Places to Learn

Children as Designers of Learning Environments

In this program students in **grades K-12** design or redesign learning spaces. Programs for **grades 3-12** run for **six 1.5-hour sessions**; programs for grades **K-2** run for **four 1-hour sessions.** In this flexible model students design or redesign one classroom, or a larger school area; a school entryway, a community school, or an at-home homework center. In the **Places to Learn: Outdoor Learning Spaces** program students design schoolyards for learning, including play spaces, gathering spaces, and places to learn about nature.

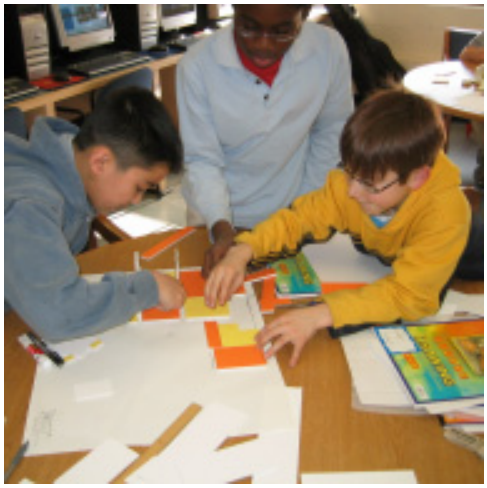
As they design, students work alongside architects and explore design as a career path. They use many skills and concepts from the **MA Curriculum Frameworks**: Mathematics (geometry, measurement, scale, proportion); Science & Technology/ Engineering (the design process, structures, materials, ecosystems, sustainable design); Social Sciences (community, mapping); Visual Arts (schematic drawing, model-building, graphic design, the elements and principles of design); English Language Arts (research, vocabulary, composition, oral presentation).

Developed at the request of educational facilities architects, **Places to Learn** is a much-needed project for schools experiencing renovation and building projects. *"As we work on a school design we would like a curriculum that we could give to the teachers – so students' ideas could contribute to the design of their new school."*

In this program, teachers, architects and students work together, learning and designing. Here is a general outline of the **Places to Learn** process:

Define the Design Problem

Who, What, When, Where, Why and What Else?
Guided by their *Design Process Checklist*, and aided by hands-on activities, students develop and write out their "design program:" Who will use the space? Where is the site? When will it be used? Why do we need specific learning spaces? What do these spaces need to do? What Else should a learning space be?" They are introduced to the concept of "universal design," design for people of all ages and abilities.



Skill-building Activities on Thinking and Drawing in Scale
Students create scale figures to serve as the "clients" for their design project. Younger students come to understand scale through arranging construction paper shapes on a pre-made classroom floor plan; older students use graph paper and scale rulers to practice converting real space to scale space.

Program Details + Learning Standards Alignments:

Places to Learn

Investigate the Design Problem

Architectural Awareness Activities: Students develop a common vocabulary of design as they *view and discuss slides of buildings and landscapes.* They identify elements and principles of design and natural, structural and geometric design features as they *trace a building façade.* Working in teams, they act out structural principles, and then demonstrate these principles using common materials in the *Being a Structure* activity.

Site Visit: The students do a *site analysis:* they observe, draw, photograph and write about the spaces for which they will design. They measure the spaces and draw rough scale floor plans, site plans, and/or elevation views. Students may also do a general tour of their school, inside and out — looking for architectural and structural features, and doing activities such as *How do Spaces Feel; What are People Doing*; and *Mapping Connections and Pathways*.

Research: Students research their design problem by surveying the people who will be using the learning spaces. They conduct traditional research, including reviewing school designs from internet websites.

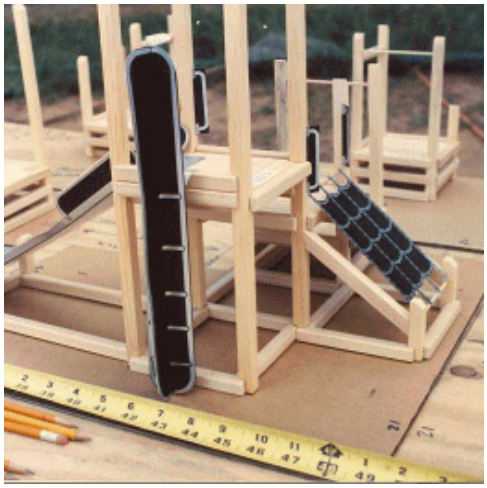
Generate Ideas: brainstorm, list, sketch, diagram…. and Choose the Best Solution

Creating Bubble Sketches: Working from their *Design Process Checklists,* the students develop their ideas for floor plans or site plans on layers of trace paper. Ideas for spaces evolve over several drafts—from general, loosely-drawn shapes, to more specific designs. Not-so-good ideas are left behind and good ideas become more clearly defined. Considerations include size and shape of areas, circulation patterns and relationships of areas to adjacent rooms and to the outdoors.

Describe the Solution through a Prototype (drawing or model)

In these sessions the students communicate their design ideas. After being introduced to the tools and the processes involved, and practicing those skills, they draw scale plans and build 3d scale models.

Floor Plans, Site Plans and Elevations: Working from their site plans and bubble sketches, students draw scale floor plans [and, as needed, elevation views] of their learning space. They use drafting tools, graph paper and scale rulers to measure and draw spaces; represent walls, windows, doors by using standard symbols; and revise their work through several drafts. Younger students create simpler plans using construction paper shapes and/or handouts that show scale furniture in plan view.



Computer-aided-drafting: An architect demonstrates how designers use CAD software to draw floor plans, elevations and 3d views of buildings. As a follow-up activity, older students may use CAD software to design.

Building 3-d Scale Models: If a landscape model is to be a part of their project, the students work from site plans to build 3-d sites for their models – models crafted from common art materials, built on a cardboard base.

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Younger students create models of buildings from boxes [e.g. shoe boxes, shirt boxes, or gable style take-out boxes]. With the teacher's help, they use scale to determine which box(es) they will need; and develop floor plans to fit inside those boxes. Once their floor plans are complete the students return to working with their boxes, covering surfaces to represent siding and interiors, adding windows, doors, roofs, and so on.

Older students build with foam core. They lay out, cut, test-fit and glue their model pieces onto the base: exterior walls are completed first; interior walls may be built next, floor by floor. Windows and doors can be neatly drawn on, carefully cut out, or cut and pasted from handouts. Scale furniture can be crafted from foam core or common craft materials. If a roof is needed, students use geometry and measurement to determine roof pitch and shapes; test-fit roof pieces from paper; then cut and build their final roof planes.

Redesigning the Solution as needed: Mini-evaluations and group design meetings during the drawing and model-building phases help students to improve their designs.

Evaluate the Solution

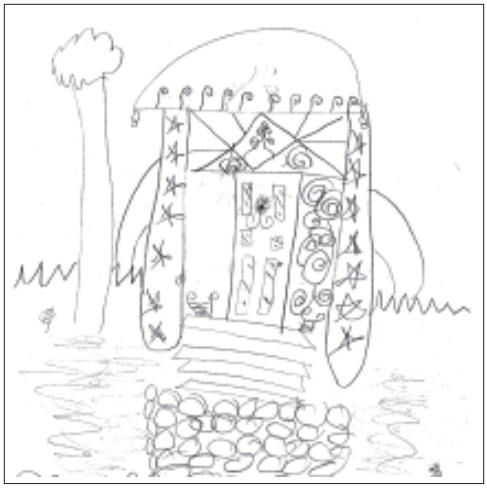
Reviewing their work — from initial writing, to bubble sketches, to floor plan, to elevation, to model — the students consider the success of their designs. In writing, they consider: "Does my design solution solve my design problem? How well does it solve my problem? Could the design be modified or improved?"

Present the Solution

Each student selects from their portfolio of writings, photographs, process drawings and final drawings to create a design presentation board — a graphic means of displaying design ideas. Media presentations may also be developed.

After oral presentations are developed and practiced, students present their final projects to educational facilities architects and to the school community.

Places to Learn and Outdoor Learning Spaces programs make good teaching sense: teachers enjoy using their school as a learning site; architects get to know their clients; and every student gets to communicate his or her ideas about school design.



5th graders have redesigned a 100' x 200' wing of a school into a learning space for four 5th grade classes. Ideas for the space included atriums, science labs, theaters, small comfortable gathering spaces and plenty of storage for teaching materials.

3rd graders have worked in teams to develop ways to turn a barren courtyard into places for students to learn about Science and the Arts. They presented their design ideas to the committee in charge of the courtyard renovations, thus influencing the final courtyard design.

All in all, interesting ideas, clearly communicated through the process of design.

Program Details + Learning Standards Alignments:

Places to Learn

English Language Arts Standards:

Standard 2: Questioning, Listening, and Contributing
Standard 3: Oral Presentation
Standard 4: Vocabulary and Concept Development
Standard 19: Writing
Standard 20: Considering Audience and Purpose
Standard 21: Revising
Standard 22: Standard English Conventions
Standard 23: Organizing Ideas in Writing
Standard 24: Research
Standard 25: Evaluating Writing and Presentations
Standard 27: Media Presentations

Science and Engineering Technology Standards:

Engineering Design Gr K -6

2.1 Identify a problem that reflects the need for shelter, storage or convenience.
2.2 Describe ways in which a problem can be represented, sketches, diagrams, graphic organizers, lists.

Engineering Design Gr 6-8

2.1 Identify and explain the steps of the engineering design process, i.e., identify the need or problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.
2.2 Demonstrate methods of representing solutions to design problems: sketches, projections, views…
2.3 Describe and explain the purpose of a given prototype.
2.4 Identify appropriate materials, tools, machines to construct a prototype of a given engineering design.
2.5 Explain how such design features as size, shape, weight, function, and cost limitations would affect the construction of a given prototype.

Engineering Design Gr 9-10

1.1 Identify and explain the steps of the engineering design process, i.e., identify the problem, research the problem, develop possible solutions, select the best possible solution(s), construct a prototype, test and evaluate, communicate the solution(s), and redesign.
1.2 Demonstrate knowledge of pictorial and multi-view drawings …. using proper techniques.
1.3 Demonstrate the use of drafting techniques with paper and pencil or computer-aided design (CAD) systems.
1.4 Apply scale and proportion to drawings, e.g., ¼" = 1'0".
1.5 Interpret plans, diagrams, and working drawings in the construction of a prototype.

Program Details +
Learning Standards Alignments:

Places to Learn

Mathematics Standards: geometry, number sense, patterns, measurement

2.G.1 Describe attributes, parts of 2- and 3-d (length, corners, edges, faces, sides).
2.G.2 Identify, describe, draw and compare 2-d shapes…
2.G.5 Identify symmetry in two-dimensional shapes.
2.G.6 Predict the results of putting shapes together and taking them apart.

4.G.1 Compare and analyze attributes and other features of 2d and 3d geometric shapes.
4.G.2 Describe, model, draw, compare, and classify 2d and 3d shapes …
4.G.4 Identify angles as acute, right, or obtuse.
4.G.5 Describe and draw intersecting, parallel, and perpendicular lines.
4.G.8 Identify and describe line symmetry in two-dimensional shapes.

2.N.3 Identify and represent common fractions as parts of wholes and parts of groups…
4.N.4 Select, use, and explain models to relate common fractions and mixed numbers…

2.P.1 Identify, reproduce, describe, extend, create simple … repeating patterns.
4.P.5 Solve problems involving proportional relationships, including map interpretation [scale 1" = 1']

2.M.4 Measure, common objects using metric and English units of length measurement…
2.M.5 Select and correctly use the appropriate measurement tools, e.g., ruler…
2.M.6 Make and use estimates of measurement, including time, volume, weight, and area.

4.M.1 Demonstrate an understanding of such attributes as length, area, weight, and volume….
4.M.2 Carry out simple unit conversions within a system of measurement, e.g. feet or inches.
4.M.4 Estimate and find area and perimeter of a rectangle, triangle, or irregular shape …
4.M.5 Identify, use appropriate metric and English units and tools (ruler, angle ruler…) to estimate, measure, solve problems involving length, area… angle size…

6.G.2 Identify three-dimensional shapes based on their properties, such as edges and faces.
6.G.3 Identify relationships among *points, lines, and planes…*
6.N.4 Demonstrate an understanding of fractions as a ratio of whole numbers…

6.M.1 Apply the concepts and formulas of perimeter and area to the solution of problems.
6.M.2 Identify, measure, describe, classify, construct: angles, triangles, and quadrilaterals.
6.M.3 Solve problems involving *proportional relationships* and units of measurement… *scale models…*

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Visual Arts Standards:

STANDARD 1 Methods, Materials, and Techniques
demonstrate knowledge of the methods, materials, and techniques unique to the visual arts.

STANDARD 2 Elements and Principles of Design
demonstrate knowledge of line, texture, shape, form, pattern, symmetry, space and composition [balance, repetition, rhythm, scale, proportion, unity, harmony, emphasis].

STANDARD 3 Observation, Abstraction, Invention, and Expression
demonstrate their powers of observation, abstraction, invention, and expression…Create 2D and 3D artwork…

STANDARD 4 Drafting, Revising, and Exhibiting
demonstrate the processes of creating and exhibiting artwork: drafts, critique, self-assessment, refinement, and exhibit preparation; visualize concepts in clear schematic layouts**;**, assess and reflect on work orally and in writing, revise work based on criteria; maintain a portfolio of sketches and finished work; prepare artwork for exhibitions.

STANDARD 5 Critical Response
describe and analyze their own work and the work of others using appropriate visual arts vocabulary.

STANDARD 6 Purposes and Meanings in the Arts
describe the purposes for which works of architecture were and are created; interpret the meanings of artistic works; describe how artistic production can shape and be influenced by the aesthetic preferences of a society.

STANDARD 7 Roles of Artists in Communities
describe the roles of artists, patrons, cultural and arts institutions in societies past and present.

STANDARD 8 Concepts of Style, Stylistic Influence, and Stylistic Change
demonstrate understanding of styles, stylistic influence, and stylistic change; identifying when and where art works were created; analyzing characteristic features of art works from various historical periods, cultures, and genres.

STANDARD 9 Inventions, Technologies and the Arts
describe, analyze how artists use and have used materials, inventions, and technologies; describe how artists use computer technology in their work.

STANDARD 10 Interdisciplinary Connections
apply knowledge of the arts to the study of other disciplines; apply knowledge of other disciplines in learning in and about the arts.