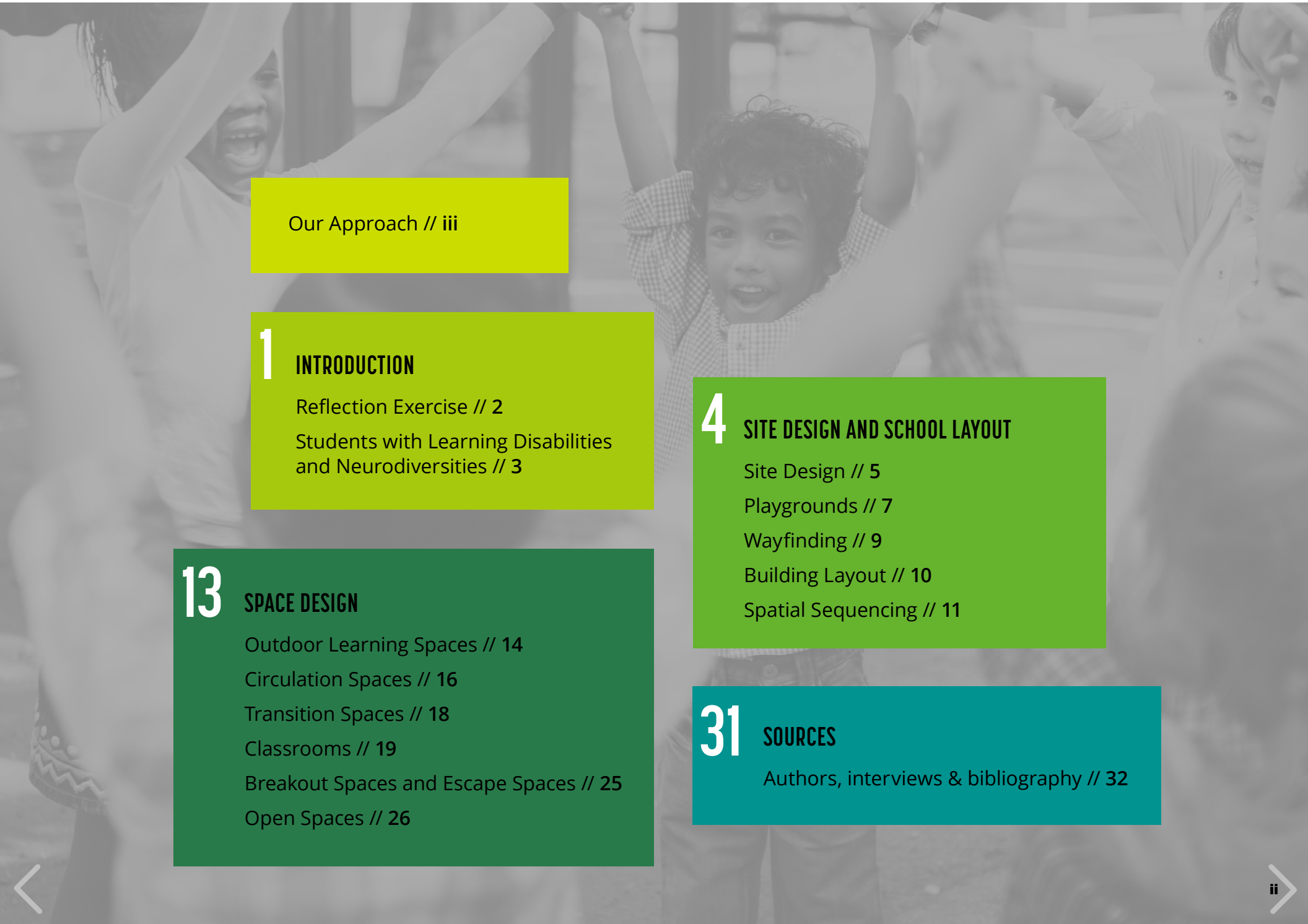
INCLUSIVE DESIGN FOR SPECIAL EDUCATION

BEST PRACTICES FOR LEARNING FACILITIES



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Our Approach

At NAC, we are committed to designing environments that inspire and support learning for all. At its core, our spaces must be humane, just, and equitable to achieve this. This includes designing general education spaces that successfully integrate students with learning disabilities and neurodiversities. As we understand more about the benefits of inclusive design for special education, we firmly believe that designing for the highest need benefits not only those with specific requirements but enriches the learning environment for everyone.

Learning disabilities and neurodiversities encompass a diverse spectrum of students, each with unique concerns. Designing for variety and flexibility remain important factors, however our focus moves beyond the general education classroom to encompass the entire school and site. We embrace a holistic approach, one that considers how students interact with their surroundings, teachers, and other students during all times of the day, fostering the most inclusive and supportive experience possible.

Drawing from NAC's collective experience, expert special educators, as well as knowledge and research from around the world, this book presents planning and design principles grounded in this holistic, whole-day approach. The research and thinking here embodies our pursuit of a more humane world, one in which inclusive facilities empower all students, setting them up for success and enabling them to realize their full potential.

Philip Riedel
AIA, ALEP, LEED AP, Principal

Ann Vacek
AIA, WELL AP, Associate

INTRODUCTION

INCLUDING EVERY CHILD

Salish Sea Elementary School

Introduction

Reflection Exercise

Think back to when you were a student in grade school. Imagine yourself as a special education student with a learning disability. Picture a typical day when you're arriving at school. Ask yourself the following questions:

What was your experience as you arrived and entered the building?

- What did the building look like?
- Where was your classroom located?
- What did your classroom look like?
- What did the common spaces look like—the gym, hallways, cafeteria, library, and playground?

How did you imagine yourself as a student? Did you think of yourself differently or the same?

What examples or experiences influenced how you envisioned the design?

AROUND 15% OF THE US POPULATION, OR 1 IN 7 INDIVIDUALS, HAS SOME FORM OF LEARNING DISABILITY.

Supportive Care ABA,
https://www.supportivecareaba.com/

Students with Learning Disabilities and Neurodiversities

We are living in a time of increased awareness about learning disabilities and neurodiversities and have become familiar with terms such as Dyslexia, Autism, and ADHD. Learning disabilities are often referred to as "invisible disabilities," as many children with learning challenges present with an average or higher than average IQ and do not also have a physical disability.[1] Many are also "2e" or what is known as "twice exceptional." They might have a learning disability, but also be highly gifted in another domain.[2]

Designing for inclusion in the general education classroom can benefit those with learning disabilities by supporting their strengths rather than their weaknesses, allowing them to interact and develop social emotional skills with their peers, and to help foster a sense of belonging. At the same time, there is a compelling case for how learning spaces that reflect the diverse makeup of student populations can set everyone up for success.

1 *Learning Disorders in Children.* Centers for Disease Control and Prevention. (2023, August 10)
https://www.cdc.gov/ncbddd/developmentaldisabilities/learning-disorder.html
2 *Twice-Exceptional Students.* National Association for Gifted Children. (2023, August 10)
https://dev.nagc.org/resources-publications/resources-parents/twice-exceptional-students

SITE & LAYOUT

STRATEGIES FOR SITE DESIGN AND SCHOOL LAYOUT


Hazel Wolf K-8 E-STEM School

Site Design and School Layout

Site Design

The drop off and entry sequence into a school building is the first interaction that students have with the school every day, and should be designed to spark their curiosity and set the stage for learning. It is important that students with learning disabilities feel inspired to learn and that the areas in which they excel are celebrated as they can become disengaged when their learning disability is the main focus of their education.[3]

3 Anna Osipova, CSU, personal interview, May 31, 2023.

Wonderful College Prep Academy

Crenshaw High School New Performing Arts

Drop off and waiting areas that protect children from the elements and are wide enough to allow multiple students and a caregiver to walk side by side provide a sense of dignity to all students.[4] Entries should be inviting with a good degree of transparency, to provide all students and parents a sense of belonging.[5]

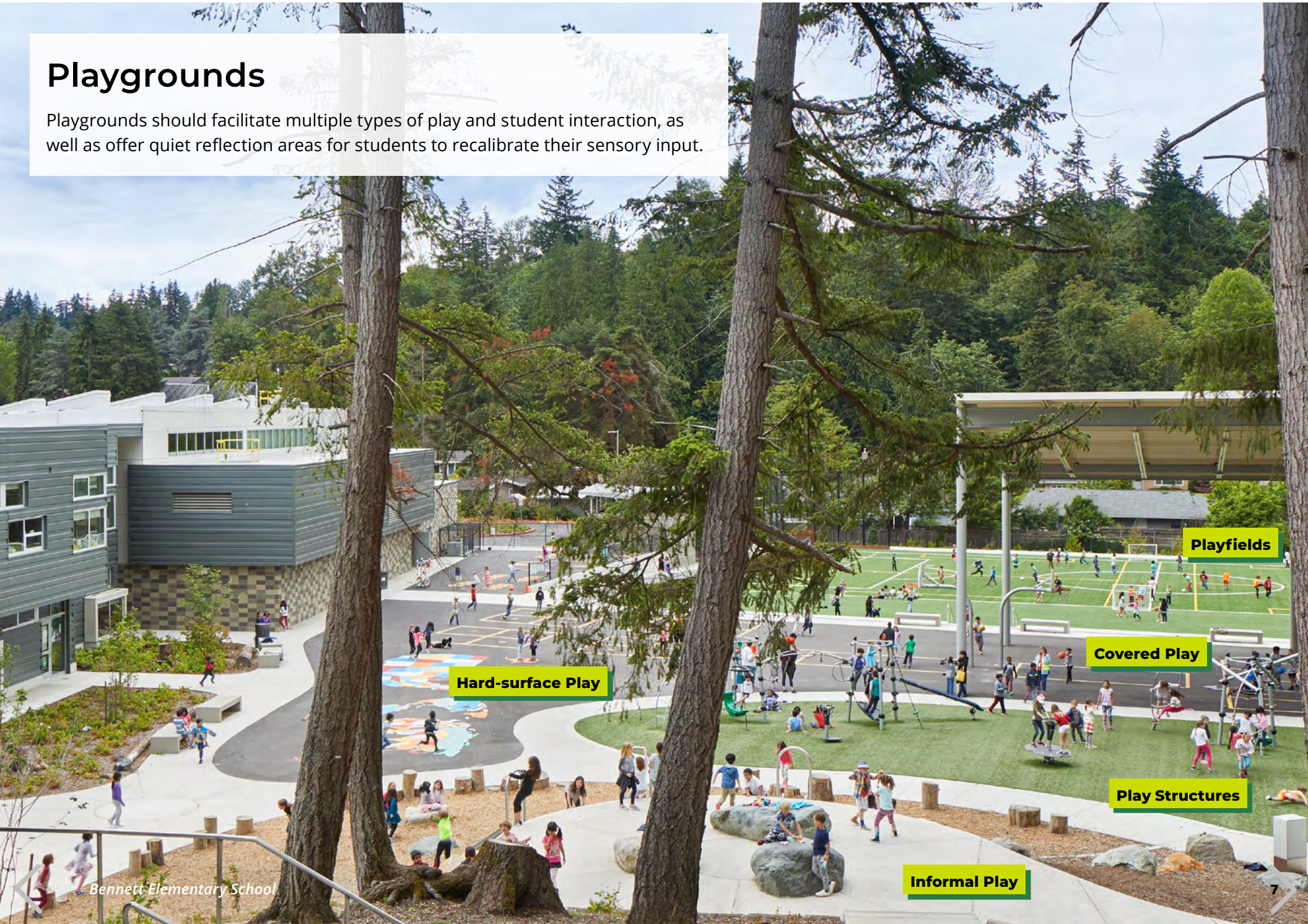
Incorporating transition zones between the entry and circulation spaces can help to reduce temporal overstimulation at the beginning of the day.[6]

This type of protection should extend to other parts of the campus as well, adjacent to play areas, outdoor eating, and primary circulation zones.

4 Jamee Zipkoff, Los Angeles Unified School District, personal interview, June 2, 2023.
5 Brian Lowney, Bethel School District, personal interview, May 17, 2023.
6 Flint Simonsen, Whitworth University, personal interview, June 13, 2023.

Playgrounds

Playgrounds should facilitate multiple types of play and student interaction, as well as offer quiet reflection areas for students to recalibrate their sensory input.



Bennett Elementary School

John Campbell Primary School

Paving and surface materials should be level with gradual grade changes as students with learning disabilities can also have proprioceptive and body control disorders, and visual processing issues. Keeping surfaces free of cracks or abrupt grades changes allows for free movement without risk of injury. *(J. Zipkoff, see Footnote 4)*

Incorporating multiple types of sensory play (sound, smell, texture, and sight) not only benefits special education students but students with physical disabilities as well.

Kenmore Junior High School Modernization and Addition

Quincy High School

Wayfinding

To support all types of learners, as well as students with written language learning disabilities, building and site wayfinding should feature graphic imagery in addition to written words. This is important both for ease of daily navigation but also for safety and security in the event of an emergency.

John Adams Middle School

Visibility study, James Baldwin Elementary School

Building Layout

Placing acoustically and stimulus level similar spaces together, rather than by function, and keeping acoustically and stimulus level dissimilar spaces separated, with transition spaces between, can help improve transition time and focus as well as limit distraction.

HIGH STIMULUS SPACES INCLUDE:

- Gymnasiums and physical activity areas including physical therapy
- Band and Music Rooms
- Commons spaces and Cafeterias
- Entry and Drop Off
- Playgrounds

LOW STIMULUS SPACES INCLUDE:

- Libraries
- Computer Labs
- Speech Therapy
- Administration
- Classrooms

Glover Middle School first floor plan

Spatial Sequencing

The overall layout of a school should be thought about from the idea of spatial sequencing, focusing on routine and one-way circulation over the course of a school day as much as possible. This allows students to stay on task and provide a level of predictability throughout the day which can ease transition between activities. Spatial sequencing can also occur by age-level or grade-level.

Crenshaw High School New Performing Arts

When considered in the earliest phases of design, setting a school up with well-planned site and building layout does not increase construction cost. These strategies can benefit neurodivergent students as well as neurotypical students, teachers and staff with comfortable and easily navigable outdoor and indoor spaces.

SPACES

STRATEGIES FOR SPACE DESIGN

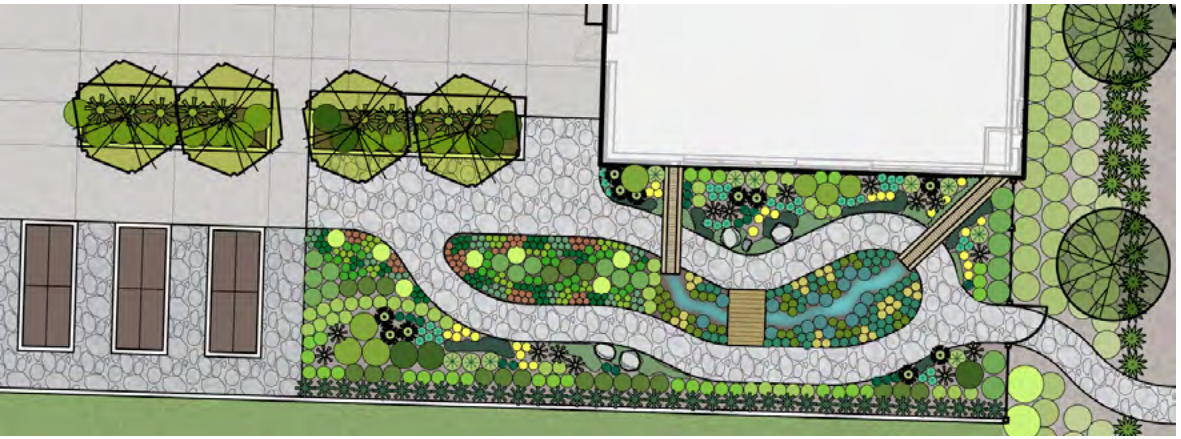
Hazel Wolf K-8 ESTEM School

Space Design

Once the overall layout of the site and building are determined, we can turn our attention to the specific space types that make up the school. In this section, we look at more specific elements for each space.

Outdoor Learning Spaces

Outdoor learning spaces that function as outdoor classrooms, sensory gardens, and vocational gardens are beneficial for all students. Outdoor learning spaces can help to foster social interaction and social/emotional learning, gardening, life skills, and function as transition spaces since access to nature aids in sensory recalibration.



The sensory garden at Silas High School (above) is specifically designed for the autism program, with plants chosen for their textural and relaxing aromatic properties, a circuitous gravel pathway, and a flat bridge across a natural water feature. NAC and Weisman Design Group.

Playa Vista Elementary School

Wonderful College Prep Academy

Vocational gardens are a great opportunity for students to learn skills in a way that supports sensory needs. Gardens that have a work area adjacent can aid in developing vegetable gardening skills, floral arranging, and herb drying and packaging. Additionally, placing gardens between high stimulus and low stimulus spaces, allows opportunity to use gardens as a natural transition space.

Circulation Spaces

HALLWAYS

Hallways should provide a clear, calm flow to circulation between spaces. The use of indirect lighting, sound absorption, curves, transition zones and minimizing glare can reduce sensory processing issues for students promote positive interaction between students in hallways.

Machias Elementary School

Missoula International School

High traffic areas in hallways and circulation spaces should be wide enough to accommodate large flows of students during peak use. These spaces can be difficult to navigate for neurotypical students, and even more difficult for neurodiverse students. Signage and graphics that manage traffic during high flow times or high flow areas are beneficial to reducing conflict and overstimulation. *(F. Simonsen, see Footnote 6.)*

Carl Sandburg Elementary School

Transition Spaces

Transition spaces are distinct spaces that prepare students for the next activity or zone in a building that differs in stimulation level from the one they are currently in. Like hallways, transition spaces should use indirect lighting, minimize glare, and feature acoustical treatment or separation. These spaces should help students recalibrate and adjust to the next space.[7]

7 Mostafa, M., (2014). Architecture for autism: Autism aspectss[tm] in school design, *Archnet-IJAR*, Volume 8 – Issue 1, 143 – 158, DOI: 10.26687/archnet-ijar.v8i1.314

La Center Middle School

Riverview Elementary School

Classrooms

LAYOUT

Classrooms that offer the greatest degree of flexibility for different types of users have the potential to be the most inclusive classrooms. Starting at the entry, transparency allows connection and a sense of belonging for students by letting their presence be acknowledged and not hidden. Transparency also provides ease of push-in/pull-out services by providing a visual connection between the hallway and teachers. To help minimize distractions, entries should be placed opposite the main teaching wall when possible.

North Middle School

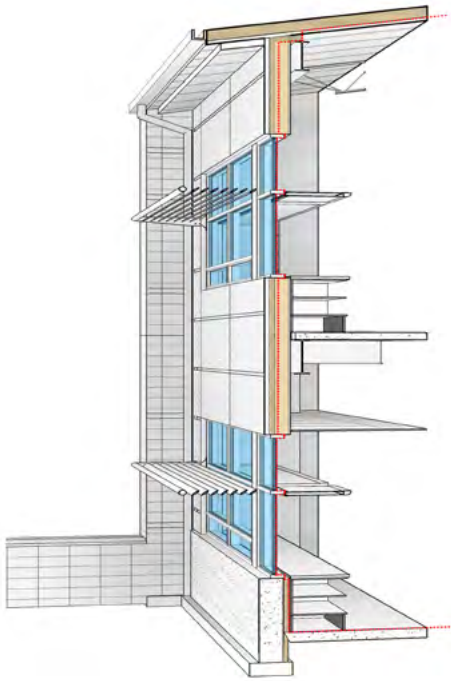
Stevens Creek Elementary School

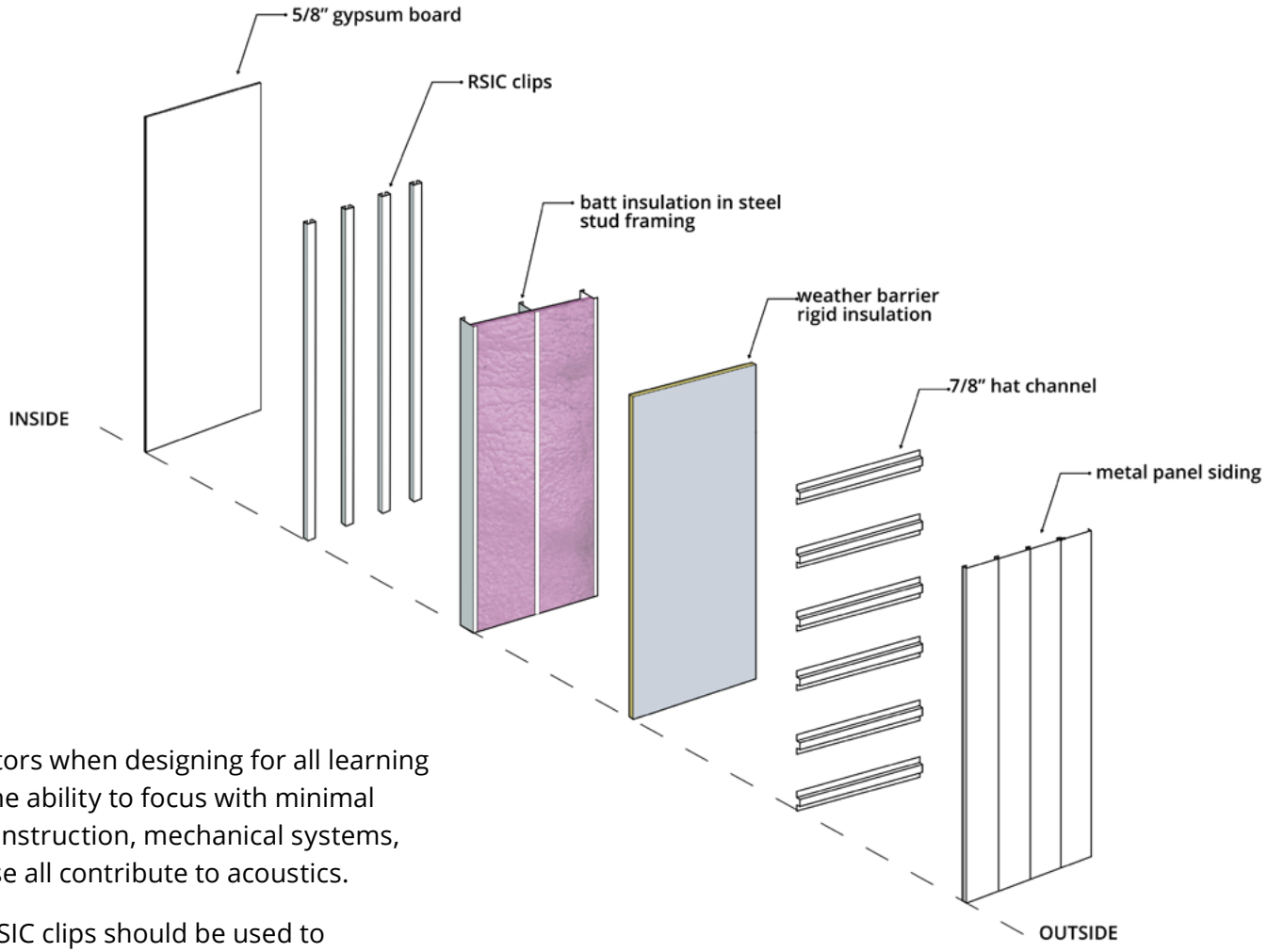
Mat-Su Day School

The layout of the classroom should focus on activity zones, using a variety of furniture types to allow for group interaction and instruction, individual focus and reflection spaces, and sensory zones. Classroom shape can also facilitate activity zones through corners, nooks, and an L-shape.

Happy Valley Elementary School, top; Silas High School, bottom

For storage and instruction, classrooms should be designed for multiple instructors. Creating space and acknowledging para-instructors in addition to the general education instructor, and providing both personal storage and instructional equipment storage, promotes ownership of the space so they can teach most effectively. Movable storage that can be placed into a classroom when needed can make classrooms agile.





ACOUSTICS

Acoustics is among the most important factors when designing for all learning disabilities. Both speech intelligibility and the ability to focus with minimal distraction is tied to good acoustics. Wall construction, mechanical systems, space adjacencies and site background noise all contribute to acoustics.

Where exterior background noise is high, RSIC clips should be used to acoustically isolate the exterior stud wall. For interior spaces, additional layers of gypsum board and double stud walls can help mitigate adjacent noise transfer. In classroom mechanical systems, mechanical boots and additional turns in the duct system can minimize mechanical noise from the unit.

Cherry Crest Elementary School

Venice High School

LIGHTING/DAYLIGHTING

In classrooms, both the electric lighting strategy as well as the daylighting strategy should be taken into consideration. Students with learning disabilities can experience a higher sensitivity to glare, and students with auditory processing issues rely on visual cues from instructors and students, so it is imperative that glare be reduced as much as possible. Electric lighting designed with both indirect and direct lights can help to soften overhead light in addition to adequate daylighting with operable shades. Adequate daylighting also helps student who depend on routine to adjust between activities based on daylight indicators.

COLOR AND VISUAL AID PLACEMENT

The use of color in classrooms and visual aid placement can both aid in focus while minimizing distraction when designed correctly. Visual aids should be limited at the teaching wall to only those required for instruction, with most visual aids being placed at the back wall or behind students.

A neutral to warm accent color placed on a side wall of a classroom can help improve focus for students who may need more stimulation while learning. It is important to understand that it might appear as though the student is distracted, when in actuality the accent wall is providing the necessary stimulation for a student while they work through a thought, idea, or problem.

Color theory is an important consideration for students with learning disabilities and neurodiversities as it differs from that of the general population. Warm neutrals, taupes, and greens are the most preferred colors and provide a positive response for most students. Students with ADHD can have issues processing the color blue and have shown a tendency to prefer warm colors.[8]

8 Gaines, K. S. & Curry, Z. D. (2011). The Inclusive Classroom: The Effects of Color on Learning and Behavior. *Journal of Family & Consumer Sciences Education*, 29(1), 46 – 57.

Dessie Evans Elementary School, top;
Summit Atlas High School, bottom

Stevens Creek Elementary School

Mount Si High School

La Center Middle School

Breakout Spaces and Escape Spaces

LOCATION AND TRANSPARENCY

Breakout spaces and escape spaces support the functions of classrooms by offering spaces that allow for more focus or different sensory input than the overall classroom. It is very important that breakout spaces and escape spaces be separate from each other however, as they provide different resources for students. Both spaces should be visible from the classroom, offer a degree of transparency for instructors and generally be acoustically separated from the classroom.

New Bethel High School

Open Spaces

The open spaces of a school, spaces like cafeterias, gym, libraries, and commons spaces, should be designed like classrooms, providing a variety of spaces that caters to a variety of students. For example, cafeterias that feature smaller scale seating areas with lower ceilings and arrangement so that the seating feels less exposed than typical cafeteria seating, allows students who may normally feel over sensitized in the cafeteria to eat alongside their peers. *(A. Osipova, see Footnote 3.)*

Proper care in ventilation design should be taken in cafeterias, gyms, and areas with strong smells to minimize unwanted sensory input in surrounding areas.[9]

When designing gyms, it is important to consider designing for different levels of sensory input and ability creating a variety of activities. For example, adding space for interactive sound play allows both blind students and those with visual processing issues to participate without depending on sight. *(A. Osipova, see Footnote 3.)*

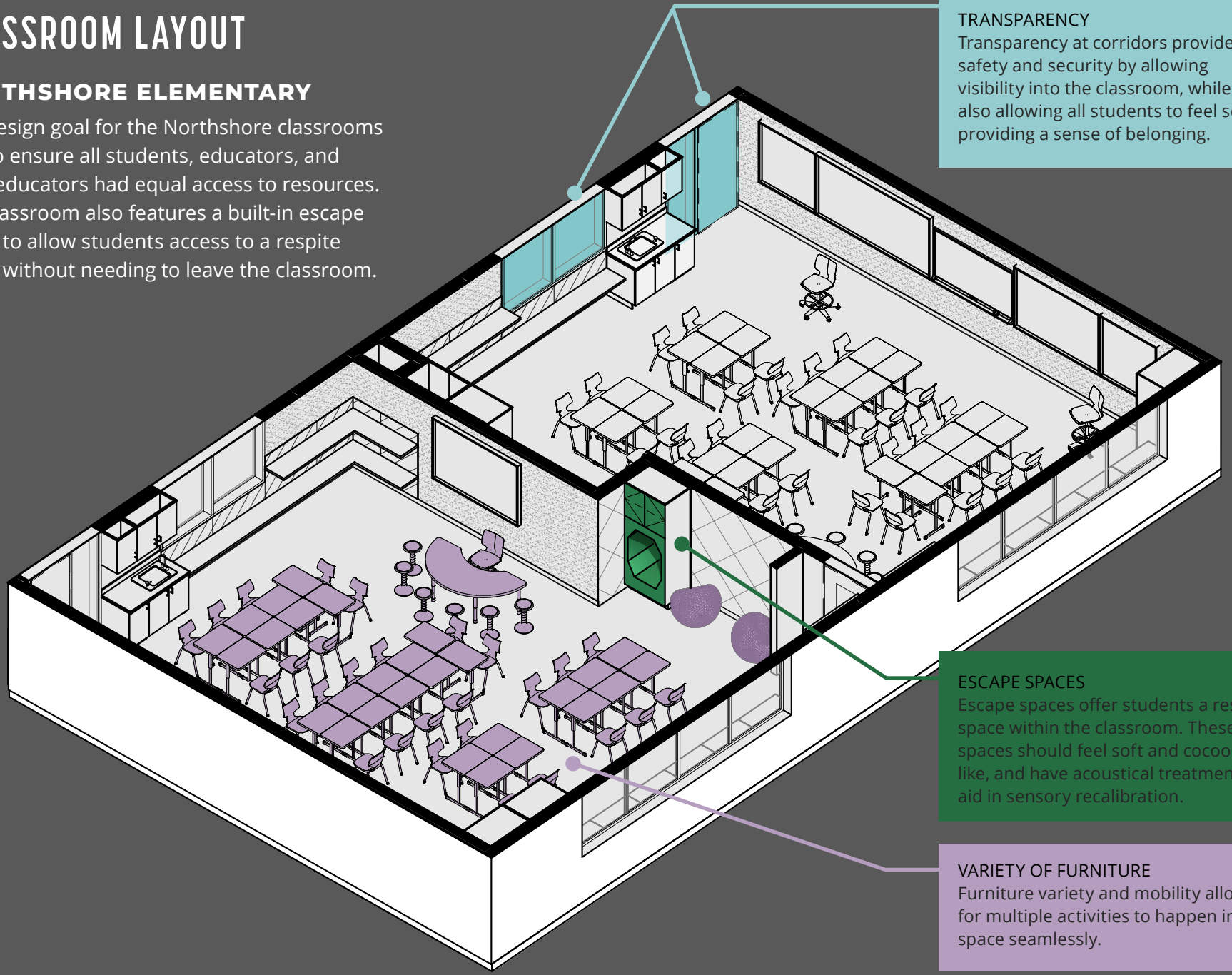
Tillicum Middle School

9 Mostafa, M., (2008). An Architecture for Autism: Concepts of Design Intervention for the Autistic User, *Archnet-IJAR,* Volume 1 – Issue 1, 189 – 211, DOI: 10.26687/archnet-ijar.v2i1.182 · Source: DOAJ

CLASSROOM LAYOUT

NORTHSHORE ELEMENTARY

The design goal for the Northshore classrooms was to ensure all students, educators, and para-educators had equal access to resources. The classroom also features a built-in escape space to allow students access to a respite space without needing to leave the classroom.



TRANSPARENCY
Transparency at corridors provides safety and security by allowing visibility into the classroom, while also allowing all students to feel seen, providing a sense of belonging.

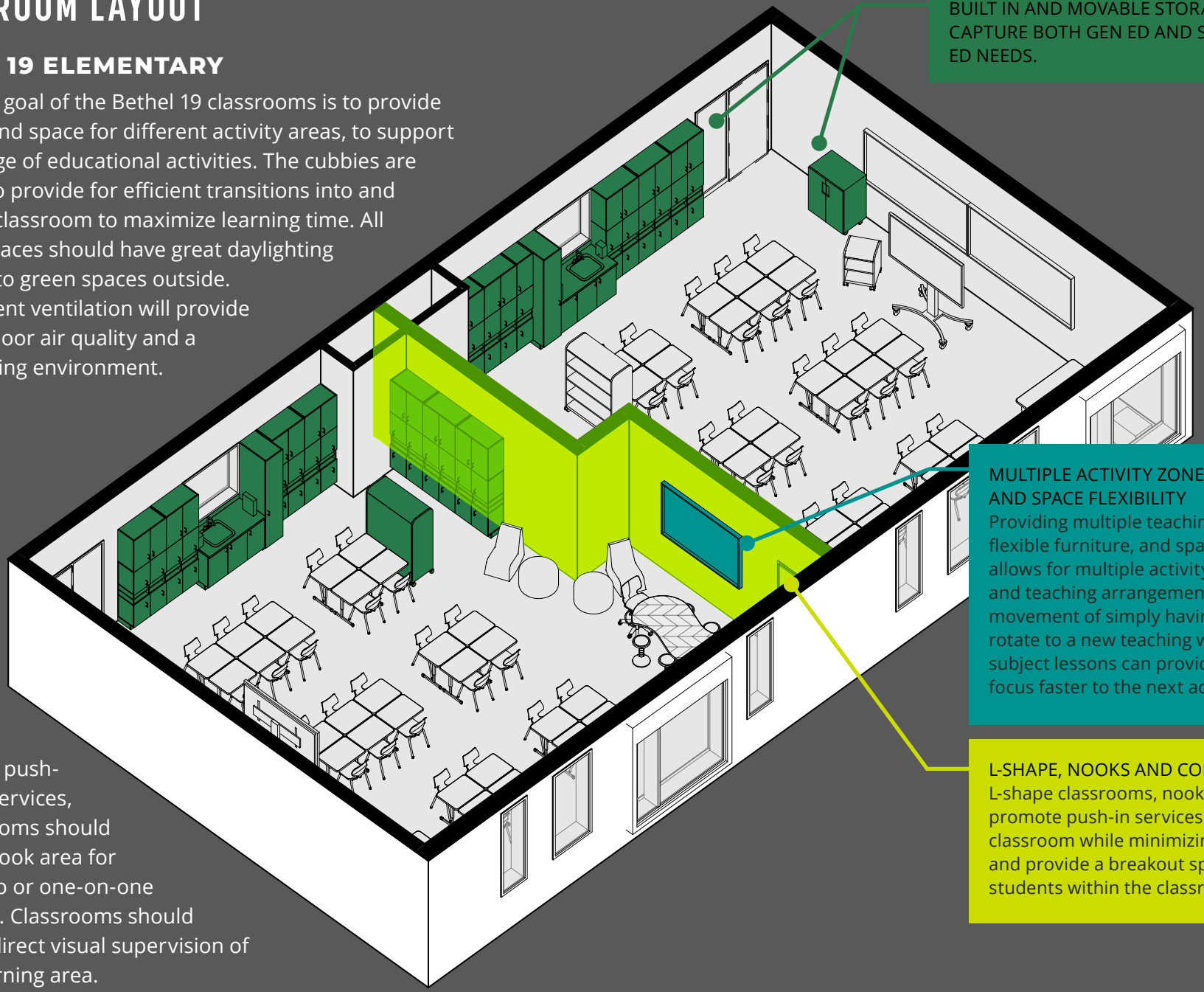
ESCAPE SPACES
Escape spaces offer students a respite space within the classroom. These spaces should feel soft and cocoon-like, and have acoustical treatment to aid in sensory recalibration.

VARIETY OF FURNITURE
Furniture variety and mobility allows for multiple activities to happen in a space seamlessly.

CLASSROOM LAYOUT

BETHEL 19 ELEMENTARY

The design goal of the Bethel 19 classrooms is to provide flexibility and space for different activity areas, to support a wide range of educational activities. The cubbies are intended to provide for efficient transitions into and out of the classroom to maximize learning time. All learning spaces should have great daylighting and views to green spaces outside. Displacement ventilation will provide healthy indoor air quality and a quiet learning environment.



BUILT IN AND MOVABLE STORAGE TO CAPTURE BOTH GEN ED AND SPECIAL ED NEEDS.

MULTIPLE ACTIVITY ZONES AND SPACE FLEXIBILITY
Providing multiple teaching walls, flexible furniture, and space flexibility allows for multiple activity zones and teaching arrangements. The movement of simply having students rotate to a new teaching wall between subject lessons can provide renewed focus faster to the next activity.

L-SHAPE, NOOKS AND CORNERS
L-shape classrooms, nooks and corners promote push-in services in the classroom while minimizing disruption, and provide a breakout space for students within the classroom.

To support push-in special services, the classrooms should include a nook area for small group or one-on-one instruction. Classrooms should also have direct visual supervision of shared learning area.

Conclusion

NAC is happy to contribute to the realization of a more humane world by sharing our knowledge and expertise in designing inclusive spaces for special education students. We hope that this guide proves helpful to all embarking on education projects, regardless of whether they are specifically focused on special education or not, as the principles of inclusion benefit everyone.

While each project presents its own unique challenges and considerations, we have addressed general principles that consistently emerge when creating these spaces. The location, student population, staff expertise, parent community, and funding model will all influence the best final solution in each case.

Our team at NAC is eager to continue the conversation and collaborate on specific school projects. If you have any comments, questions, or wish to explore further, please feel free to contact us as noted in the section: About the authors.

SOURCES

MEET OUR EXPERTS & SOURCES

Sources

About the authors

NAC is committed to a deep understanding of the environments we design, particularly from the perspective of the buildings' users. For special education, these include the students, teachers, administrators, and parents who form a supportive community.

To develop this level of understanding, we pair our architectural experience and knowledge base with current research into how users experience buildings. Interviews with multiple professors, teachers, faculty and administrators provide us with experienced perspective into contemporary classrooms and teaching pedagogy, and how various approaches to classroom inclusion are being applied. Philip Riedel represents the experienced architect behind this digital book; Ann Vacek is the interviewer and researching architect who brought together the sources on which it is based.

PHILIP **RIEDEL**

AIA, ALEP, LEED AP, PRINCIPAL
PK-12 SECTOR LEADER

Philip Riedel is a registered architect in Washington and Texas. He has dedicated his career to the thoughtful design of educational environments, including a variety of schools that serve students with special needs. He uses education research, classroom observation, faculty discussions, and building science to develop environments that promote active learning and meet the needs of the whole child. Philip is the Past President of the Association for Learning Environments, Pacific Northwest Region.

ANN **VACEK**

AIA, WELL AP, ASSOCIATE

A lifelong learner herself, Ann has a passion for educational facility design and planning. She is an extremely organized and responsive architect who is always thinking of the user's and client's needs. Ann's experience ranges from large district and campus master plans to small renovations and additions—a versatility that allows her to see a plan through at various scales and solve a multitude of design and technical challenges with attention to detail. With superb communication skills, she provides dedicated service to every project.

INTERVIEWS

Special thanks to the following experts for contributing their time and thoughts to this work:

Dr. Anna Osipova, Associate Professor, Division of Special Education & Counseling, California State University, Los Angeles

Anna actively engages with the community through her work at Cal State LA and weekend community classes held at the College of Education. Her expertise shed light on the holistic approach needed for inclusive and motivating educational spaces for students with learning disabilities. She emphasized the significance of considering "invisible disabilities" in design, moving beyond physical impairments. She stressed the need to disrupt stereotypes and design spaces that students can personalize, and the importance of creating welcoming entry spaces for neurodiverse students. In open spaces, Anna recommended incorporating interactive sound elements, magnet building play, and engaging features like child-sized doors. For hallways, she highlighted the importance of sound absorption for sensory and language processing issues. Anna urged designers to embrace kids' culture and interests to create a captivating school environment.

Jamee Zipkoff, Assistant Principal of Special Education
Los Angeles Unified School District

Jamee offered crucial insights on establishing supportive spaces for students with diverse needs. She stressed the importance of inclusive entry points, avoiding sensory overload, and ensuring drop-off spaces are accessible and spacious. At outdoor spaces, she emphasized the need for flat and cool surfaces, accommodating associated disorders students may have. Jamee advocated for gender-inclusive individual restrooms, promoting comfort and parity for special and general education students.

Inclusive classroom suggestions included nook spaces for push-in services, multiple teaching walls for smooth lesson transitions, natural light, and ample whiteboard room. Enclosed areas should feature curved walls, noise-masking elements for sensory concerns, and wheelchair-appropriate widths. She underscored the importance of adequate space for both teachers and para-educators, along with room for occupational therapy equipment and parent observation.

Dr. Brian Lowney, Assistant Superintendent of Secondary Schools
Bethel School District, Bethel, Washington

As an experienced educator with over two decades in teaching, coaching and administration, Brian emphasized the importance of de-escalation training over restraining students and avoiding segregating special education students. His insights emphasize the importance of inclusive spaces that promote belonging and dignity for all students, regardless of their individual needs or abilities.

Brian proposed a reflection exercise to challenge biases and historical perceptions associated with special education spaces. He highlighted visibility into spaces, integrating push-in services into classrooms, and providing equal entrances for all students. Regarding classroom design, he recommended incorporating calming sensory spaces and nooks within general classrooms, promoting inclusivity rather than isolating special education students. He shared examples of effective classroom spaces, advocating for flexible furniture and fixtures to accommodate diverse needs.

Flint Simonsen, Associate Professor, Special Education and Applied Behavioral Analysis, Whitworth University, Spokane, Washington

Flint, a PBIS (Positive Behavioral Intervention and Support) expert, provided insights for designing inclusive and flexible educational environments that benefit all students and foster diverse collaboration. He emphasized considering spaces temporally, analyzing traffic flows, and identifying potential high traffic zones that could cause overstimulation or unwanted behavior. He showcased schools that addressed these issues through teacher engagement and innovative design. He recommended creating student respite areas along travel routes and aiding students with dual disabilities in navigation.

Flint proposed interviewing teachers about their spaces, routines, barriers, and desired student collaboration. Examining routines like teacher collaboration and respite could pinpoint flexibility needs. He acknowledged potential challenges, especially for visually impaired students who might depend on the predictability of a space and emphasized balancing changing space needs while minimizing risk.

Annotated Bibliography

Gaines, K. S. & Curry, Z. D. (2011). The Inclusive Classroom: The Effects of Color on Learning and Behavior. *Journal of Family & Consumer Sciences Education,* 29(1), 46 – 57.

This article explores the impact of color on student behavior and learning in the inclusive classroom environment. It reviews existing literature and empirical evidence related to color use for students of all abilities, focusing on three main areas: the inclusive classroom for students with disabilities, color theory, and physiological and psychological aspects of color. The findings emphasize the importance of functional color applications in designing effective learning spaces, particularly for students with special needs. The study indicates that color influences physiological reactions and emotions, affecting mood and attention. It also discusses gender differences in color preferences and their effects on learning. The article provides practical recommendations for incorporating color in classroom design, aiming to create balanced and supportive learning environments.

Mostafa, M., (2008). An Architecture for Autism: Concepts of Design Intervention for the Autistic User. *Archnet-IJAR,* Volume 1 – Issue 1, 189 – 211, DOI: 10.26687/archnet-ijar.v2i1.182 · Source: DOAJ

This study addresses the lack of architectural design guidelines for individuals with autism, a prevalent developmental disorder. Conducted in two phases, it first collected insights from caregivers through a questionnaire to identify key architectural elements impacting autistic behavior. Acoustics and spatial

sequencing emerged as significant factors. In the second phase, interventions targeting these aspects were implemented in a school environment, resulting in improved attention span and reduced response time among autistic individuals. The study proposes a "sensory design matrix" linking architectural elements to sensory issues, offering guidelines for creating accommodating environments. Recommendations encompass noise treatment, acoustically modified rooms, "escape spaces," and routine-based designs. The study emphasizes enhancing independence and advocates further research for wider application.

Mostafa, M., (2014). Architecture for autism: Autism aspectss™ in school design. *Archnet-IJAR*, Volume 8 – Issue 1, 143 – 158, DOI: 10.26687/archnet-ijar.v8i1.314

This paper delves into the intersection of architecture and autism, concentrating on designing environments suitable for individuals with autism. Architects often utilize sensory elements to convey functionality, but such considerations have generally been overlooked in architectural codes. The absence of standardized guidelines is attributed to the diverse challenges within the autism spectrum. The debate surrounding the impact of sensory environments on autistic behavior is explored, with one perspective advocating for immersive environments to encourage adaptation, while another supports sensory design theory. This theory proposes altering sensory environments to promote positive behavior and has undergone empirical testing, demonstrating potential benefits for autistic individuals. The paper also introduces a case study illustrating Sensory Design Theory's application in the design of an educational center.

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