

Artifact 3: Question Redesign - Dialogically Informed Questioning

Team Member

Name: Emma Stine

Context

I am redesigning questions that may be used in a hydraulic engineering class. These questions relate to a lecture I gave on pipe flow problems (Type I, II, and III). These problems involve understanding how water flows through pipes of different sizes and materials, and how to calculate things like:

- How much pressure is lost due to friction when water flows through a pipe (Type I)
- How much water can flow through a pipe given a certain pressure difference (Type II)
- What size pipe is needed to deliver a specific amount of water (Type III)

Question 1

Original Question: "What is the Darcy-Weisbach equation and how is it used to calculate friction losses in pipes?"

Redesign #1: "Think about a time when you've observed water flowing through pipes of different sizes or materials. How did the flow seem to change, and how might the Darcy-Weisbach equation help explain what you observed?"

Question 2

Original Question: "When solving Type II pipe flow problems, what iterative process do you use to find the flow rate?"

Redesign #1: "Describe a situation where you've had to use trial-and-error to solve a problem in your life. How does this process relate to the iterative approach we use when solving Type II pipe flow problems?"

Redesign #2: "How would you explain the iterative process of solving for flow rate in a pipe system to someone in your family who isn't an engineer? What analogies from everyday life could make this concept more relatable?"

Question 3

Original Question: "What is the significance of the Reynolds number in determining the friction factor from the Moody diagram?"

Redesign #1: "Share a time when you noticed how smoothly or turbulently a fluid was flowing - perhaps water from a faucet, smoke from a chimney, or clouds in the sky. How does your observation connect to what the Reynolds number tells us about flow behavior?"

Redesign #2: "If you were tasked with explaining the concept of laminar versus turbulent flow to younger students, what everyday examples would you draw from your own experiences to illustrate these different flow regimes?"