DESIGNING LEARNING ENVIRONMENTS

A learner-centered design process from the Learning Environments for Tomorrow (LEFT) Institute

Appreciations

Founded in 2007 at the Harvard Graduate School of Design and the Harvard Graduate School of Education, the Learning Environments for Tomorrow (LEFT) Institute explores how designers create and sustain powerful pedagogical places for today and tomorrow's learners. We convene educational researchers, architects, planners and designers from around the world to better understand the science and art of effective learning design.   Our mission is to improve how we create spaces, objects and materials that support human development at all ages. In turn, LEFT creates resources and programs for those designing, planning and building places for learning, such as schools, libraries, childcare centers, playgrounds, museums, and many others.

The ideas within these pages have emerged from years of conversations and gatherings with over a hundred interdisciplinary teams designing or redesigning learning environments. Included in our community are dozens of gifted LEFT faculty from around the world, ranging from award-winning architects, innovative designers, community leaders and educational researchers. Many thanks to all those, LEFT faculty and participants, who have shaped and developed these concepts and practices. Specific thanks to LEFT faculty: Victoria Bergsagel, Jason Boone, Sara Carrier, Dan Coleman, Katie Ertel, Betsy Grady, Danish Kurani, Fran Locker, Paula Marra, Patricia Nobre, Grace O'Shea, Nick Salmon, Gabriela Scarritt, Sarah Shifrin, Lisa Yokana, and Jane Zhang. Many thanks to the students and teaching assistants in the graduate course I teach, Designing Learning Places, who helped me think more about these ideas: Daniel Noh, Isabella Capeci, Mari Longmire, Nam Nguyen, Staci Jasin, and Maureen Isimbi Kalimba

Finally, I am honored to learn from and with my two LEFT co-Chairs, David Stephen and Ela Ben-Ur. Their leadership and design wisdom continue enrich my thinking and inform LEFT. Each were pivotal in developing the practices you will encounter within.

On behalf of LEFT, we hope you find ideas that can inspire, tools that may guide, and partners to push your designs forward.

Dr. Daniel Gray Wilson

Faculty Chair, *Learning Environments for Tomorrow Institute*
Lecturer, *Harvard Graduate School of Education*
Senior Researcher, *Project Zero*

The LEFT Approach

How can we better design learning environments to best support the learners of today and tomorrow? What effective practices can we use to create powerful learning places for the communities we serve? These questions drive the inquiry at the Learning Environments for Tomorrow (LEFT) Institute. Drawing on the wisdom of experienced architects, innovative designers, and learning researchers from around the globe, this document shares five key practices that underly the creation of powerful learning environments. Their experience and our approach at LEFT rests on several fundamental assumptions about what learning is and where learning happens, such as:

Learning is complex & active.

How and what we learn emerges in often unpredictable ways as we interact with ideas, environments and people. Learning is something learners do, not something that is done to them.

Learning environments are ecologies.

From classrooms and playgrounds to schools and libraries, learning happens in *environments*. These are ecologies of spaces with objects and materials that interact and mediate the learning. When designing a particular area we need to consider the role it plays within the larger ecology that learners experience.

Learning environments are big & small.

While campuses, school buildings and classrooms get a lot of attention, small settings are equally vital to a thriving learning ecology. A nook, break out area, or a lobby entrance are each micro-environments rich with design possibilities for support learning.

Design is iterative & learner centered.

Visions and creations emerge through cycles of ideation, prototyping and testing. Designs should speak to learner needs and they should be involved throughout the process.
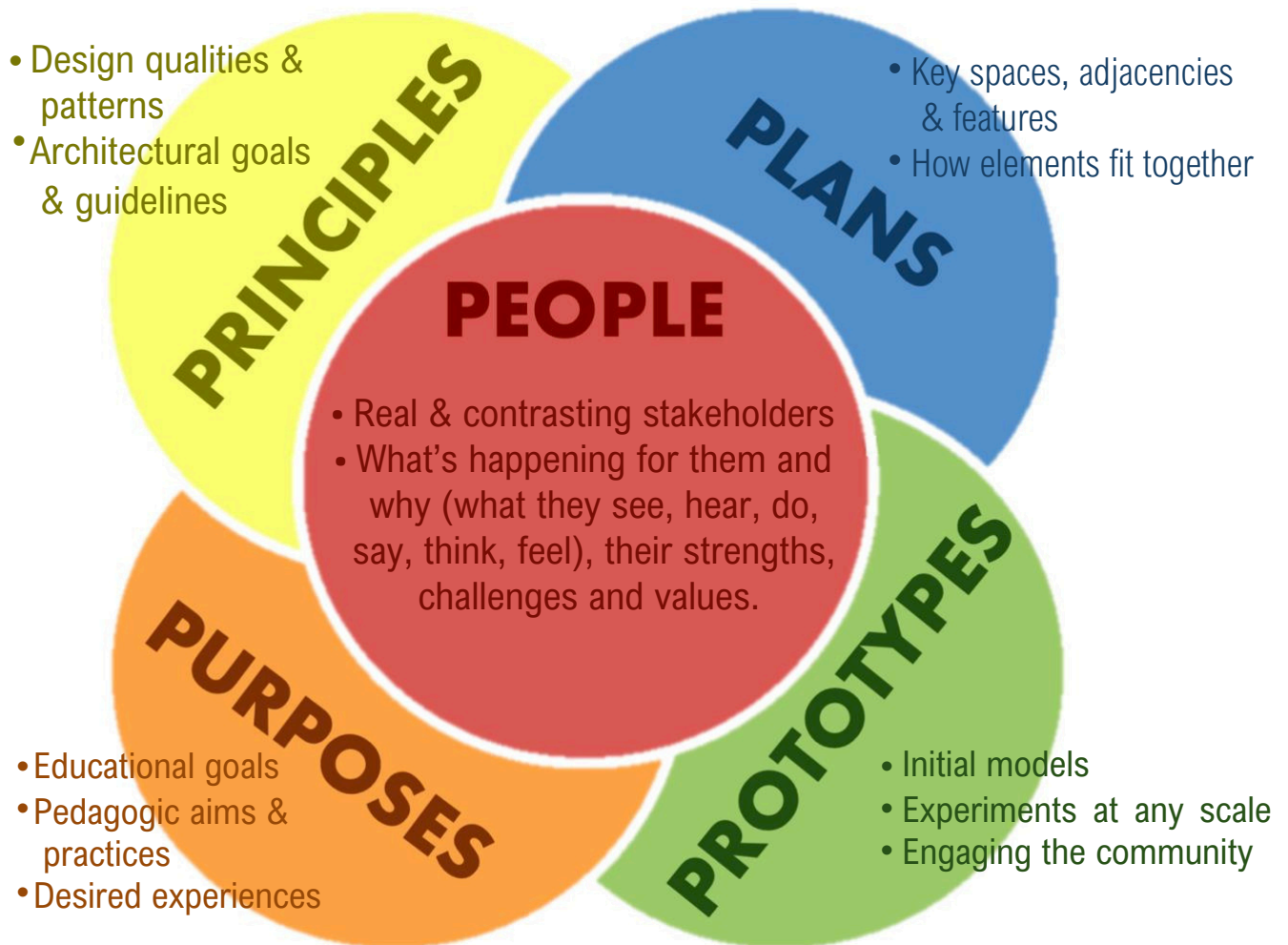
Design aligns pedagogic purposes with place.

The spaces, objects and elements we create should directly support the learning goals we have for our students and the practices that support them.

At the center of the LEFT approach is designing with and for real **PEOPLE,** followed by connecting to clear pedagogical **PURPOSES,** developing guiding design **PRINCIPLES,** generating spatial **PLANS** and continually creating, testing and refining **PROTOTYPES**.

These five practices are interrelated and the approach is not linear: you will regularly toggle between different practices as you design. We do strongly suggest you begin by initially exploring your people, purposes and guiding principles: What are they experiencing? What are the goals? What are the qualities? Once ideas on these have emerged, then we suggest iteratively testing these with emerging plans and prototypes: what might a place that supports these look like? Expect ideas to shift and sharpen as you cycle through several rounds of thinking, exploring, making and experimenting.

PRINCIPLES
- Design qualities & patterns
- Architectural goals & guidelines

PLANS
- Key spaces, adjacencies & features
- How elements fit together

PEOPLE
- Real & contrasting stakeholders
- What's happening for them and why (what they see, hear, do, say, think, feel), their strengths, challenges and values.

PURPOSES
- Educational goals
- Pedagogic aims & practices
- Desired experiences

PROTOTYPES
- Initial models
- Experiments at any scale
- Engaging the community

PEOPLE

At the heart of good design is understanding who the people are, how they experience their learning, and how we might improve it.

Learning spaces create a sense of belonging and community for the people who learn in them. For students, the feeling of being welcomed and known is crucial for learning.   But teachers, too, are learners. They will build knowledge and skills every day they create, experiment and develop their pedagogical practice. Administrators and staff also learn as they encounter operational problems and solve school challenges. And families and community members may learn ideas as they form connections with the school. When designing learning spaces, we must first consider the constellation of people who the spaces will serve. At the heart of good design is understanding who the people are, how they experience their learning, and how we might improve it.

Effective learning spaces address the needs of learners. Perhaps teachers need more storage space for students' projects. Maybe students need a better way to find and access tools. Or parents feel unwelcomed in the building. Effective design is grounded in empathetically understanding their needs, problems, and goals. A design should never create more obstacles or barriers to learning for learners. This is avoided when we put people at the center by designing for and with them.

Of course, there might be many reasons driving a design that aren't about the learners' experience. A school may need to downsize due to decreased funding or update antiquated facilities to meet new building codes. While these are formidable forces, we must never lose focus on the goal of designing learning spaces: to create the optimal learning conditions for those in them.

Learner-centered design can take many shapes and forms. We might talk with students to understand their current challenges. We could create workshops with teachers or assemble focus groups of parents to better understand their needs. Interviews, group discussions, and observations are important windows into learners' experiences. Understanding their experiences of learning, the good and the bad, offers insights into how a design might improve it for them.

Tips

Whatever approach we use, here are some important tips to for putting learners at the center:

- **Create vivid and contrasting profiles.** These could be tangible snapshots of real students, teachers, staff or community members we have interviewed. Or they could be posters inspired by real people we know (e.g. a struggling student, tired teacher, nostalgic grandpa, aspiring administrator, etc.) that we display and revisit.

- **Gather, distill and express their experiences without judgement.** Collect what is happening for them in schools and why – when they are learning, what do they see, hear, do, say, think, feel, etc.? What are their goals, challenges, values and needs? Stay close to their words, not ours. This will allow us explore ways a design might best support the learners.

- **Design with and for them through the process.** Involving learners directly and authentically in the design process is ideal, but not always practical. That's where these profiles help us. They allow us to keep the voices of people in the forefront as we create ideas and prototypes. If prominently displayed, we can quickly test ideas against the feelings, needs, and goals of the learners. Designing with and for them means continually incorporating their experiences into every step to ensure that a design will support learners and learning.

Tools

Aside from individual/group interviews and observations, there are several practical tools we can use:
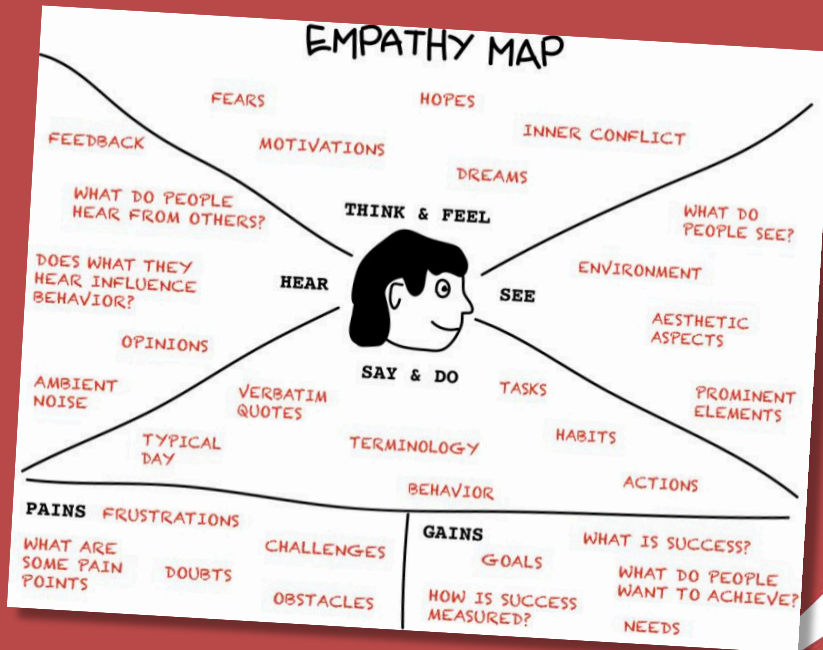
Actor Maps

Sometimes referred to as stakeholder maps, these depict the various types of key people that will be interacting as learners in the spaces – students, teachers, administrative staff, operational employees, parents/caregivers, etc. It offers us a holistic view of the social system the design will serve.

6
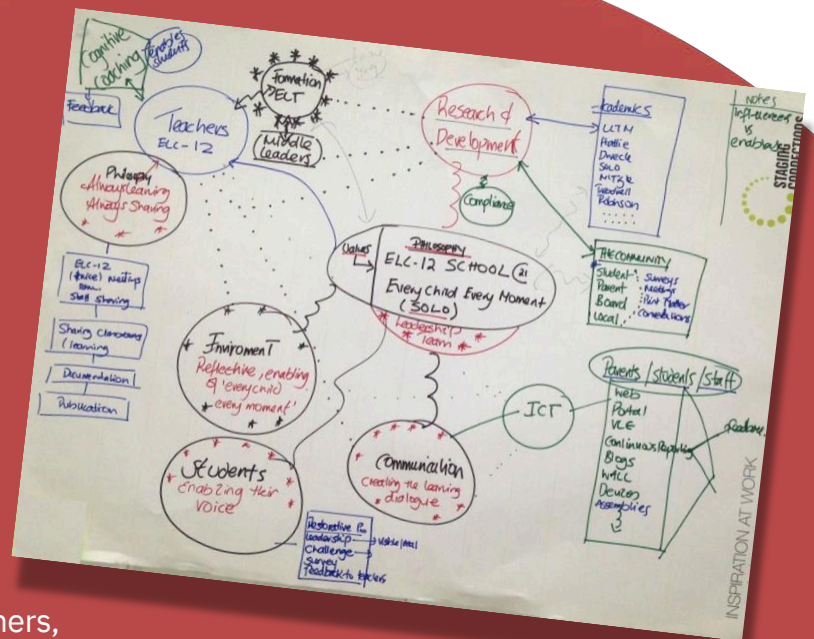
Empathy Maps

A systematic way to visually organize what we learn about a learners' experiences: what do they think, feel, say, do, see? What challenges or pains do they encounter? What values do they bring to, and what goals do they have for their learning?

EMPATHY MAP

FEARS HOPES
FEEDBACK MOTIVATIONS INNER CONFLICT
DREAMS
WHAT DO PEOPLE HEAR FROM OTHERS? THINK & FEEL WHAT DO PEOPLE SEE?
DOES WHAT THEY HEAR INFLUENCE BEHAVIOR? HEAR SEE ENVIRONMENT
OPINIONS AESTHETIC ASPECTS
AMBIENT NOISE SAY & DO TASKS PROMINENT ELEMENTS
VERBATIM QUOTES
TYPICAL DAY TERMINOLOGY HABITS
BEHAVIOR ACTIONS
PAINS FRUSTRATIONS
WHAT ARE SOME PAIN POINTS CHALLENGES GAINS WHAT IS SUCCESS?
DOUBTS GOALS WHAT DO PEOPLE WANT TO ACHIEVE?
OBSTACLES HOW IS SUCCESS MEASURED? NEEDS

Personas

Evocative and different profiles that are tangible -- could be physical cards, documents, or visual posters that depict our people. They have images of the person, key information about them and their experiences, ideally based on what we learn from other tools like empathy maps.


Aisha (14)
Hey, my name is Aisha and my favorite space at school is the library, especially when I'm with my technology club friends. I enjoy spending time there, because it's quiet and peaceful. This really helps me concentrate on whatever I'm working on. My favorite assignments are usually reading and writing assignments. I love getting lost in a good book and expressing myself through writing. However, I find math and science classes to be boring and challenging. I struggle to stay engaged in these subjects, even though I know they're important. The place where I feel least comfortable is in physical education class. I struggle with sports and physical activities.

Journey Maps

Represent a person's experiences over time – perhaps during a class, over a day, or spanning a week. They show the highs and lows of key moments as they unfold for our people. It offers us opportunities to consider real sequences of how, when, and where they experiences unfold for them.

Jen's Daily Journey Map

Sarah's Weekend Journey Map
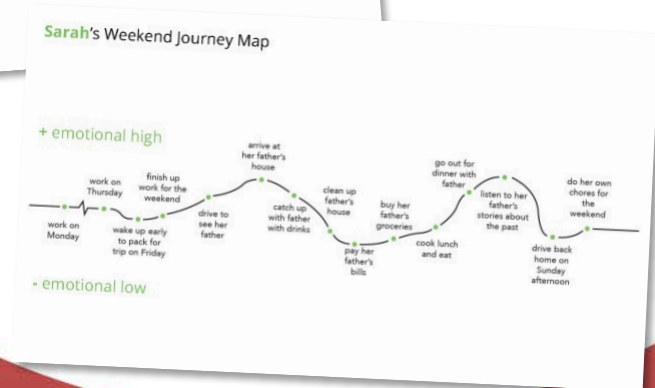
Once we have details of our people's experiences, we can look for across them for themes. Affinity maps visually describe the patterns across our learners' needs, values and goals. They offer us insights into collectively shared needs and common challenges that can drive an effective design for our learners.
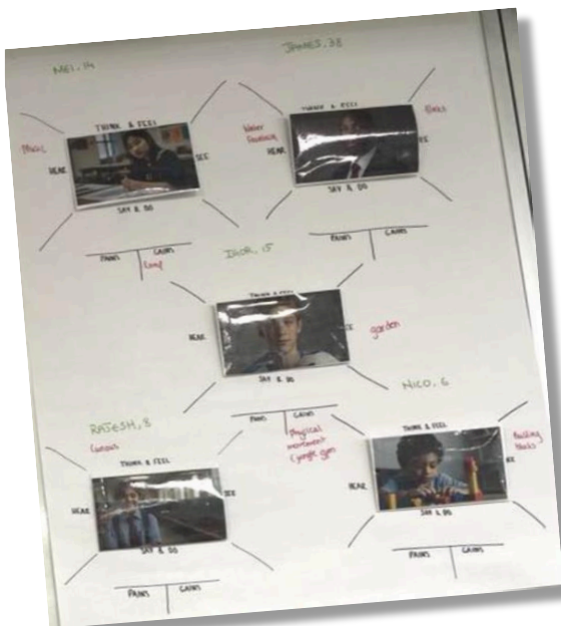
Affinity Grouping

PEOPLE *notes*

Who are the learners? What are their needs and experiences?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Next Steps:

Purposes are the goals and types of learning that will matter most for the lives our learners will likely lead.

PURPOSES

in spaces are decisions about layout, furniture, and objects that explicitly favor some goals over others. When desired goals are unclear, or if goals change, it is no surprise that spaces are often experienced as ineffective and as obstacles.

Designers, like navigators, need a direction and bearings to realize their destination. Rather than become lost in the vast sky of possibilities, they navigate by finding a clear "north star" or a visible constellation. Likewise, designing learning spaces requires a clear and manageable set of goals to guide our way. Without clarity of learning we want to support our spaces will be experientially empty. Conversely, if we try to design for too many goals, learning spaces will be unfocused. We need to find a small number of guiding purposes that resonate with our learners and reflect our hopes for them is.

Purposes can come from many sources. They may emerge from school missions, district-level student profiles, state-level standards or research-based frameworks. They may connect to local issues learners will experience our communities, such as employment, environmental sustainability, or civic participation. Whatever their source, clear purposes articulate the learning that will matter most for the lives our learners will likely lead.

Effective design comes from clear intentions. Designing learning spaces is no different – the process requires articulating the quality and types of learning we strive to support. Perhaps we desire students to be complex thinkers, empathetic collaborators, or courageously curious. Maybe we want experiences of interdisciplinarity, authentic community-based projects, or artistic performances. These are *purposes* that describe our hopes, aims, and dreams for the learning in the spaces we design. Whether the learning spaces are early childhood stations in classrooms, middle- school common areas, or high-school media centers, what makes them effective is how intentionally they support our learning purpose.

Architects and designers have long known that successful spaces need to be built with clear purposes in mind. Embedded

Tips

Crafting a handful of clear, focused and meaningful purposes that guide a design is not an easy task. To aid your thinking, here are a few tips to keep in mind:

- **Dream and discuss desired experiences.** Think about what we want learners to feel and experience in our learning spaces – perhaps it's joy, curiosity, empowerment, belonging, or other states. Teachers and students should be critical partners in this discussion; they will be the ones learning and living in the environments we create.

- **Consider your curricula.** Scan the current courses, topics and goals that seem more future oriented and aligned to your school's vision. Similarly, look to other standards or frameworks that guide your school. Look for patterns in the types of learning they support, the competencies they develop. They may offer clues for purposes you can adaptively craft.

- **Define your pedagogical essence.** Pause to reflect on the pedagogical programs and practices that are (or will be) the *essence* of your school. Perhaps it is project-based learning, portfolio assessments, team-based problem-solving, interdisciplinary capstones or community-based internships. Schools often have many of these happening simultaneously. However, pick one or a few that can catalyze the desired experiences we aim to support.

Tools

EASEL LAB

There are many inspirational frameworks we can u se to consider purposes. The EASEL Lab at Harvard University has gathered and organized dozens of noteworthy frameworks from around the world –21st Century Skills, IB Learner Profile, UNICEF Life Skills, etc. They offer tools to understand, analyze and compare these contemporary frameworks as we consider our learning purposes.
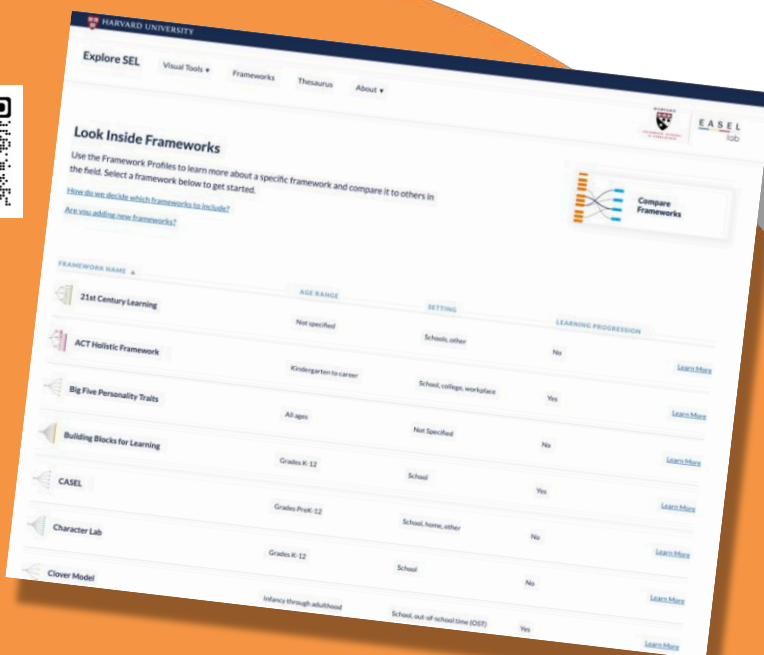
An exercise that surfaces guiding purposes by asking us to think of our students twenty years from now and develop answers to questions such as:

- What kinds of people do we hope they will be?

- What do we hope they will do in the world?

- What do we hope they will understand?

- How do we hope they will think?

FUTURING

**FRAMES &
WINDOWS**

It aims to connect potential purposes (frames) with concrete examples of what it concretely looks like (windows). Developed by the Leading Learning that Matters Project, this tool tests and sharpens purposes by grounding them to specific, concrete moments

PICTURE OF A GRADUATE

What competencies is your school hoping to develop? Many schools and districts create a "picture of a graduate" that spells out the key knowledge, skills and values they hope students will develop during the time at school. These are purposes and are displayed in ways that are easily recognizable and understandable to students. They also help teachers and administrators to develop and sharpen the school's programming and learning experiences.

DA VINCI Connect

Our HS Habits of Heart and Mind

Quality — reflecting on the quality of my work, decisions and interactions; revising so the outcome represents strong, accurate and beautiful work

Equity — showing fairness in the way people are treated by understanding their experiences, celebrating diversity and advocating for fair treatment for all

Empathy — understanding another person's experiences, perspective, and emotions

Collaboration — working effectively with others, providing support, and accepting that someone else may have an idea that better serves the project or group

Agency — recognizing obstacles and leveraging resources to navigate challenges in one's life in order to create positive change

Accountability — consistently considering directions, requirements and deadlines; accepting responsibility for results

DA VINCI RISE HIGH

Graduate Profile

Effective Communicator:
- Speaks and writes clearly
- Listens actively
- Resolves conflict peacefully
- Adapts to the needs of the audience
- Engages with print and digital media
- Develops a responsible digital footprint

Tactful Collaborator:
- Seeks diverse team members
- Listens and acts with empathy
- Owns their role
- Values individual contributions
- Gives and receives feedback
- Owns team outcomes

Skilled Problem-Solver:
- Analyzes and evaluates academic information, points of view and industry process.
- Synthesizes conclusions and justifies evidence
- Questions and applies critical reasoning to real world situations.
- Applies acquired knowledge to the design, creation of and revision of projects

Critical Thinker:
- Asks questions
- Uses relevant and reliable evidence to support claims
- Designs and implements solutions to complex problems

Empowered Citizen:
- Shows empathy and respect
- Understands the power of their own identity
- Seeks cultural understanding
- Makes safe, legal and ethical choices
- Demonstrates civic responsibility
- Participates in the democratic process
- Impacts the community responsibly

PURPOSES *notes*

What are the guiding educational aims, experiences and programs?

_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____
_____   _____

Next Steps:

PRINCIPLES

Principles are the design qualities and architectural characteristics of the spaces, objects and materials that support our learning goals.

Research suggests several qualities of environments that support learning. Spaces should have fresh air, ample natural light, and comfortable temperatures. Furniture and layouts should permit flexibility, movement and circulation.Tools and materials need to be accessible. Spaces should offer visible connections to others and perspectives to the outdoors.These qualities –comfortable, well-lit, flexible, accessible, connected, visible, etc. –are principles. They are adjectives we use to describe the qualities and characteristics of the spaces, objects, materials and other elements within them. And they help us to identify key priorities for design that can be referenced through all stages of our process to ensure we stay true to our goals.

There are many principles that can guide our design of learning spaces. Perhaps we want openness in communal lobby or intimacy in study nooks. We might desire moveable walls or reconfigurable furniture to promote student and teacher choice. Or we wish for our spaces to be technologically rich and sustainable in their materials and operations. Principles are descriptive, expressing material attributes within the environments we are creating.

Principles come from many sources. States may have guidelines for sustainability or safety. Architects and designers may see ways to introduce novel shapes, colors and forms to spark curiosity. The learners in the spaces – the students, teachers, staff, etc. – may desire more comfortable chairs or quiet areas to focus. Wherever they come from, principles describe and guide the material and aesthetic choices we make in the built environment.

The challenge is to ensure these principles support our learning purposes. In other words, good principles create *affordances* for the experiences we hope will happen. For example, if we want students to feel more empowered and engaged in their learning, flexible furniture that allows movement supports their freedom and choice. If we want students to feel socially connected, rooms should offer visibility and openness for learners see one another and interact. Articulating and aligning design principles to the experiences we seek to support is often a vital but often overlooked step in developing potent learning environments.

When developing guiding principles here are a few suggestion and key ideas to keep in mind:

- **Consider catalytic qualities.** Look for qualities that can cut across spaces, materials and other elements. For instance, connected describe how we position furniture, select culturally meaningful materials, create perspectives to the outdoors, or organize spaces with other spaces. Avoid focusing on qualities that are limited to small applications to the design.

- **Connect qualities to learning affordances.** Principles are only powerful if they support our learning purposes. Be sure that the qualities we select create clear opportunities for developing them. At the very least, the principles we use should not undermine our purposes.

- **Refer to guidelines.** Be sure to review any local, state or federal principles we need to use. The aims and rules of construction projects spell out many qualities we may need to include, such as qualities of daylighting, airflow, acoustics, safety, and circulation. Look for ways to connect at least some of these requirements to other more learning-focused principles.

Tools

ABC'S of LEARNING PLACES

Research at the Designing Learning Places Lab has identified a dozen principles of places that support learning purposes of agency, belonging, curiosity and satisfaction (ABC'S). They include qualities such as open, varied, visible, communal, contrasting, multi-sensorial, comfort, playful and hopeful.
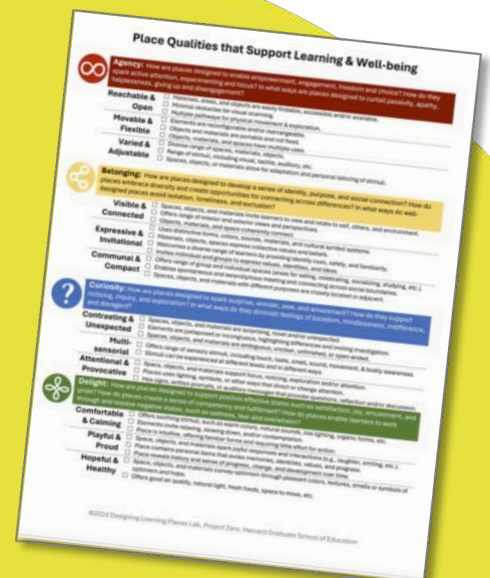
READ THE ROOM

Visit places that feel interesting or aligned to your learning purposes. They could be in your e xisting school or in provocative third spaces, such as museums, public libraries, local playgrounds, or a community garden. In groups, "read the room" by looking closely and noticing the qualities of its space, furniture and other material elements. Name these qualities and discuss how these, or other qualities, currently support the learning purpose. Consider how these or other qualities can be adapted to suit your design.

Designer Rosan Bosch uses several spatial archetypes to guide designing learning environments, such as mountain tops that offer views or caves that provide quiet and focus. These archetypes are forms of principles that can be used to describe the qualities of the spaces and their potential uses.

SPATIAL ARCHETYPES

MOUNTAIN TOP

CAVE

CAMPFIRE

WATERING HOLE

HANDS-ON

MOVEMENT

Fielding International archite cture firm has compiled dozens of design patterns that describe various qualities of spaces and their elements, including calming retreats, transparency, to natural materials. You can search for patterns using descriptive key words like autonomy, curiosity, belonging, nature, joy or safety.

DESIGN PATTERNS

MORE DESIGN PATTERNS

Architect and educational planner David Stephen has created multiple examples of design patterns for specific age levels -- elementary, k-8, and high school.
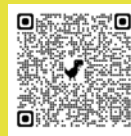
k-8

Elementary

High School

PRINCIPLES *notes*

What are the architectural qualities of spaces, objects and materials?

Next Steps:

PLANS

Plans are the drawings, diagrams and other visual illustrations that show the arrangement of spaces and objects in ways that support our purposes and principles.

A critical step in designing is creating visual possibilities of what the spaces and their elements might look like and how they fit together. To convey an idea of a new type of classroom chair, we might quickly sketch it on the back of a napkin. We might convey how students will move through a library by drawing a floor plan, noting its entrance and where books stacks or breakout study spaces could be located. These are all *plans* – drawings, diagrams and other visual illustrations that show the spaces, objects and how they might be arranged.

Plans an obvious but often under-developed part of designing learning environments. Because plans are not only for architects. Although technical drafting is one of their areas of expertise, there are many types of plans that teachers, students and others can do. Students might draw ideas for better

desks. Teachers can diagram how different areas of their classrooms are used. Community members can help plot where native trees might be planted around a playground. Architects and designers can work alongside these efforts, offering more sophisticated visuals such as computer renderings that offer more detail. But plans can be simple, too, allowing others to participate. They give us the visual artifacts we need, illustrating how our environment might work for our people. They offer tangible possibilities of how our purposes and principles come alive. They communicate how the spaces and its elements will be arranged for and experienced by our learners.

Plans are much, much more than just finalized blueprints. Though blueprints are a formal type of formal plan, they emerge from lots of other informal sketches and diagrams. If we begin or focus too early on blueprints of a room or building, we risk skipping steps that could create a more effective design. Moreover, we miss critical opportunities to engage our learners in sharing and co-developing ideas. Plans are the ways we collectively communicate spatial possibilities. They are loose at first and slowly take firmer and more formal shape with time and feedback.

When we create plans for our learning environments, keep in mind these important lessons:

- **Start loose.** Perfection is the enemy of innovative design. Ensure that early on illustrations are provisional drafts and revisable sketches. Don't hover on too much details too early. Hold early plans as previous, they will and should evolve in interesting and unpredictable ways.

- **Focus on key spaces and features.** Plans convey what's important, but can never communicate everything about an environment. Select the areas that will be key to your purposes, principles and people. Classrooms are a natural key space for learning. But so are libraries, playgrounds and workspaces. Focus on features – windows, pathways, common areas –that show the essence of your ideas in action.

- **Show arrangements and adjacencies.** Plans allow us to see how elements might fit together, particularly important in large design projects. Show how the key spaces and objects relate. This offers us a view into how learners may experience them as they move through their day. Draw on design patterns, such as neighborhoods or commons areas, that offer hubs of areas for the learning we are aiming to support.

Tools

Designers use many tools to visually communicate the relationships among spaces and objects. Here are some key tools that educators, students and other community actors can develop and put in their toolboxes:


BUBBLE DIAGRAMS
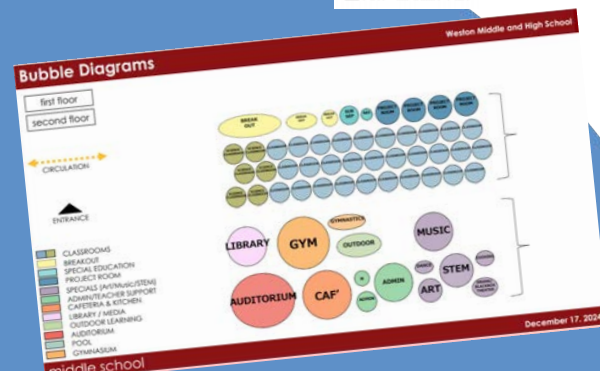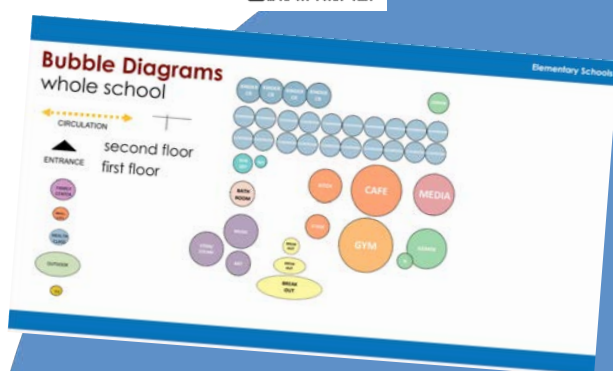
Creating circles of functional areas and they connect gives us a quick visual sense of potential layouts of spaces. Bubble sizes suggest importance, but not what it might actually look. Use lines to suggest flow and connection or colors to show commonalities or differences. This a critical tool used early in the design process to sketch potential areas and how they might relate. Clink on the QR codes for tools by David Stephen to create your own.

FLOOR PLANS

Sketch birds-eye views of areas, labeling important elements. Don't worry about straight lines, focus on showing key parts relate and are arranged. Topographical illustrations take practice, so dedicate some time to build this muscle: try drawing one of the space you're in now. Developing this skill in learners enables them to co-participate in the design process.
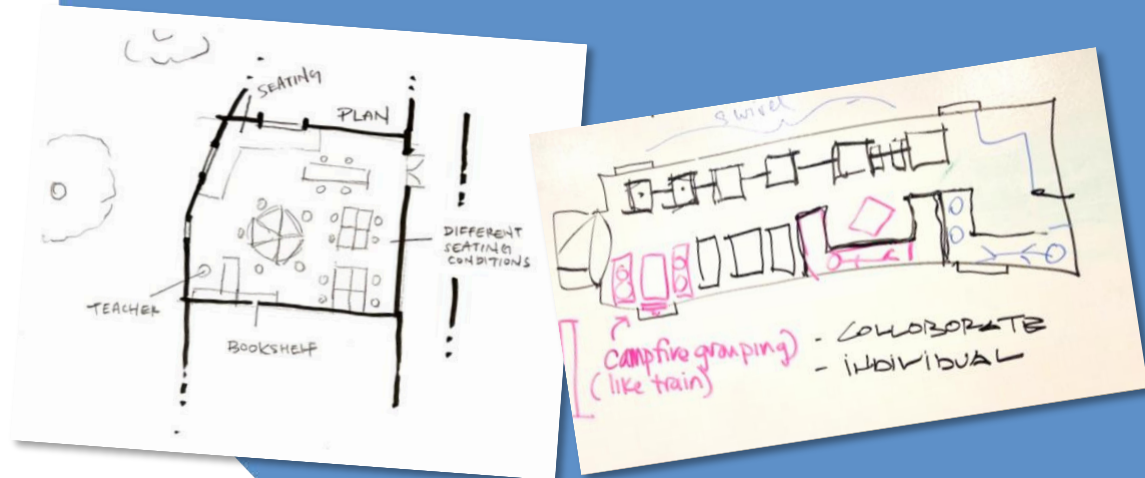

Views from the side give glimpses into the vertical arrangements of areas and elements. They can be straight-on or side views of what learners will see. While still in two-dimensions, elevations offer us ideas about possible heights, lengths, widths, and other dimensional details of the environment. Often used for external views of buildings, elevations can also be used to show how a particular setting, such as a seating area, might be seen from our learners' perspective.
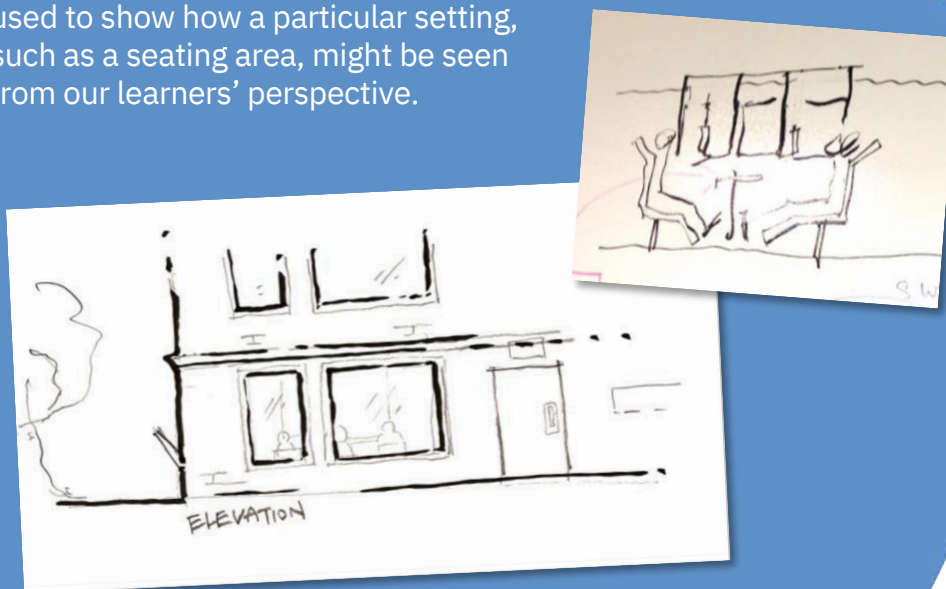
ELEVATIONS

These offer interior views into our environment by removing exterior wall or other obstacles. Although sections are not what learners will see, they offer us perspectives into a space by slicing it with an imaginary cutting plane. It offers more details about how interiors interact with exterior features and other elements, such as windows and doorways.

SECTIONS
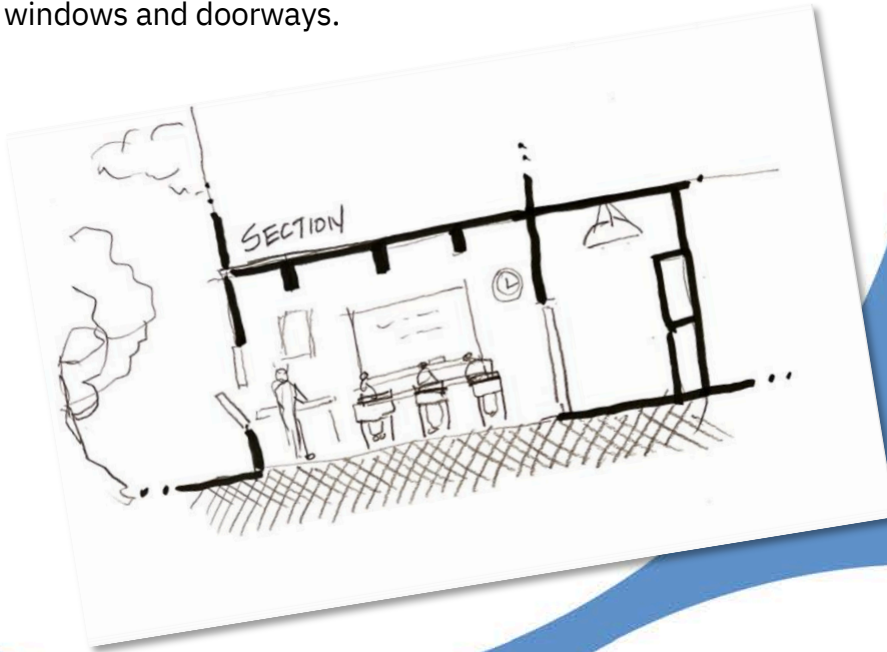
Short for axonometric diagrams, axons are 3-dimensional drawings of a space or object that shows multiple sides. These are drawn from a viewing angle by projecting the area or object as it would visually appear for learners or from some other point of view.

AXONS
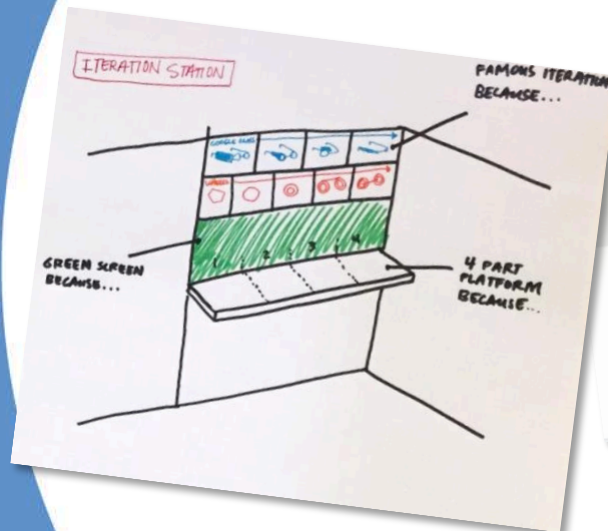
PLANS *notes*

What sketches, diagrams or other visuals will show how spaces relate?

Next Steps:

PROTOTYPES

The tentative and intentionally rough models we iteratively create, test, revise with our people, purposes and principles in mind.

Good designs for learning come from the good learning of their designers. They learn by iteratively refining ideas through nimble cycles of testing, gathering feedback, and revision. For example, perhaps we have a neat idea for a new desk or a novel layout for an innovative classroom. Before going further, we test the idea. We could mock-up a cardboard desk and invite students to try it out. Or we could physically set up a room to mimic the layout and roleplay learners' experiences in it. These loose, cheap and tentative models of ideas are prototypes.They allow low-risk and quick ways to see if an idea might work and how it could be improved. Prototypes fuel our learning as we design. And the cheaper, faster and easier the prototype the better.

Prototypes are the tentative and intentionally rough models that we iteratively create, test, revise and with our people, purposes and principles in mind. What the process looks like depends on the prototype. It could be a rough physical mock-up, a thought experiment or scenario-testing, or role-playing scenarios. Whatever the model and method, prototypes help us (and our people) experience the idea firsthand.

Good prototypes have several hallmarks. First, they are held gently as sacrificial ideas that will change. So don't get overly attached to them: they will and should change based on the feedback. Second, good prototypes are simple and straightforward, allowing easy ways for others to experience them and give input. So don't get too caught up in the details or try to fashion a finished product. Keep them loose, unfinished, and accessible.

Prototypes should emerge alongside our plans, providing opportunities to test them with others. The testing fosters collaboration with our people and clarifies connections to our purposes and principles. Remember that designing is a learning process, so be open to cycles of experimentation with the prototypes you create.

When developing prototypes, and prototyping processes, here are a few strategies to keep in mind:

- **Use found materials to keep them rough.** Look around and use what you find – discarded carboard boxes, cans of play-dough, masking tape, paper waiting to be recycled, glue guns, boxes of used LEGOs, etc. No need to splurge on anything new. Use easy to find materials that don't create too much attachment or seem too finished.

- **Engage your community.** Prototypes create opportunities to engage the people for and with whom you are designing. Invite students, teachers, administrators and other community members to experience and offer reactions to them. Be sure to frame the prototype as an emerging idea, not a final product.

- **Consider cognitive or embodied prototyping.** While testing physical prototypes with learners are most generative, there are other ways to experiment with rough ideas. You might run a quick thought-experiment of a "day-in-the-life" storyboard of a learner going through a space plan. Or you might role-play a teacher and a student physically sitting at model table design. These and other cognitive or embodied experiments can also spark quick and useful feedback.

Tools

SPRINTS

To get the juices flowing, try a "sprint" to prototype an idea in just 10-15 minutes. At LEFT, teams have 15 minutes to redesign a traditional school bus to make it better support learning. It can't be finished in such a short amount of time, which is the point. Using a shoebox, paper, and whatever materials are around, they generate loose and unfinished models for feedback from other teams. Short sprints can be used often to quickly push and test ideas as we design.

Using personas of our people, illustrate a sequence of moments they might have as they experience our design. A story board is a model that imagines what people will see, feel, think and do over time. While the learners may not physically be with us, story boards offer ways to be "with us" as we design and seek feedback from others on our design team to test the model.

STORY BOARDS

With a rough prototype in hand, assume the personas of the people with and for whom we are designing. How will they experience it? What will they say, think, feel or do? Play out moments and speak as best you can from the perspective of the people you select. First-person roleplaying puts us into the shoes of our people, generating experiential feedback we can use to refine our idea.

ROLE PLAY

Use phone cameras to take images and videos of learners as they move through your prototyped spaces and elements. A camera angle can reveal what the learners might see and suggest ways to improve it. Walk-throughs generate quick feedback to spatial models, offering information about what our people will see and how they move in a model.

PROTOTYPES *notes*

What rough and loose models will you continually create, test and revise?

Next Steps:

The Wave & Woods Playground

Using the LEFT approach, a team of designers, architects and educators created a vision for a new urban playground for their city. Located in the Northeast, one of their challenges was to design a playground that offered enclosed areas for people to use during the cold winter months.

People

They focused on four very different children who would be primary users of the playground, ranging in ages 5-8 yrs old, and one parent. They created personas and empathy maps for each, capturing their interests, needs, likes and dislikes. Using affinity maps, they identified commonalities to inform potential purposes. These were prominently posted in their studio so they could refer back to them throughout their process.
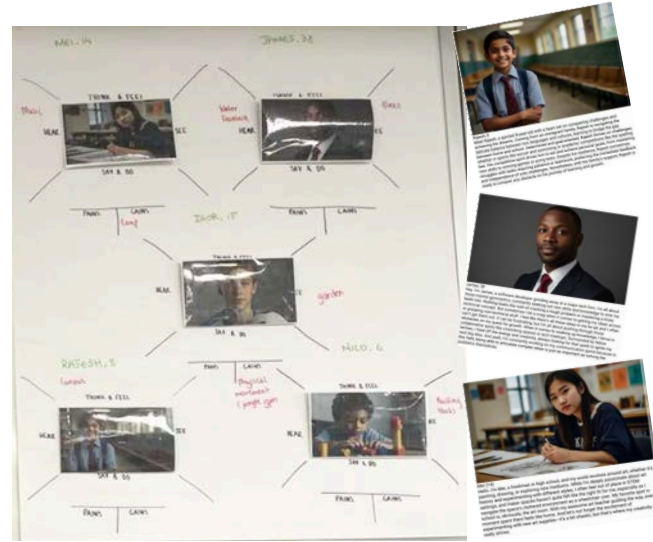
Purposes

With the needs of their people in mind, they consulted the goals the city has for playgrounds and SEL frameworks that local schools were using. After many rounds of ideation, they developed the purposes: to support *joy, exploration,* and *well-being.*
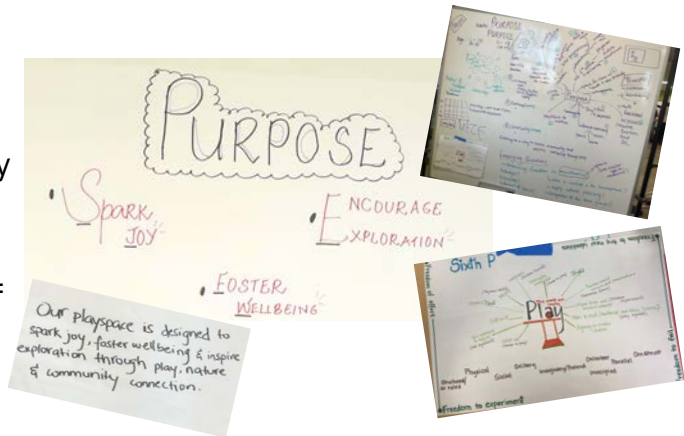
Principles

They used tools, like the ABC'S of Learning Places, and discussed the qualities of inspiring images of playgrounds that were built for similar purposes. They visited a local playground to understand design principles that they might adapt to support their goals.

30

Plans

They created bubble diagrams and other sketches to explore how the playground areas might fit together spatially. They tested these arrangements by referring back to their peoples' needs, the overall purposes and the design principles. The process led them to sharpen and refine their purposes and principles.

Prototypes

Throughout the process, they created a variety of rough mock up of ideas to iteratively test their plans with their people, purposes, and principles. They created storyboards that explored how their people might experience it. Loose models of furniture, equipment and areas. Using their cameras, they did walk-throughs to understand what their people might experience. And they created a list of experiments they will do next to continue to test and develop the idea with their community.

31