Introductory Fluid Mechanics taught using a carburetor

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The typical fluid mechanics introduction in mechanical engineering covers basic fluid statics, forces on submerged bodies, control volumes, continuity, conservation of momentum, conservation of energy, Reynolds' transport theorem, internal and external flows. Students often struggle with the basic concepts and how they might apply to a real system.

In the winter of 2015, a new set of open-ended labs were created for mechanical engineering students. Teams of 3 or 4 students in a third-year class of 110 were each given a small engine, and removed the carburetors. The series of labs had them discover some of the principles within the small carburetor from a single-cylinder 4-stroke gasoline engine. Students were asked to explore and explain how the carburetor worked, and then progressed through a set of hands-on labs culminating with a design modification and performance measurement of a real carburetor. At each stage, the students applied principles of fluid statics, control volumes, internal flow losses, and external flow drag to the physical device.

The paper will describe the specific activities, and track the evolution of refinements to the experience through three implementations of the same course by three different instructors. Student feedback and measured evidence of learning will be reported to help justify the evolution of the activity. The scalability of the activity will be discussed.