CRITICALLY INFORMED DIALOGIC LESSON PLAN

Class: CVEN 3323: Hydraulic Engineering

Week #: Type I, II, and III Pipe Flow Problems

Lesson Focus and Goals:

- To connect everyday observations of water systems to technical concepts of pipe flow analysis and friction losses through dialogic learning.

Materials Needed:

- Photos of various water systems (fountains, faucets, sprinklers)
- Chart paper and markers
- Sample pipe sections of different materials
- Moody diagram handouts

Learning Objectives:

- Identify the three types of pipe flow problems in real-world water systems
- Connect observable water behaviors to underlying hydraulic principles
- Apply the Darcy-Weisbach equation conceptually to everyday water experiences

Structure/ Activity:

On this day, we will begin by asking students to share their everyday observations of water systems in their lives. Students will reflect on experiences like changes in shower pressure, water fountain flow differences, or pipe noises in their homes. After brief individual reflection, we will form a circle for sharing these observations. As students share, I will note connections to hydraulic principles on the board, highlighting how their experiences relate to the three types of pipe flow problems we're studying. After this discussion, students will break into small groups and receive photos of common water systems. Each group will identify which type(s) of pipe flow problems (Type I, II, or III) would be needed to understand their system, draw what they think the pipe network might look like, and list the variables they would need to measure. During their work, I will circulate to ask questions linking their observations to concepts like Reynolds number, friction factors, and the Darcy-Weisbach equation. We will reconvene in our circle where each group will briefly present their analysis. As students share, I will ask clarifying questions about how pipe characteristics might affect what they observe in water systems. To conclude, each student will write down one insight connecting pipe flow theory to a water system they regularly encounter, with volunteers sharing these connections with the class.

Assessment:

Formative Assessment:

- Quality of students' water system observations and their connections to hydraulic principles
- The activity focuses on relating personal experiences to technical concepts, as hydraulic engineering can feel abstract and disconnected from students' lives. Creating these connections helps students see the relevance of complicated equations and iterative problem-solving methods in systems they interact with daily, which is essential for developing engineering intuition and practical understanding beyond mathematical calculations.