**Introduction**

What is this project about?

Students design a fluid delivery system including pipes, pumps, and the various components typical of such systems. The students will also need to engage with a customer, be cost conscience, and identify opportunities to create value. Details are included on the handout for students.

What course has it been implemented in?

Fluid Mechanics – a third-year engineering course typically required of Architectural, Chemical, Civil, and/or Mechanical Engineers.

Number of students

This project can be used for any course size from three students to hundreds of students. It has been implemented in courses with approximately 15 to 40 students.

Teaming

Students should be in teams of two to four students. Three students is optimal.

Duration

This project is usually assigned for a four to five week period. Students will work outside of class for much of the project, but some in-class sessions are helpful.

Why is it important?

The Fluid Mechanics course covers the basic principles and applications of fluid statics and fluid dynamics. It is a required course for mechanical, civil, architectural, and chemical engineers since it studies commonly encountered concepts of fluid continuity, flow work, flow momentum, and energy interactions of fluid systems.

The problem-based learning module (or entrepreneurially minded learning module) will emphasize many of the concepts necessary for the discipline within a real-world context. The students will learn many concepts not explicitly covered in the classroom, and will reinforce application of concepts covered in the classroom. In addition, students will apply many example behaviors and complementary skills of the entrepreneurial mindset. Of particular note is the potential for opportunity recognition to create value.

How is that accomplished? Students will usually just find an appropriate pump to supply water from a lake uphill to the cottage which will need to be upgraded later for an entire hotel. The pump to supply an entire hotel would be very expensive. The opportunity is “hidden” with the considerations given in the student handout as bullet points. Because the hillside continues steeply above the lodge/cottage, a tank can be placed at the top. A small pump at the lake can refill the tank at night when electricity rates are lower. During daytime water use, the entire system is gravity fed. Using this opportunity, the system does not need upgraded later, and it is considerably cheaper. A sufficiently sized tank can supply the entire hotel needs.

How is it different from current methods of teaching this concept?

The method used for this project emphasizes student-centered learning, specifically problem-based learning, but it also includes elements of the entrepreneurial mindset (to create an entrepreneurially minded learning exercise). Usually the learning objectives contained within this learning module are taught using traditional lecture, homework, and exam study.

Note that the instructor will need to “wear two hats” during the course of the project. You will need to answer questions from the customer point-of-view as well as questions posed to an expert (i.e., you the instructor). Be sure to ask the student to whom their question is being addressed.

Who should implement this project?

Anyone teaching Fluid Mechanics.