



FRANK  
LLOYD  
WRIGHT  
TRUST

# DIGITAL MODELING

**GRADE:** Middle School, High School

**TIME:** OPEN

In this lesson participants engage in the architectural practice of model building by drafting designs in three-dimensions using SketchUp or Tinkercad. Modeling is a practice used by design professionals to work-out ideas, revise, critique, and challenge themselves. Taking part in this practice gives insight in to the design profession while providing hands-on opportunities to develop and strengthen skills. Models will be drafted using 1/4" scale.

**INTEGRATED SUBJECTS:** Math, Science, & Visual Art

## OBJECTIVES

### MATERIALS | RESOURCES

Images of Wright's designs

Access to computers or tablets

SketchUp (available free online at:  
<https://www.sketchup.com/>)

Tinkercad (available free online at:  
<https://www.tinkercad.com>)

Sketchbooks

Pencils

Client Cards

Site Cards

1. Develop skills in modeling and drafting in three-dimensions.
2. Introduce new technology and resources.
3. Learn about and experience practices used by professional designers.
4. Think critically to creatively solve unique design challenges.
5. Accurately and successfully apply the use of scale in a design.

## ESSENTIAL QUESTIONS

1. Why do designers create models and drafts of their work?
2. What skills and strategies are needed to draft digitally in three-dimensions?
3. How can technology enhance the way we design and create?

# LESSON PROCEDURE

## EXPLORE

- Explore some of Frank Lloyd Wright's designs and have participants take a few minutes to look and observe. Examples of Wright's work are available at: <https://www.teachingbydesign.org/multimedia/>
- **Ask:** What do you see? What elements of design do you notice first? How are they used and what do they do?

## ENGAGE

- **Guide discussion to begin exploring Wright's design choices and the design process.**
- **Ask:** Why do you think Wright made that design choice? What things do you think he consider when making the decision? Do you think he tried it out or practiced first? How do you think he worked out his ideas?
- **Review the design process with participants and discuss each of the steps. A design process map is available at: <https://www.teachingbydesign.org/multimedia/>**
- **Introduce modeling to participants and discuss how professionals use it.**

## DESIGN

- Assign or have participants randomly choose a client and/or site card. Client cards and site cards are included below.
- Using SketchUp or Tinkercad, have participants design a unique model that addresses the specific needs of their client.
- Models should be drafted in 1/4" scale. ( 1/4"=1', 1/2"= 2', 1" = 4')
- As participants draft their designs, provide time for check-ins and short critiques to provide feedback.

## CRITIQUE & INTERPRET

- Once participants are completed with their designs, have them present their work as they would to their clients by creating a proposal and presentation.
- Allow time for each participant to present their work.
- Have participants complete a self-evaluation of their work and reflect on the experience.

# CLIENT CARDS

The following cards feature twelve clients with specific needs and design challenges. They can be used and adapted for any design or building lesson to challenge participants with real-world design scenarios. For an additional challenge, the client cards can also be paired with site cards which provide environmental and landscape descriptions. To find lessons that pair with these clients explore build and design in the Lesson Plan section of the Teaching by Design website. And don't forget to check out how Frank Lloyd Wright solved some of the same design challenges!

# CLIENT ONE

## NEEDS

- 3 Bedrooms
- Garage
- Large public space
- Play space

## WANTS

- Lots of windows
- Connection to nature

# DESCRIPTION

**BUILDING TYPE:** House

This family of four includes two adults, a boy (age 6), and a girl (age 2).

Client One is looking for a private and safe home where their children can play inside and outdoors. This family loves to spend their time outside and requests that the house be designed with a connection to nature and include many windows. In addition, they often have friends and family visit, and ask for large, public spaces to have parties and dinners. Finally, the father owns a business where he builds cars and asks for a space at home where he can work and store them.

# CLIENT TWO

## NEEDS

- 3 Bedrooms
- 2 Offices/workspaces
- 1 Private entrance
- 1 Public entrance

## WANTS

- Space for their son & 2 dogs

# DESCRIPTION

**BUILDING TYPE:** House

This family of three includes two adults and a boy (age 5).

Client Two is looking for a unique home where they can work and raise their young son. Both fathers have home businesses and need separate offices or workspaces. One is a designer and the other is a veterinarian. They also would like 2 entrances, one for their family and the other for clients. In addition to their son, the family also has two medium sized dogs that like to run around. Client Two also has a large extended family that visits often, and requests an extra bedroom for them to use.

# CLIENT THREE

## NEEDS

2 Bedrooms  
Study Space

## WANTS

vegetable garden  
Freenhouse or garden shed  
Space for books

# DESCRIPTION

**BUILDING TYPE:** House

This family of three includes two elderly adults and a girl (age 12).

Client Three would like a home that is large enough to include a study space for their granddaughter, but small enough that they can continue to live in as they age. While they do not want a large house or yard to care for, they do enjoy gardening and grow vegetables each summer. They also like to read together and have a large library of books. This family would also like the interior spaces to feel open and be full of light.

# CLIENT FOUR

## NEEDS

3 Bedrooms  
Wheelchair accessible  
Large dining area

## WANTS

Open floor plan  
Separation of public & private spaces

# DESCRIPTION

**BUILDING TYPE:** House

This family of four includes two adults and a girl (age 11) and a girl (age 8).

Client Four has a parent who uses a wheelchair and requires space to be able to easily move around. Family dinners are especially important and so a large dining area where they can all sit together is required. The family would also like all the private spaces to be near one another and separate from the public areas of the home.

# CLIENT FIVE

## NEEDS

3 Bedrooms  
Open den/living room  
View of backyard from the kitchen

## WANTS

A large, quiet master bedroom  
Storage space

# DESCRIPTION

**BUILDING TYPE:** House

This family of three includes one adult and a boy (age 4) and a girl (age 6).

Client Five would like a house design that helps to keep things organized and has plenty of storage space. With two young children, a large open living room for the family to play inside together is important. Likewise, a view of the backyard from the kitchen is important to help watch the children play outdoors. Client Five would also like a large master bedroom where they can relax each night.

# CLIENT SIX

## NEEDS

5 bedrooms  
Large kitchen  
Large Living room

## WANTS

A laundry room  
Storage

# DESCRIPTION

**BUILDING TYPE:** House

This family of 6 includes three adults and boy (age 10), a boy (age 14), and a girl (age 16).

Client Six is a large family with lots of diverse needs. Included in the family is a grandparent who would like their own bedroom and bathroom separate from the rest of the family. The family also requires a large kitchen for them to all cook and eat together in and a large living room for the family to watch movies and play games in. The parents would also like a laundry room and additional storage to help with the demands of a larger family.

# CLIENT SEVEN

## NEEDS

Studio  
Client waiting room  
Large office

## WANTS

Tall ceilings  
High placed windows  
Space for multiple work stations

# DESCRIPTION

**BUILDING TYPE:** Studio & Office

Client Seven is building a new headquarters for their architectural firm. They require a building that has a large studio with space for up to 6 work stations, and a place for their clients to sit comfortably and wait. Client Seven also requires a separate office that has a space for an assistant as well as a private space to do work. To help the office feel open, the client would prefer high ceilings with plenty of long horizontal windows placed high on the walls. This will help provide plenty of natural light while preserving their privacy.

# CLIENT EIGHT

## NEEDS

A large multipurpose room  
A large exhibition area  
3 offices  
Single level

## WANTS

Windows only in front & offices  
Open floor plan

# DESCRIPTION

**BUILDING TYPE:** Museum

Client Eight is building a small, single level museum. The museum will share history and artwork about the local community. They require a large exhibition area for the artifacts and artwork as well as a large space that can be used for meetings, workshops, and other groups. Client Eight would prefer that the windows are only placed at the front of the museum and inside the offices. An open floor plan would also help with the movement of guests and provide additional flexibility for different exhibits.

# CLIENT NINE

## NEEDS

2 large rooms  
A single office with 2 areas

## WANTS

Tall ceilings  
1 space with plenty of windows  
1 space with no windows

# DESCRIPTION

**BUILDING TYPE:** Community Center

Client Nine is building a new community center that needs to separate large rooms that can be used for multiple events. One room should have plenty of windows and provide lots of natural light. The second room should have no windows. To help the spaces feel open even when they are crowded, Client Nine would like the rooms to have tall ceilings. The community center also needs an office that has 2 different work areas.

# CLIENT TEN

## NEEDS

Reception Area  
Breakroom/kitchen  
Bathrooms  
Conference space

## WANTS

Tall ceilings  
High placed windows  
Open Concept  
Opportunity to rent work spaces to

# DESCRIPTION

**BUILDING TYPE:** Office Building

Client Ten needs an office building for their company of 30 employees. While the building will primarily serve their business, they would like the building to be designed so they could rent out work space to others for additional revenue if needed. The design of the space should be open with work stations for each person. A reception area is needed to welcome clients as well as a conference room for group collaborations. The client prefers natural light, but would like the windows to be placed high similar to Wright's Drafting Room in the Oak Park Home and Studio.

# CLIENT ELEVEN

## NEEDS

Showroom/gallery space  
Reception/sitting area  
3 work stations  
Space to collaborate

## WANTS

Welcoming, laid back design  
Open concept with different zones  
Keep historic details

# DESCRIPTION

**BUILDING TYPE:** Re-design of historic building into office space

Client Eleven has recently purchased a two-story home that was originally built in 1889. Client Eleven needs the historic home to be re-designed into an office building for their small design firm. They would like the first floor to be an open space to meet clients and showcase their work with a welcoming, laid-back feel. Upstairs, they need space for 3 designers. While they spend a lot of time collaborating and working together on projects, each needs their own individual work-space. The client would also like to highlight some of the unique details of the historic home in the new design.

# CLIENT TWELVE

## NEEDS

Kitchen  
Counter/register area  
Separate to-go and seating areas  
Bathrooms

## WANTS

Feature original fireplace

# DESCRIPTION

**BUILDING TYPE:** Re-design of historic building into coffee shop

Client Twelve needs a historic building to be re-designed into a coffee shop. The building is long and narrow and sits on a busy main street. There is an alley on the left side of the building and a local store that shares the right wall. Client Twelve would like the coffee shop to be a place where people can grab a quick cup on-the-go or sit leisurely with a friend or good book. As a result, they need a unique design solution to help people in a hurry get their cup of coffee separate from those who are staying for a while. Inside, the building also features a large central fireplace that the clients would like to feature in the new design.

# SITE CARDS

The following cards feature twelve sites with unique characteristics that create various design challenges. They can be used and adapted for any design or building lesson to challenge participants with real-world design scenarios. For an additional challenge, the site cards can also be paired with client cards which provide specific needs and requests. To find lessons that pair with these sites explore build and design in the Lesson Plan section of the Teaching by Design website. And don't forget to check out how Frank Lloyd Wright solved some of the same design challenges!

# SITE ONE

ENVIRONMENT: Prairie with woods

## DESCRIPTION

Slight downward slope with surrounding trees. Mostly hidden from the road. Neighboring buildings are visible but not close by. Mostly quiet and outside of the city center.

# SITE TWO

ENVIRONMENT: Prairie, Urban

## DESCRIPTION

Flat, long, rectangular corner lot (180 x 60 feet). Located on a busy street in an urban area. Neighboring buildings to the north are brick with a mix of architectural styles. South of the site is an open lot with a view of a park and lake.

# SITE THREE

ENVIRONMENT: Prairie lake view

## DESCRIPTION

Smaller, flat site (50 feet x 70 feet) between two existing buildings. Located in the middle of the block on a busy city street. Lake Michigan is located behind the site to the east across an open lot.

# SITE FOUR

ENVIRONMENT: Prairie

## DESCRIPTION

Large, open site with prairie grasses and scattered trees. Mostly flat. Rural location with surrounding farmland.

# SITE FIVE

ENVIRONMENT: Prairie

## DESCRIPTION

An open acre lot situated between residential homes. Wide street in front with an alley at the back.

# SITE SIX

ENVIRONMENT: Prairie

## DESCRIPTION

Mid-size site located across the street from a community park. Surrounded by buildings on both sides and to the back. The front looks out onto a wide, quiet street with large, old trees.

# SITE SEVEN

ENVIRONMENT: Desert

## DESCRIPTION

Large sandy site in a quiet area not far from a town center. Large rocks, cacti, and sage are scattered throughout the site. No large trees or other vegetation are included.

# SITE EIGHT

ENVIRONMENT: Small mountain range

## DESCRIPTION

Large site situated on the side of a small mountain range. Includes many trees and natural vegetation. A small waterfall and stream run through the center separating the site into two.

# SITE NINE

ENVIRONMENT: Coastal

## DESCRIPTION

Smaller site situated on a rocky coastline and directly on the water's edge. Long and rectangular with no surrounding neighbors. A road runs along the front of the site and connects to a nearby bridge.

# SITE TEN

ENVIRONMENT: Mountainous, rocky

## DESCRIPTION

A large lot with a steep elevation. Includes several scenic overlooks and many tall coniferous trees. Large boulders and rocks make up the majority of the landscape with few clear, level places.

# SITE ELEVEN

ENVIRONMENT: Coastal, hilltop

## DESCRIPTION

Mid-sized site located at the top of a large hill overlooking the coast. Little vegetation other than tall grasses. Quiet area with no visible neighbors.

# SITE TWELVE

ENVIRONMENT: Forest

## DESCRIPTION

Small site surrounded by mature trees. Other vegetation includes native shrubs and flowers. Elevation is even. Other buildings are nearby, but hidden by the trees.