



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
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Architecture: Experiences in Space Perception for Young People

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In order to develop a unit on Architecture for my middle school students, it became apparent to me that the complex technical, visual and aesthetic skills of professional architects would be extremely difficult for my students to comprehend. Most of my students have very limited experiences in art. For this reason developing perceptual awareness can improve the child's ability to handle visual information. Since the study of Architecture emphasizes the designing and constructing of buildings and other structures; this plan will stress the development of space perception in children.

Pertinent to the educational growth of children is the stimulation that they receive from their environment. When a child is deprived of valuable sensory experiences it can negatively influence their growth. Many factors may cause this lack in development. It is suggested that children who are deficient in understanding spatial relationships also have learning difficulties in other school subjects.¹ In the modern urban environment many creative activities are neglected. In the classroom, activities that increase perceptual awareness need to be provided. Most theories of perception generally agree that, the young child perceives simple wholes initially, and as the child develops he/she perceives the details within the whole. The child can be taught through training in observation and doing to increase his/her perceptual discrimination. This process is also influenced by the child's cultural environment, which is the total of economic conditions, child rearing practices, social interaction, religious beliefs and peer influence which affects each child differently.

This unit is being organized to be presented to sixth through eighth graders with generally limited visual literacy. My sixth graders are scheduled for art one forty-five minute period per week. This demands that the Architecture activity be compressed and simplified. Seventh and eighth graders meet four forty-five minute periods per week for one marking period of ten weeks. For seventh and eighth graders this unit will be utilized three to four weeks dependent upon the ability grouping of the students.

Metaphor of the House

Any contemporary discussion of Architecture must coalesce, not only the perceptual systems that produce buildings, but the human emotions connected to our body image and the buildings we know as home. The house can be said to be an extension of our bodies. Being vertical, the house rises upward like the human body from the cellar to the attic. The attic provides a roof that gives shelter from the rain, snow or sun. The

cellar is said to contain our deepest fears. The concept of the house is considered to be much more than a building that can be described by its appearance or simply as a space that is-inhabited. All of the houses that we have lived in hold memories for us and bring forth images that shape themselves in a continuous life long process. Our memories of houses can provide us with the inner feelings of protection and intimacy that provide a sense of stability.²

The entrance of a house holds an important meaning since it is the boundary that separates our private life from our public life in the community. The front or facade of the house can be compared to the front of our bodies standing symmetrically facing the world. Windows can permit a view in, out or shut out the community. The backs of homes, not always symmetrical, exhibit the private life of people. Boundaries are usually defined in backyards in order to discourage interference from the outside. The interior of the house complements the exterior with a vertical directionality moving up and down by means of stairways. Stairs leading up may direct us to rooms that provide us with privacy or separateness, while concealed stairs leading down to the basement may exemplify the idea of a cave. Rooms within a house can either be those that are utilized for group activities or those that provide individuals with seclusion.³

In order to further develop the incorporation of awareness of body image in architectural design, research done in the area of *proxemics* can be helpful. *Proxemics* studies the cultural influences of how we experience space. As people throughout the world have developed their cultures uniquely and distinctly from one another problems can and do arise when cultural groups attempt to communicate with one another. For the purposes of this paper human space perception is emphasized, while it needs to be remembered that we interact with all of our perceptual systems. Research shows that people orient themselves in space according to the culture that they were reared in. Each of us sense other people as close or distant. Four distance zones affect how we react: intimate distance, personal distance, social distance and public distance. These distance zones greatly affect how people use their senses to distinguish between the relationships of others, their feelings and what activity they are involved in. What may be considered intimate in one culture might be public or personal in another culture. Without going into detail describing the distance zones, the awareness of these territorial spaces is particularly valuable when designing urban environments. Crowding human beings into vertical buildings without considering the negative effects of crowding upon the human needs within different relationships is harmful. The result becomes evident when we observe the stress found in many urban dwellers. Contemporary Americans have need for urban environments that provide a variety of spatial experiences. ⁴

Development of Three Dimensional Space Perception in Children

The study of space perception can be defined as the process by which we acquire knowledge through the senses of the position of objects and their relations in space to each other, their general surroundings and the perceiver. Though this is a complex process ; occurs in children gradually from birth. The developmental growth in space perception for the child initiates with what is known as *Mouth Space* . *Mouth Space* occurs during the first three or four months of the infant's life and is connected to sucking. During this time infants look at objects that emit sounds, and appear to realize that they belong together. *Tactile Space* is developed through the infant touching his or her own body. In *Visual Space* the infant follows moving objects with its eyes. At about four months the infant will look at an object held in front of him/her and reach and grasp for it. The visual and the tactile impressions begin to combine at this age towards an understanding of what shape

is. Gradually the infant begins to learn that the same object may appear differently when it is seen from a variety of views at different distances. Throughout this process the infant sees that the shape he/she is looking at visually corresponds to the shape that he/she feels with his/her hands. The infant is approximately two before he/she begins to understand that objects have their own identity even when they are moved in space. Young children begin to name concepts of space such as in, out, above and below when they are about three. Yet, the objects are not yet perceived, as wholes since the child is experiencing the object(s) haptically. This can be interpreted to mean that the very young child remains almost passive when he has to identify objects from touch. The child's grasping and handling is rather haphazard. ⁵

Between the ages of 4 through 7 the tactile experiences with an object can be translated visually. This happens when the child attempts to draw from tactile perceptions. The child's drawing will reflect his/her ability to explore objects and recognize shapes from tactile experience. Initially rounded shapes are drawn followed by those shapes drawn with straight lines. One must be aware that this process develops quite slowly in the child. In addition children can match shapes more easily than they can draw them. ⁶

By the ages of 8 and 9 the child becomes aware of the body's orientation to the horizontal and vertical coordinates of space. Objects such as buildings and trees can be perceived as upright forms as well as our bodies, due to the pull of gravity. Our ears contain the mechanisms that indicate when our head is not parallel to gravitational pull. It appears that the more active motor experience the child has the greater awareness he/she has of the horizontal and vertical condition of the environment. Active participation in such activities as walking, bicycling and other sports can develop this skill when contrasted with passive movement such as bus riding. The child is moving through a world that contains objects scaled generally for adults. This observation suggests that playgrounds need to be designed with the child's sense of scale; a scale that provides spatial learning activities between the levels of toy playing and the larger adult scaled environment. ⁷

As the child of 8 to 9 is becoming more aware of depth and distance in space, he/she is also developing perceptions of body image, as attitudes towards their bodies and the bodies of other people. Research in the area of how children perceive the size of their bodies appears to show that children will overestimate or underestimate the size of their bodies in relation to what is culturally desirable. Many variables influence how the child perceives his/her body: sex differences, personality types, and emotional feelings of self-importance, success and power. Generally, the child, as well as the adult, functions within three dimensional boundaries that surround our bodies. For the child these boundaries are not fixed since their growth processes are not complete. ⁸

Children develop their awareness of distance and depth very slowly. Judgment of distance becomes clearer as the child has more experience with actually traversing the distance themselves. The child will gradually perceive the changes in; the appearances or objects as they move towards them or away from them. Older children through maturation, experience and training can usually perceive that objects gradually recede into the distance. The focusing of both eyes in what is known as binocular vision is necessary for accuracy in depth perception. Changes in the size of objects will cause them to appear smaller as they recede into the background. The texture of the surfaces of objects becomes more dense the further they are away from the viewer. As the older child becomes less self-centered and more aware of other viewpoints, what is known as linear perspective (parallel lines converging to a vanishing point at the horizon) can be understood. The horizon is relative to one's point of view and the surrounding environment (urban, flat rural land, ocean, hills, mountains, etc.). Generally we look up towards objects that are distant, and down at near objects. Movement and the speed at which an object moves conveys depth. Objects which are closer appear to move more and faster than similar objects at greater distances. Shadows created as a result of a light source contribute to the

impression of an object being in three dimensional space. ⁹

In any discussion of developmental growth in children it must be remembered that there are a multitude of variables affecting the learning process. The perception of spatial relationships is a complex learning process that does not complete itself in childhood; nor can it be isolated from other learning processes. It is discussed here for the purpose of guiding one in planning art activities that can improve the child's awareness of space. This awareness of space is connected directly to our thoughts, feelings and imagination as we experience buildings in our environment.

Fair Haven Neighborhood

The young people in my art classes live in the Fair Haven neighborhood of New Haven. From this neighborhood the young people receive a continuous amount of sensory information regarding the architecture of their homes and other buildings. Homes in Fair Haven will be emphasized with a set of slides that presents examples of houses as extensions of the human body. This concept is discussed above in the *Metaphor of the House* .

The Fair Haven community lies in the eastern area of New Haven bounded by the Mill River on the West and the Quinnipiac River on the East. Fair Haven was first settled around 1640. With the construction of the Dragon Bridge in 1793 over the Quinnipiac River and the Barneaville Bridge in 1819 across the Mill River, Fair Haven became more accessible. Early Fair Haven was inhabited by people involved in the oyster business. Oystering became a major industry by the middle of the nineteenth century. Many immigrants began to inhabit Fair Haven during this time as well as necessitating the building of many homes. Growth continued until the early twentieth century. During recent years redevelopment and renovation have rescued some of the homes built during the nineteenth century. The Historic Commission is involved in creating an historic district along the Quinnipiac River. ¹⁰

Classroom Art Activities

Lesson One: *The Outside of My House*

Draw and/or paint on large paper the front view of child's home. Emphasize the basic form of the home by discussing shapes commonly seen in homes of area. Observe the front entrance or doorway to the building as well as the window pattern. Note, if there is any decorative ornamentation. If home is part of a larger housing complex have the child isolate the front of the building section that they inhabit. Continue by discussing exterior grassy areas in front of home or walks that lead to front entrance. Attempt to position home on the ground. Do not try to include other elevations of home, i.e., do not show side or back views.

As a supplementary activity children can cut and glue large front views of their homes using black on white. Folding to cut symmetrical forms found in homes can be instructional in terms of cutting openings for doors and windows.

Lesson Two: *The Inside of My House*

Somewhat more challenging is the process of having each student imagine that he/she would be able to remove the entire front exterior wall of his home. This can be called a section or x-ray view of the interior of the front of his/her home. Draw using pencils markers, and/or pen and ink on large paper the interior of the child's home. Include all levels of the home from the basement to the attic. Include only the interior spaces that can be viewed from the front of the home. Discuss what common rooms are observed to face out towards the street. Outline in heavier lines the outer walls and levels that separate each floor. Within each space or room draw the furniture as simple shapes. In the basement draw the full source(s) of the home if found there. If the attic is used for storage draw some of the objects found there. Finally draw yourself in one of the spaces.

Lesson Three: *Looking Down Into My Room (or Looking Down Into One Level)*

Depending upon the ability level of the class have the students imagine that they were above their room looking down and inside the outer walls that enclose the space. A ruler can be utilized for straight lines, but no emphasis is placed upon measuring space. If students have difficulty, a piece of drawing paper can be cut into rectangular/square shapes to assist in drawing the room. Have the students imagine that they are walking through the door opening into their room. Walk to familiar pieces of furniture or objects in your room. Think about where each wall is placed and any windows that are found in each wall.

Lesson Four: *The Picture Language of the Architect*

The above three lessons involving student's own homes require the student's memory. In order to reinforce the student's perceptual skills in how the architect visually represents space on a two dimensional surface, the following activities utilize a small object to present the three conventional views used by the architect. Dependent upon the abilities of the students the use of scale and complex measurement is not suggested. The three views are known as *elevation* , *section* and *plan* . The emphasis is upon drawing parallel lines perpendicular to the drawing surface. Known as orthographic there is no attempt to represent three dimensional qualities. Common objects for this lesson can be collected so that each student can have a close view of the object as well as an opportunity to touch the object. Suggestions for objects may include food: pieces of fruit and vegetables, small toys, candy bars, models of cars, boats, etc. Drawings can be done using pencil, crayon, markers and/or pen and ink.

I. Elevation

The elevation drawing of the object is the horizontal view of one side or face of the object. It includes the exterior details of the one side of the object. Using a model car as an example, an elevation view can be one side of the car that includes the outer body of the car showing doors, windows, fenders, tires, etc.

II. Section

The section drawing of the object is the horizontal view of one side or face of the object after that side or face has been visually removed. It is a view of the interior space. Some objects can have the side opened. A piece of fruit or a candy bar can be cut open. The body of a model might be able to be removed showing the interior details.

III. Plan

The plan drawing of the object is the sectional view that looks down inside the object. It is an interior view of the object after the top has been removed. Using the example of a car model the plan view would be the

interior forms and spaces seen when the roof of the car is removed.

The three views of a simple object are intended not only to be descriptive, but to increase the student's awareness of spatial elements.

Lesson Five: *Distance—What is Near? What is Far Away ?*

In order to encourage the development of spatial perception in children it becomes important to the child to want to know how to present forms in three dimensional space. Being a more advanced skill developmentally, it is presented here as separate activities. This does not mean that the student's perception of distance is acquired in isolated instances. The goal is that the student achieve success and understanding. In order not to create visual confusion color will not be used. Black, values of grey and white will be utilized with paper, paint and pencil.

There are four characteristics that can be presented in art activities to demonstrate distance in three dimensional space.

I. *The Horizon: Near is Down. Far is Up.*

II. *Overlapping Forms*

III. *Diminishing Size*

IV. *Density of Texture*

I. The Horizon: Near is Down. Far is Up.

Draw a horizontal line freely or with the aid of a ruler across a piece of drawing paper. This line represents the natural horizon. The area above the horizon becomes sky while the area below the horizon becomes land or water. The area below the horizon can be divided into three levels of distance: front, middle and back. Select three simple objects or shapes. Cut one *front* object from black paper which will be glued in the space near the bottom of the paper. Cut one *middle* object from grey paper. Magazines can be used for their wide variety of grey values. Glue the middle object or shape in the space between the bottom and the horizon line. Finally cut a shape in a lighter grey for the *back* object and glue it near or on the horizon line. At this point discuss adding other front, middle or back shapes that may be drawn or cut from black and varied grey papers. The goal is to suggest three levels of distance in space. Near objects are down near the bottom of the paper. As objects move farther back in space they are placed higher up on the paper. The use of black and grey values can assist in strengthening the appearance of distance.

II. Overlapping Forms

Draw a horizon line across a piece of drawing paper. The area above the horizon line represents sky while the area below the line represents land or water. Have the students cut at least five shapes using black and grey papers. Arrange the five shapes so that they overlap one another. All of the shapes must overlap. Discuss how shapes appear to be in front, middle and back relative to their arrangement and the horizon line.

III. Diminishing Size

As objects are perceived in three dimensional space they visually appear to become smaller and shorter in

relation to the observer as they recede to the horizon. For the purposes of this problem no attempt is made at formal skills in perspective drawing unless the visual maturity of the students demonstrates a readiness for instruction.

Have students draw a horizon line across their drawing paper. Using cut paper in black and values of grey have students cut a series of eight to ten objects that gradually reduce in size from large to small, tall to short. Some examples that commonly express themselves well in reduced size are: simple forms of people or animals, buildings, trees, flowers, insects, cars, airplanes, birds, etc. Shapes can have details added with drawing or cut paper. Have students arrange their series of shapes from large to small. The largest can be considered the closest to the observer and the smallest the farthest away, near or on the horizon line. Have students complete their composition by adding details to the ground or water below the horizon and the sky above the horizon.

IV. Density of Texture

The density of texture as part of an object's surface is another characteristic of perceiving three dimensional space. Students can have practice in creating surface textures through drawings and rubbings. Small pieces of drawing paper can be used to make rubbings of surface textures in the classroom and/or from collections of objects. Students can also be given practice in drawing texture: vertical and horizontal lines of varying thickness and spacing, crosshatching, scribbling and dot drawing. After the student has acquired an assortment of textured papers he/she can cut and arrange the textured shapes on paper. This activity can make use of the horizon line as well as overlapping forms and diminishing sizes. The goal is to increase the student's awareness of three dimensional space as it is represented on a flat (paper) two dimensional surface.

Lesson Six: Constructing a Model: The Doll House

Valuable to developing skills in space perception is having experiences with the construction of forms. In this problem students are to build one room of a "doll house." The term "doll house" does not have to be used directly with students since some students, particularly boys, may find this term offensive at the middle school level. Students will be constructing with paper and easily cut cardboard a room of their choice. This room is to have an outside and an inside. The basic shape of the room can be rectangular, square, triangular, circular or any shape appropriate to the function of the room. Students at the middle level have interests that may influence the design of their room: sports, music, entertainment, need for social interaction with peers, privacy, fashion, etc. The room will contain model furniture suitable to the function of the room constructed by each student. Important to the scale of objects in the room as well as the use of space and movement around the room is the construction of a model of the student in his/her room. In order that the students have success in constructing their room appropriate skills need to be demonstrated. These skills include: cutting, folding, scoring, rolling and curling. Joining forms for strength necessitates learning how to make tabs, hinges and interlocking slits. For this project students may use paint on surfaces that are strong enough not to warp.

In conclusion the above activities and preceding objectives can be considered valuable learning experiences for young people. As adults of the future today's students will probably have decisions to make in regard to their living and working environments. Spatial learning for young people can contribute positively.

Notes

1. Zaidee Lindsay, *Art and the Handicapped Child* (New York, 1972), p. 42.
2. Gaston Bachelard, *The Poetics of Space* . Translated by Maria Jolas. (Boston, 1964), pp. 3-29.
3. Kent C. Bloomer and Charles W. Moore, *Body, Memory, and Architecture* (New Haven and London, 1977), pp. 45-50.
4. Edward T. Hall, *The Hidden Dimension* (New York, 1959), pp. 107-122.
5. M. D. Vernon, *Perception Through Experience* (London, 1970), pp. 118-121.
6. Jean Piaget and Barbel Inhelder, *The Child's Conception of Space* (New York, 1967), pp. 40-43.
7. Roger M. Downs and David Stea, Eds., *Image and Environment: Cognitive Mapping and Spatial Behavior* (New Haven and London, 1976), pp. 58-62.
8. Seymour Fisher, *Body Experience in Fantasy and Behavior* (New York, 1970), pp. 36-50.
9. Vernon, pp. 119-136.
10. *Inside New Haven's Neighborhoods* (New Haven, 1982) pp. 19-33.

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Student's Reading List

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Materials for Classroom Use

A set of slides of homes in the Fair Haven area of New Haven.

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