Lab Framework

Text:Cord Applied mathematics

Unit 10: Sale drawings

Short Description: This lab is for an end of the unit skill assessment. Students will design a parking lot or a classroom. They will make a scale drawing and 2 dimensional scale models).

Developed by: Jim McLuen

Contact Information: Lindbergh high school, Renton school district, james.mcluen@rentonschools.us

Date: June 2010

Lab Title

Scale drawing

Parking lot or classroom

LAB PLAN

TEACHER: Teacher Prep/ Lesson Plan

- **Lab Objective**
- Students will demonstrate the ability to:
  1. Choose an appropriate scale for a drawing project.
  2. Convert dimensions to match their scale.
  3. Make a drawing to scale and scale models using those dimensions.
  4. Explain the advantages of their design clearly using complete sentences.

- **Statement of pre-requisite skills needed**
  Students need to be able to use a calculator to convert dimensions to match a scale.
  Students need to be able to measure using rulers.
  Students need to be able to work in a small group or with a partner.

- **Vocabulary**
  Scale
  Model
  Design
- **Materials List**
  Large piece of paper for each group. (24" x 32")
  Smaller pieces of colored paper for the models (8" x 11").
  Instruction sheet
  Rulers, calculators
  PPW of classrooms and parking lots is helpful, not required.
- **GLEs (State Standards) addressed**
  Math: 2.2.2, 5.1, 5.1.1, 5.3
  Reading: 2.1, 3.3.1
  Writing: 1.2, 1.3, 2.2
- **Leadership Skills**
  1.1
- **SCAN Skills/Workplace Skills**

- **Set-up information**

  Many occupations involve design work. Civil engineers design streets, parking lots, and water collection systems. Marine engineers design boats, chefs plan out their kitchens, store owners decide how to set up their floor space, interior designers help design the interior of buildings and a variety of rooms. Teachers plan out their classrooms. Every design is a mix of function and aesthetic qualities. Designs are affected by personal motives as well as time and price. Often, psychology plays a role

  .

- **Lab organization**

  This lab is intended as an end of unit assessment.
  Students should work in groups of 2 or 3.
  (Timeline required) The lab will take 2-3 full class periods.

- **Teacher Assessment of student learning**

  Rubric (See last page).

- **Summary of learning** (to be finished after student completes lab)

  Discuss real world application of learning from lab, what types of occupations would use scale drawings and models

  Students will share their thoughts on the lab answering questions posed at the end in a journal format.

- **Optional activities**

  Share their design with a teacher and persuade them to try it.
  Re-design the parking lot where they work or at school.
  Go online and research occupations that use models and scale drawings

- **Career Applications**

  Interior design, civil engineer, attorney, business owner, chef, homeowner.

LAB TITLE: Scale Drawing

STUDENT INSTRUCTIONS:

- **Statement of problem addressed by lab**

  You have been hired to design a parking lot or a classroom. You and the members of your group will have 2 days to make a scale drawing, including 2 dimensional models, to present to the business owner/teacher. You will also present a rationale for your design and explain why it would be superior to other designs and/or the current design.

- **Grouping instructions and roles**

  1. Form a group of 2 or 3 students
  2.You may pick your partners but consider each other's strengths and weaknesses.

- **Procedures** – steps to follow/instructions

Day 1

1. Choose your group members.

2. Read the information sheet and instructions for the parking lot and the classroom.

3. Decide if you wish to design a parking lot or re-design Mrs. Perkins room.

4. **Materials**
   1.Calculators
   2. Several sheets of colored paper.
   3. 1 sheet of white paper (24" x 32")
   4. Ruler, meter stick, scissors

5. Choose a scale for your drawing, calculate the size of your drawing and lay it out on your white paper. At the same time a different group member should begin to make scale 2 dimensional models to aid in the design process. Have all calculations checked by someone else in your group. Once the basic shape is drawn begin to explore ideas on a design using the scale models.

Day 2

6. Finalize your design and tape or glue the scale model pieces into place. Verify that you have met the design criteria and that your design is feasible.

7. Explain, using proper grammar and in complete sentences, the advantages of your design. Advantages should include functional attributes, aesthetic reasons, cost conditions, and time constraints.

- **Outcome instructions**
  Each group will produce a 2 dimensional scale model of their design. The students will also include a complete explanation of the advantages of their design. Each student will also write their own reflective piece on this activity.

- **Assessment instructions (See rubric)**

Description	4	3	2	1
Scale drawing	Drawing is complete and to scale. Addition items included for clarity or salesmanship	Drawing is complete and all items included are drawn appropriately to scale	Drawing is incomplete or not completely to scale	Drawing is largely unfinished
Design	Aesthetics and functionality exceed requirements	Design meets criteria, some creativity evident	Design does not meet criteria and displays a lack of imagination and effort	Design is incomplete
Group explanation	Explains design in a creative fashion that promotes the design choice	Clearly explains how design was chosen and meets objectives	Incomplete explanation, grammar errors,	Explanation is incomplete, lacks complete sentences
Individual reflection	Thoughtful responses to questions, displays deeper thinking about project	Questions clearly answered, proper grammar and spelling	Does not contain complete sentences Grammar and spelling problems	Incomplete answers, serious grammar and spelling problems

Parking lot requirements:

The business is a restaurant. The owner wants to get as many cars as possible in the lot but still is concerned that it be easy to enter and exit the lot. They also are concerned that each space be easy to get in and out of. The lot measures 76 feet x 120 feet. The 120 foot side runs next to the building and the other 3 sides are on the street. The lot requires at least 2 entrance/exits that are a minimum of 30 feet wide. The city requires a minimum of 3 handicapped spaces that allow for 5 feet on both sides of the vehicle. The average car measures 6 feet by 14 feet. Standard space design calls for 2 feet on each side of the car.
(I made a small, non-scale drawing showing the building, the lot, and the building's entrance).

I am in a computer lab so I measured the classroom next to mine. I measured the interior as well as the student desks, teacher's desk, document camera station, computer station and shelves. I made a small, non-scale drawing of the interior for the students and a table showing the size of the desks. If you are doing your own classroom you could add a day and have the students do the measuring.

Reflective questions:

1. How did your group divide up the work? Did your group do a good job managing their time? How could you have helped your group do better ?

2. Which project did you choose and why did you choose it?

3. What problems did you have and how did you overcome or solve them?

4. Was this activity challenging? If yes, did you enjoy the challenge? If no, how could I make the project more interesting?

5. Do you think a job that included some sort of design component as part of your responsibilities would be rewarding?