

For using Problem Centred Learning (PCL) pedagogy to achieve high level engagement, enthusiasm and exceptional learning outcomes

Since 2008, I have developed and implemented three distinctive strategies to embed PCL, inspire and motivate students. These strategies are operationalised through the whole teaching and learning process.

1. Purposeful, research informed subject content design with authentic and practical professional problems

To foster students' intellectual curiosity and interest in foundation subjects, I have re-designed the subject content to embed PCL into the two subjects. Teaching materials have been purposefully structured in order to facilitate better student understanding of core concepts using meaningful links to real-world problems that are authentic, interdisciplinary and thought provoking, mirroring those found in their future careers. The aim in providing practical and problem-oriented subject materials is to demonstrate the relevance of the theoretical

practical problems and how to solve the problems by following the correct steps, significantly enhancing their enthusiasm in learning and effectively instilling their critical thinking and problem-solving skills. This strategy has been particularly appreciated by the students, with positive student evaluation responses such as *"Learning the content and then demonstrating it through the use of examples is a very effective teaching method"* (Student evaluation, 2013), *"I benefited a lot from the in class examples"* (Student evaluation, 2013), and *"It is really useful the way Wenxian uses examples throughout his lectures to explain the concepts"* (Student evaluation, 2014).

3. Close monitoring of student progress and needs-based support approaches

The cohorts of both subjects are multidisciplinary, with very diverse academic capability. Increasingly, a notable proportion of the students enter the subjects demonstrating limited previous achievement in mathematics

Figure 1: Average institutional student evaluation scores of *Fluid Mechanics* and *Advanced Fluid Mechanics* over 2011-2014. Score scale: 1 = strongly disagree, 2 = disagree, 3 = neither disagree or agree, 4 = agree, 5 = strongly agree.

The student-centred and needs-based teaching and support strategies centred on problem solving have been particularly successful in encouraging active student engagement and motivating students to learn theoretical subject content, and build the students' confidence to achieve their best. The numerous positive student responses received during the institutional student evaluation process reflect the impact on student learning: **"He is a great lecturer who makes me enthusiastic about a topic I was not previously interested in"** (Student evaluation, 2011), **"He was always enthusiastic when teaching and made the subject an enjoyable experience"** (Student evaluation, 2013), **"Couldn't ask for a better lecturer! It is a credit to JCU & I recommend to students to select Mechanical as their discipline purely for him"** (Student evaluation, 2011).