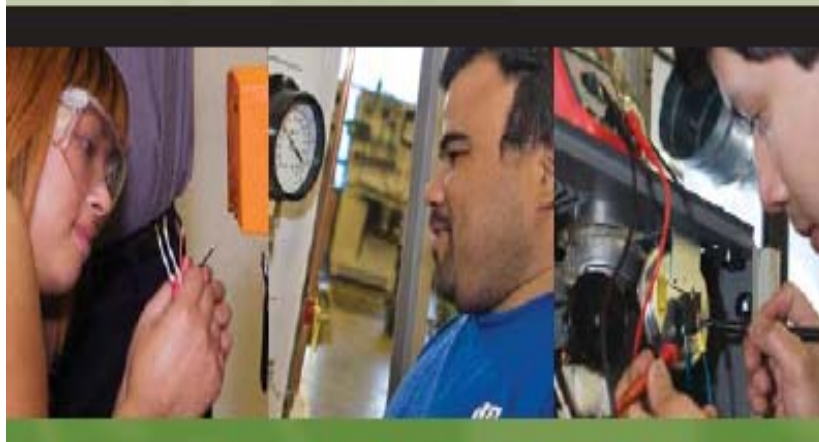




PROBLEM BASED LEARNING

Environmental Control Technology

(Heating, Ventilation,
Air Conditioning and Refrigeration)



ECT 212: Testing, Adjusting, and Balancing (TAB)

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PROBLEM BASED LEARNING (PBL) SCENARIO

Instructor: Hadley Hartshorn

Course: Testing, Adjusting, and Balancing (TAB)

Course Number/Code: ECT 212

SCENARIO TITLE

“Determine the Performance of the Air Conditioning System”

Key Course Concepts:

- Demonstrate the ability to measure the air conditioning system airflow and correctly complete sample Testing, Adjusting and Balancing forms.
- Profile airflow in an entire building by measuring flow in an appropriately small sample of rooms.

SCENARIO DURATION

- **5 partial class periods:** An introduction to the Problem Based Learning (PBL) process, presentation of sample projects, and class time to work on the project as a group

BUSINESS PARTNER

Laney College, Environmental Control Technology (ECT)

LEARNING OBJECTIVES

By the end of the semester, students will be able to demonstrate the ability to:

- Demonstrate the ability to measure and adjust system airflow using velometers, balometers and pitot tubes
- Demonstrate the ability to review measurement data and correctly complete sample TAB forms

THE FOCUS OF THE PROBLEM

The focus of this Problem Based Learning (PBL) scenario is based around a real life scenario.

In various settings, the Problem Based Learning (PBL) scenario may be presented as a real time problem, hands-on scenario, or hypothetical problem. Using critical thinking and investigation, the students go through a process to solve a problem and provide recommendations for a solution.



PROBLEMATIC SITUATION

The Building “B” complex at Laney College was built in the early 1970s as part of original construction of the campus. There have been student and staff complaints ranging from uneven and fluctuating temperatures to not enough outside air being circulated within the building. The cause of the air conditioning concerns has not been determined. Some “spot” measurements have been taken and it is believed that the airflow in the complex is far off specification.

Your team has been subcontracted to measure the existing airflow in the building and make up a representative air balance report to determine the performance of the air conditioning system. As a team, it is your job to figure out how to measure the system airflow and correctly complete the sample Testing, Adjusting and Balancing forms. Your data will be used to determine possible ways to remediate the problems.

There will not be enough time to measure every air outlet in the complex. The challenge in this exercise is to select the right percentage of the total system to measure, and then use that information to project the performance of the entire complex. Your team will have to determine the schedule and time needed to take measurements. It is your job to create a report to convince the building owner/operator that the sample measurements that are taken are representative of the entire building.

Questions to think about while investigating the Problem Based Learning (PBL) scenario:

WHO is involved?

WHAT is not working?

WHEN did the problem start?

WHERE is this scenario taking place?

TIME pressures or deadlines?



STUDENT MATERIALS

The instructor will provide students with the following information:

- A copy of the Problem Based Learning (PBL) cycle and steps
- An explanation of the Problem Based Learning (PBL) approach
- Sample Testing, Adjusting and Balancing forms
- Design blueprints of building and the AC systems
- Tool: “Need to Know” to gather information
- Tool: Scoring rubric for final presentation
- Problem Based Learning (PBL) scenario evaluations: Team evaluation and online survey

Resources and Media:

- The internet
- Educational materials and books
- Configuration documents from the District Office

INSTRUCTOR ROLE

The instructor will support the Problem Based Learning (PBL) experience by:

- Introducing the scenario and process
- Facilitating reflection and discussion
- Providing applicable resources and materials
- Answering any questions related to the scenario and coursework
- Providing class time to work on the scenario

STUDENT ROLE AND GUIDELINES

Individual

The intended outcome will be measured by having each student:

- Distribute project tasks between the group members
- Perform a specific individual role in their team
- Perform a specific individual role in the final presentation
- Complete a Problem Based Learning (PBL) scenario and team evaluation as a part of the final project

Breakdown of Problem Based Learning (PBL) scenario tasks by class:

Class 1: Introduction
<p>Date: _____</p> <ul style="list-style-type: none"> • Introduction of the Problem Based Learning (PBL) approach and tools • The group will need to determine the decisions that need to be made, select the locations for the air measurements and develop the methods for substantiating that the sample is representative of the entire building • Collect and review the existing configuration documents for the building
Class 2: Develop the Plan
<p>Date: _____</p> <ul style="list-style-type: none"> • Create the group “Project Plan”: Timeline of how to achieve solution and task assignments for each person on the team • Present “Project Plan” to the class • Refine the project plan from the class discussion and prepare for implementation of the plan
Class 3: Take Measurements
<p>Date: _____</p> <ul style="list-style-type: none"> • The group will start to take the measurements and analyze the gathered information based on a review of the initial measurements, assess the adequacy of the plan and schedule other/additional measurements as needed
Class 4-5: Finish Measurements and Document the Solution
<p>Date: _____</p> <ul style="list-style-type: none"> • The group will finish taking measurements and start the process of organizing the design documentation and presentation materials
Class 6: Present the Solution
<p>Date: _____</p> <ul style="list-style-type: none"> • The group will present the final documentation and recommended solution(s) • The class will discuss the solution and insights <p>*Extra credit will be giving to presentations provided in Power Point</p>

STUDENT ROLE AND GUIDELINES

Group

The intended group outcome will be measured by providing:

- A group presentation where each student will individually present a particular segment (1-2 minutes) of the recommendations to the client
- A single document which describes recommendations on the problem and the solution(s)
- A class discussion where each student on the team will make an oral presentation of what they learned

Group Size:

- 4 or 5 groups (Approximately 5-6 students per group)
- The Instructor will participate in the selection of members of each group

Presentation Guidelines:

Problem Based Scenario is 20 points out of 100:

- The project must be completed and final reports must be turned in on or before the day of the presentation which is **Thursday, May 5, 2011**
- The project grade will be equivalent to a Midterm, a maximum of 20 points, but extra credit will be given to presentations provided in Power Point.

Refer to the “Scoring Rubric for Final Presentation” tool for the key elements of how the final presentation will be graded. Final Presentation is worth 5 out of 20 points.

STUDENT FEEDBACK

As a team, and individually - students will review, assess and provide feedback regarding the Problem Based Learning (PBL) scenario experience.

Requirements of the final project: Before final presentation

- Completion of team member evaluation and online survey

TEAM LINK

The instructor will support the team learning process by allowing:

- 15-20 minutes approximately every week, where students will be able to work on the scenario as a group
- Time to meet during class, outside of class and on the phone to work on the scenario