

Epistemic Game

Epistemic game is a coherent activity which has both ontological components and structural components. The ontological components are described by two sections – knowledge base and epistemic form – while the structural components are described by entry and ending conditions and moves.

Quote: My first thought, when I think of this problem, is back in high school physics and physics class I'm taking right now. We always did the experiment with some crazy shaped containers; where each of the different containers for water was different, but they were all connect underneath. And the water level was always the same. Because - the actual reason I can't completely remember, but I do know that's the answer.

Analysis: Students often believe what they have previously observed and experienced before to be right, and accept conceptions derived from these experiences without difficulty. They will build justification for what they have seen to make sense of their answer to them.

Problem 1

A child is playing with toys in the bathtub, including a large toy boat with various crew members. You notice that the water level in the tub suddenly gets slightly lower. Which of the following actions by the child could have resulted in that change in water level? Choose all which apply.

A. The child dropped a crew member from the boat into the tub, and the crew member sank to the bottom of the tub.

B. The child dropped a crew member from the boat into the tub, but the crew member floated in the water.

C. The child threw a crew member from the boat onto the floor outside of the tub.

D. None of the listed options would cause the water level in the tub to become lower.

ρw . Answer the following questions: A. What is the volume of water displaced by the boat?

volume of water displaced by the boat (with the rock on it)?

volume of water displaced by the boat and the rock?

of the water.



An Epistemic Game For Answer Making

The thrust of the interviews is to validate a short task on Archimedes' Principle and Pascal's Law; thus, the protocol asked students to solve 10 related problems in multiple-choice or free-response format.



Quote: Obviously, if one little crew member comes out of the boat, the water level, or the boat rise a little bit in the water, and it would increase the, or decrease the water level in the bathtub. But that same figure has been placed in the water, so it's making up for the amount that, or the change on the...where is it...the water level of that the boat

Analysis: In the beginning, the student chooses an intuitive answer based on his daily life observation or previous physics classes. Then

Quote: I'm not sure, because I'm trying to think, whether or not, the amount of the water, the amount of the displacement that the...or the change of the displacement of the boat would be equal to the change of the displacement of the person being added to the water. If those two displacements are equal, then yes; or then no, it doesn't change the

Analysis: After the above conceptual understanding, the student stops talking and starts to write down all equations relating buoyancy to weight. He starts with the kind of intuitive reasoning, then tries to make sense of that and write down all equations relating to his reasoning. If the student can not get an answer which makes sense to them, then they will go on to write a lot of math to find the answer.

Implications

Students believe that water level doesn't change as long as conditions in the container remain the same (no matter where the objects stay in the

Evidence from the study indicates that introductory level students have a vague idea about Pascal's Principle, which they cannot apply correctly

Reference

J. Tuminaro, and E. F. Redish, Phys. Rev. ST Phys. Educ. Res. 3, 020101 (2007).