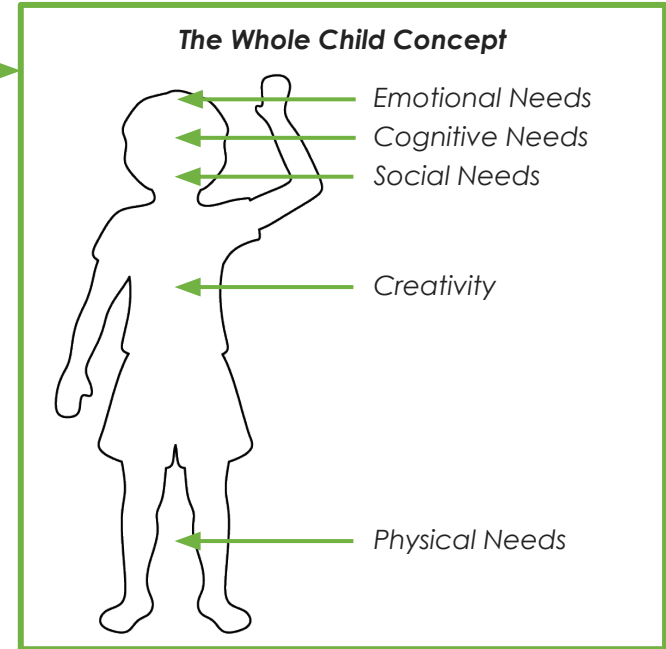
- 1) How does your space or ideas nurture the whole child?
- 2) Which elements can help to mitigate modern-day challenges?

- Stress
- Digital Distraction
- Limited social engagement
- Etc...

Take 5 minutes to brainstorm to map your design. Make note of components or ideas you would add to make for a better design.

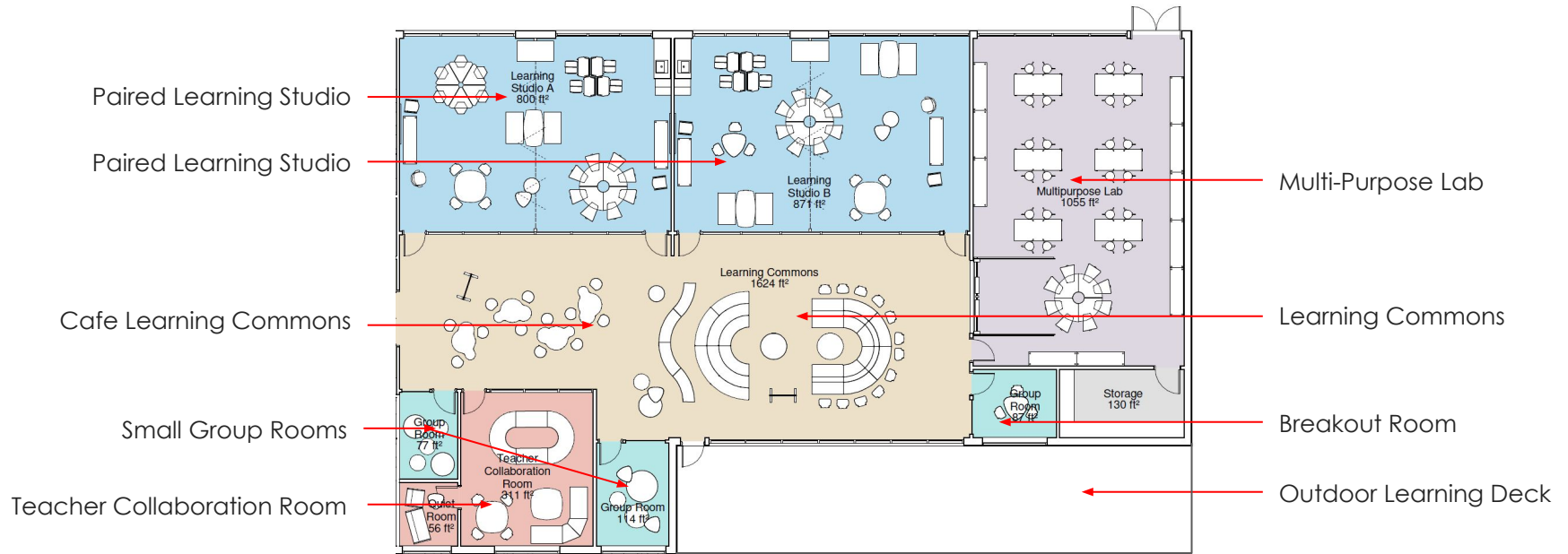
3) Pair Discussion

Take 5 minutes to share how you would refine your design to better serve the whole child and address modern day challenges



Example NASAT Designed Learning Environment

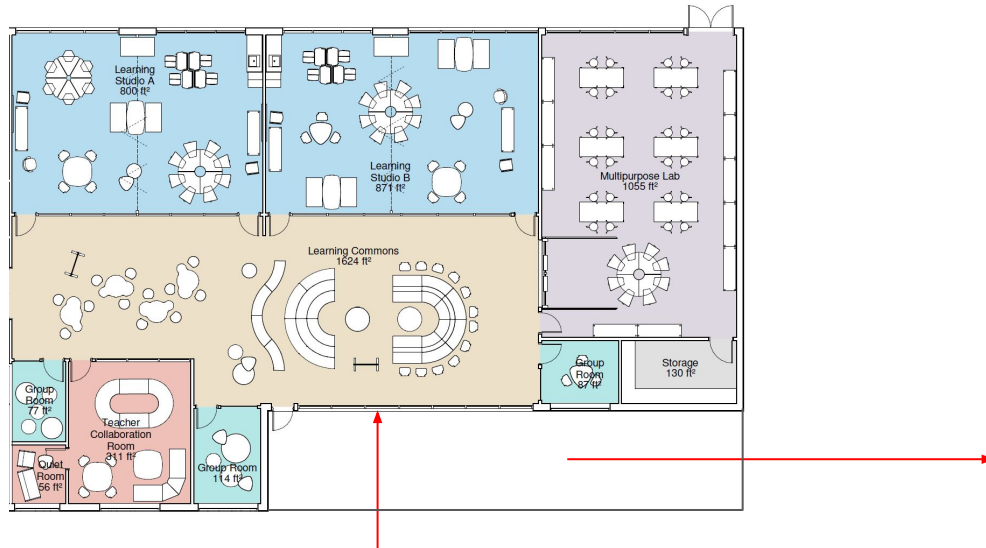
In order to demonstrate how these concepts are integrated into school design, we will go through the design of a block of spaces for 100 students and 4 teachers. **EDI calls this block of spaces a learning community.**



Natural Environment Alignment in Design

Examples of biophilic design: natural light, views of greenery, use of organic materials.

Impact: Cognitive benefits, stress reduction, emotional growth.



Learning commons offers a direct visual connection to an outdoor learning environment.

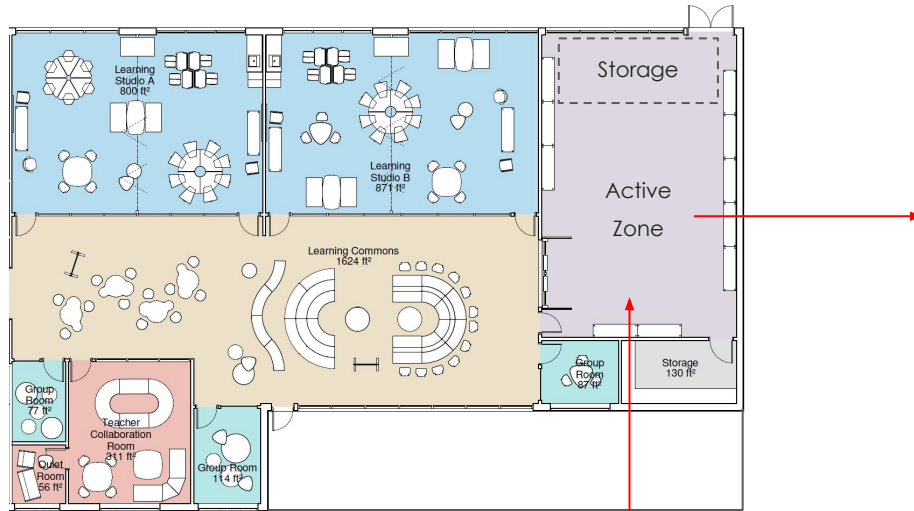


A learning deck offers an easy to supervise opportunity for outdoor learning.

Activity and Mobility in Spaces

Dynamic play areas and movement-friendly designs. Movement is crucial for cognitive development.

Non Active Examples: Interactive installations, spaces encouraging exploration.



Loose Furnishings in this lab are stackable and lightweight allowing for this room to be used as a movement studio.

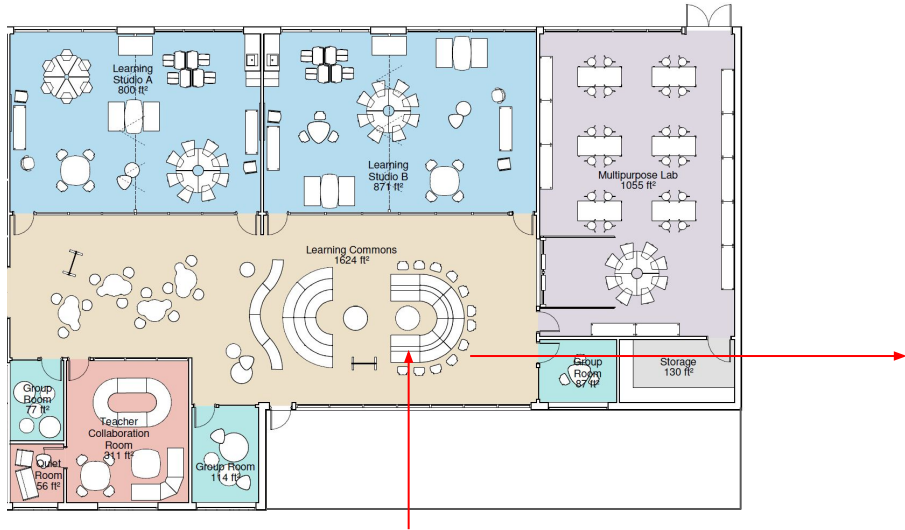


Large open areas can be used for physical or interactive movement (a science fair)

Social Structures and Support

Communal spaces for collaboration and reflection.

Areas designed for emotional support and interpersonal connection.



Collaborative furniture is selected to promote group activities and informal student interactions.

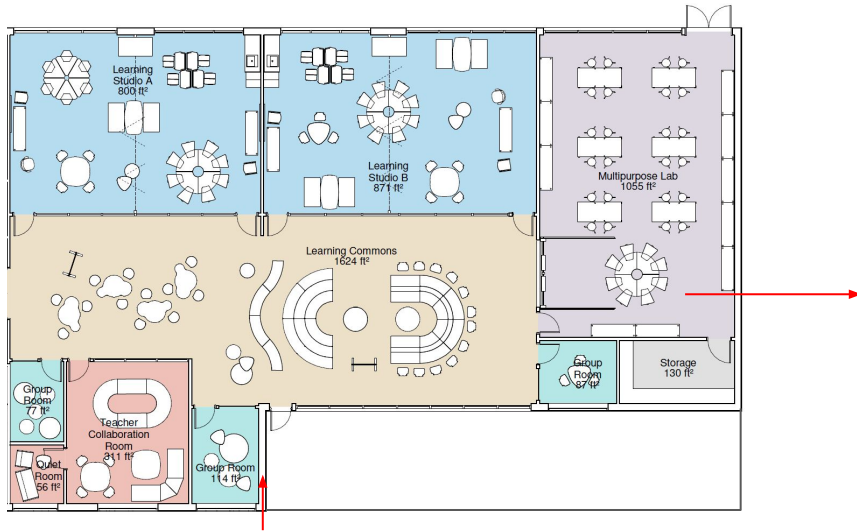


Educational spaces fostering collaboration and emotional intelligence.

Access to Natural Resources

Sustainable design principles in education spaces: water conservation, gardens, ecological learning zones.

Practical examples of integrating these elements.



Building is equipped with rainwater harvesting systems, school gardens, solar panels.

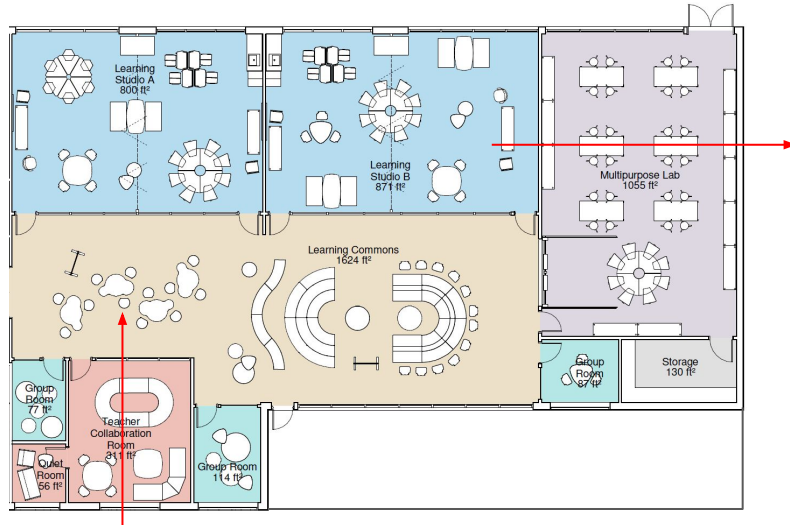


Project lab that may be used for natural resource and sustainable education. Features of the building can be used as a learning tool.

Technology and Information Balance

Designing spaces with tech-free zones and mindful technology use.

Examples: Integrating tech in a way that supports, not overwhelms, learning.



Learning commons supports social emotional learning with or without technology



Learning studios offer both analog and digital presentation techniques and features for teachers and students.

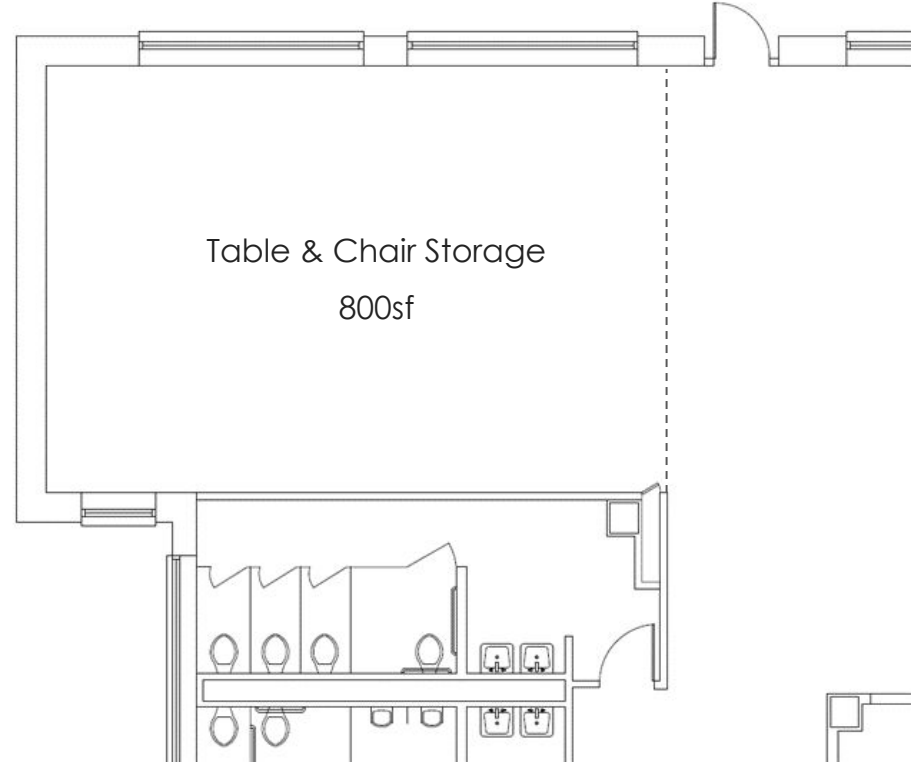
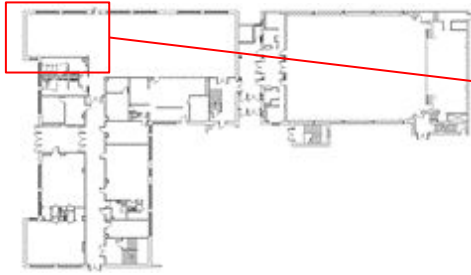


Before & After Recalibration Project

A low cost - high impact first step for a school

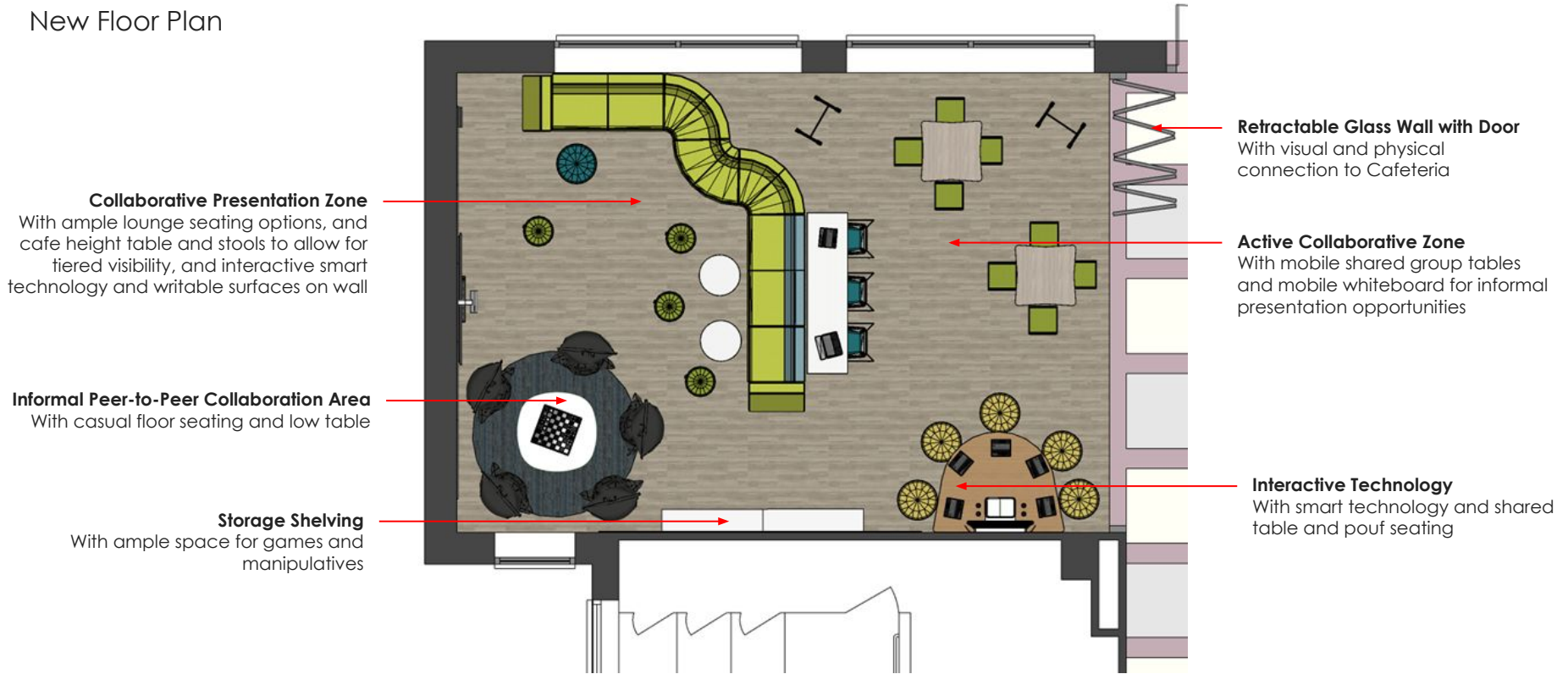
Recalibration Project: The Learning Lounge

Existing Floor Plan



Recalibration Project: The Learning Lounge

New Floor Plan



Recalibration Project: The Learning Lounge

Before Image



Recalibration Project: The Learning Lounge

Rendering



Recalibration Project: The Learning Lounge

After Image



Recalibration Project: The Learning Lounge

Before Image



Recalibration Project: The Learning Lounge

Rendering



Recalibration Project: The Learning Lounge

After Image





Conclusion

Addressing the Modern Disconnect

Standardization, efficiency, and the misuse or overuse of technology in teaching create a poor learning experience for students that is misaligned with our evolutionary biology & resulting neurobiological needs.

Learning to be Efficient



Everyone learns in the same way, in the same space, doing the same thing.



The gap is widening as technology is used as a crutch in many 'future centric' schools. This is having a profound impact on student well being.

★ Learning that is Personalized ★



Student mobility through student selection of where, how, and what they learn.

NASAT in Education Design

NASAT aligns learning spaces with neurobiological needs. Benefits include cognitive, emotional, and social growth.

Natural Environment



Connecting with nature enhances focus and reduces stress.

Activity



Simplified, clean spaces improve cognitive processing.

Social Support



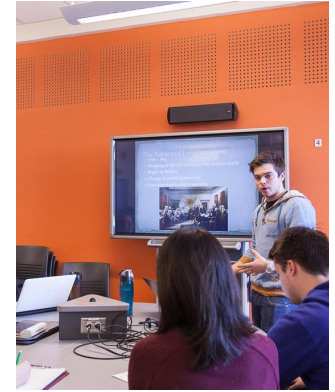
Diverse sensory input boosts engagement and learning.

Access to Resources



Flexible spaces foster creativity and problem-solving.

Technology Balance



Thoughtfully integrated technology supports lifelong learning.

Key Takeaways

Nature, mobility, and social support matter. NASAT provides a comprehensive design framework for schools.

A School Designed with NASAT Principles



Encourages collaboration and social interaction in flexible environments.

Enhances student engagement through sensory and experiential learning.

Strengthens the connection to nature, promoting ecological stewardship and sustainability.

Promotes well-being by reducing stress and fostering emotional regulation.

Improves academic performance by aligning space with natural learning patterns.

Fosters creativity and critical thinking through adaptive design.

Supports cognitive development with neurobiologically informed spaces.

The Path Forward

In order to provide the best possible education for students future schools must embrace NASAT principles in their design.



Vision for future schools:
nurturing, adaptive, and
intellectually stimulating
environments.



NASAT Designed Learning Environments

Scavenger Hunt



Spaces Filled with NASAT Design Concepts

In the following photos identify the elements that are tied to NASAT design concepts



Quality Lighting

Lack of Clutter on Walls

Thoughtful Color Combination

Connection to the Outdoors

Multi-Use / Flexible Furniture



EMERALD ELEMENTARY SCHOOL





Aa
Bb
Cc
Dd
Ee

Colorful sticky notes on a blackboard.















Questions?



THANK YOU FOR PARTICIPATING

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