

Faculty	Engineering, Architecture and Information Technology
School	School of Mechanical and Mining Engineering
Activity	Flipped classroom using Small Private Online Course (SPOC)
Lead	Dr Vince Wheatley
Course	MECH3410 Fluid Mechanics
Average no. of students	250

The course

- Enhances knowledge of fluid mechanics (including the description and analysis of multi-dimensional, viscous and compressible flows) and a range of important engineering systems such as pipe flow in the process industries and flow of air around aircraft.
- Is taught in combination with tutorial and laboratory work to develop practical skills in flow measurement, analysis and interpretation of results.

Flexible and Active elements

- A Massive Open Online Course (MOOC) 'Hypersonics: From Shockwaves to Scramjets' (Hypers301x) developed in 2014 utilised the complete analysis of a scramjet engine as a relevant course-wide learning topic. Short video segments are interspersed with online formative problem solving activities and assessment.
- Hypers301x has attracted over 19,000 learners from 129 different countries.
- The MOOC paved the way for learning to be 'flipped' with a Small Private Online Course (SPOC). Traditional lectures were replaced with interactive problem solving sessions in the compressible flow component of the course. Engagement was maximised through using scenarios from 'dream jobs' which are integrated into each level of activity from in-class examples to assessment.
- A dynamic learning space was developed with these contextualised opportunities for experiential learning combined with digital response systems for real-time response and feedback.

Learning outcomes

- Students voted with their feet: class attendance rose sharply in the flipped classroom for the Compressible Flow section of Fluid Mechanics even though it was not for credit.
- Student performance on compressible flow questions on the final exam improved by 37% from 2013 to 2016 and continues to improve compared to the lecture-taught components.

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What the students say

In terms of student perception, early live polls of the class showed only 18% of students preferred the new format, with the remainder unsure (42%) or averse (40%). By the end of the course, perceptions had radically turned around; with live polling indicating over 90% of students preferred the flipped course design.

An excellent alternative to the traditional lecture format allowing students to have greater control and flexibility in their learning. I think that more courses should adopt this online lecture style... there are many students who like to learn by example, and this caters to them very well.

(Former UQ undergraduate and new hypersonics PhD candidate)

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