Why:

Sketches are used to quickly communicate ideas. Many common designs are not limited to 90-degree angles, but utilize odd angles from various planes. They also serve as a written documentation of the ownership of a design. Engineers must be able to sketch the designs properly in order to communicate conceptual ideas. The ability to understand angled orthographic projections is another vital skill of the successful engineer.

Learning Objectives:

- Continue to develop visualization skills.
- Proper placement of views, dimensions and use of dimension lines and arrows.

Performance Criteria:

- Properly fill out a modeling strategy form.
- Obtain correct size and shape information from solid model using view and measure functions.
- The sketch is done in a neat and professional manner using the proper border and lettering.
- Sketched views are properly oriented and lined up.
- Sketched views and 3-D model are the proper shape and size.
- Appropriate number of dimensions are used and spaced and located properly.
- The clay model is done in a neat and professional manner using the tools provided by the instructor.

Resources besides Class Notes, Other Students, Instructor, Textbook, and Previous Hands-Ons:

- SI (Supplemental Instructor).
- Visualization study session.

Plan:

1. Preparation: Work in teams of 4. (Decide on team roles: reader, sketcher, modeler, inspector)
   a. Reader:
      i. Look at figure 5-1 below.
      ii. Each ‘tick’ mark or grid mark on the pictorials shown below corresponds to one space on the calculation paper. Each grid on the engineering paper equals 0.2.
      iii. Verbally describe the overall size of figure 5-1 to the sketcher, inspector and modeler.
      iv. Tell the sketcher how many views will be required - only the necessary views.
      v. Do NOT show it to the sketcher or modeler.
   b. Fill out a modeling strategy form. Design Intent: 5-1 material is important. 5-2 cut away portions are important. 5-3 material is important. 5-4 material is important. Locate the depth from the front surface. 5-5 material is important. Locate the width from the left side of the part.
   c. Inspector:
      i. Stake claim to white board space.
      ii. Make sure you have 4 different colored white board markers.
      iii. Using the red marker, lightly sketch the overall sizes of all six views on the white board.
      iv. When finished, help the reader complete the modeling strategy form.
   d. Sketcher:
      i. Sketch the border and title block on engineering calculation paper. (Use Penn State Erie Standards web link.) General tolerance is ±.01.
      ii. Remember to not crowd the views.
      iii. Sketch one for each team member.
2. Read the following steps. If you need any steps clarified, please ask questions. When all team members are ready begin.
   a. Inspector: Correct any mistakes made along the way.
   b. Reader: Verbally describe the 2-dimensional (2-D) shape and size of the most descriptive feature to the sketcher. I, E, U, H, I, L, T, etc.
   c. Sketcher: Lightly sketch this 2-D shape in all six views on the white board in a color other than red. Write in dimensions.
   d. Reader: Verbally describe the 3rd dimension to the most descriptive shape.
3. Modeler and Sketcher:
   a. Modeler: Using the sketch on the board, scribe the shape of the most descriptive shape to scale on the clay and cut along the lines. Repeat for each feature.
   b. Sketcher: Calculate dimensions needed to center the six principal views on engineering calculation paper. Be sure to use a minimum of ½" clear space between dimensions and/or views. The views should be properly arranged and aligned and centered on the page. Lightly block in the views on the engineering paper.
4. Inspector: Check 3D model to see if it is within tolerance. General tolerance will be ±.01.
5. Everyone is to complete the necessary principal planes on engineering paper for the next class.
   a. Completely dimension the parts using 2-place decimal, unidirectional chain dimensions. General tolerance will be ±.01.
   b. Below each view, neatly print the name of the view.
6. Repeat for each problem shown below.

Critical Thinking Questions:
1. Are all six views necessary? If no, why not?
2. How many features make up this part?