

Teaching in Action

Faculty stories that inform and inspire.



Challenge

Students struggled with unfamiliar Fluid Mechanics concepts, showing poor engagement and performance in this historically challenging course.



Solution

The flexibility of Mastering Engineering allows students to work at their own pace, encouraging consistent engagement and reinforcement of critical concepts.



Impact

Student performance improved by 10–20%, with the only change being 2–3 hours of bi-weekly homework in Mastering Engineering.

Mastering Engineering

Transforming Fluid Mechanics through Interactive Learning

Professor Gerard Nagle at Technological University Dublin faced a challenge that plagues engineering educators worldwide: students struggling with Fluid Mechanics due to unfamiliarity with complex theoretical concepts, leading to poor engagement and historically low performance in this notoriously difficult course.

"The Fluid Mechanics course has historically been challenging for students due to their unfamiliarity with the concepts," Nagle explains. "Feedback indicated that students struggled with the unknown aspects of the subject." Teaching a four-year undergraduate course with a cohort size of 80–90 students, Nagle found himself in a position many engineering educators recognize—watching students disconnect from essential concepts they desperately need for their professional careers, with traditional teaching methods failing to bridge the gap between theory and practical application.

The Pearson Solution

The challenges presented by COVID inspired a new opportunity for Nagle to explore teaching methods and address classroom challenges. He discovered that Mastering Engineering could be a valuable tool in tackling these issues.

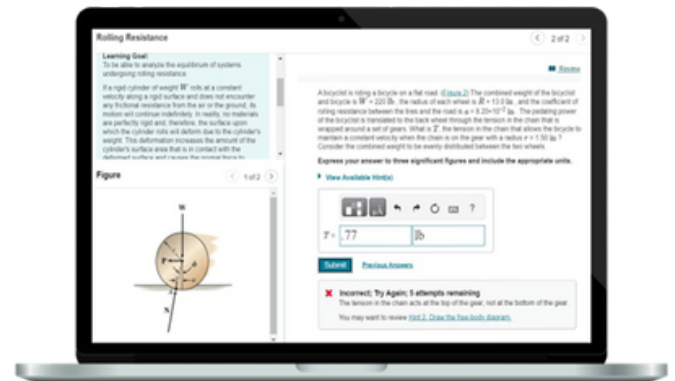
With Mastering Engineering, Nagle could confidently restructure his assessment approach, using strategic integration to support real learning and engagement while giving students consistent practice with immediate feedback.

Nagle chose Hibbeler's textbook as the foundation for his Mastering Engineering implementation because "the questions are practical and well-illustrated, making it easier for students to visualize and understand the problems." The textbook's many diagrams helped clarify complex concepts, while the problems focused on "practical engineering issues rather than purely academic ones," making them better suited for his students' needs.



**10–20% improvement
in student performance**

Mastering Engineering's weekly homework assignments, integrated seamlessly with the LMS, became an ideal solution for Nagle. The platform provides individualized support, practice, and feedback to learners directly within their assigned materials.



One key advantage was that "the textbook comes as an e-textbook, which eliminates the need to rely solely on physical copies from the library."

The student support in Mastering homework provided "hints without penalty," a feature that consistently ranked as most valuable by students. "A key highlight was the option to provide hints for each part of a question without students losing credit, helping them succeed," Nagle explains. Students could work through complex fluid dynamics problems, receiving guidance when stuck without fear of grade penalties, giving them multiple pathways to understanding concepts.

This strategic approach transformed Nagle's classroom dynamic. "The flexibility of Mastering Engineering allows students to work at their own pace, encouraging consistent engagement and reinforcing their understanding throughout the semester," he reflects. Instead of students avoiding challenging problems, they began developing what Nagle describes as determination, "similar to completing a quest in a video game."



The Outcome

The results spoke for themselves during implementation. Students actively used the platform for weekly assignments, working through problems with immediate feedback—exactly the kind of engagement Nagle hoped to see.

His controlled experiment using six past paper questions revealed something remarkable: students were achieving 10–20% improvement in performance with the only variable being 2–3 hours of bi-weekly Mastering Engineering homework.

Student feedback on Mastering Engineering was generally positive. One of the key advantages was the ability for students to view statistics and compare their performance with that of their peers, which proved helpful for self-assessment.

Students were eager to solve the questions and compare their progress, fostering a sense of healthy competition that led to increased engagement.



The flexibility of Mastering Engineering allows students to work at their own pace, encouraging consistent engagement.”

“Before using Mastering Engineering, I rarely had students asking for clarifications,” Nagle said. After implementing Mastering Engineering, students frequently approached Nagle with questions, indicating they were actively working on their assignments and engaging with the material.

Nagle reflects that “witnessing students' “Aha” moments as they understood new concepts is incredibly rewarding.”

The use of Mastering Engineering significantly improved student engagement by encouraging active learning and promoting collaborative study.

Educator Reflection

By embracing interactive technology while maintaining clear educational standards, Nagle has prepared his students not just for their next exam, but for a future where continuous learning and problem-solving skills will be integral to their engineering careers.

From his experience with Mastering Engineering, Nagle found the hints feature particularly valuable, as it allowed students to receive help without losing credit. The platform's automatic grading provided students with detailed performance breakdowns, while his favorite features—the e-textbook and average completion time data—proved essential for course management.

"The e-textbook ensures that all students have access to the required material, allowing me to set specific pre-reading tasks, while the average time feature provides a global benchmark, helping me gauge an appropriate workload for students," he explains.

“My favorite features include the e-textbook and the analytics that include the average time to complete questions.”



The platform's tracking feature proved invaluable in identifying and supporting non-participating students, ensuring they received the necessary assistance to stay on track. Nagle found witnessing students' "Aha" moments as they understood new concepts incredibly rewarding, with survey feedback revealing students likened their determination to finish the course to completing a quest similar to a video game.

"To bridge the gap between theoretical knowledge and practical lab experience, I aimed to introduce more interactive elements into the module using Mastering Engineering," Nagle concludes. In finding this balance, Nagle has created a model for how engineering educators can leverage technology to enhance student engagement while ensuring students develop the critical thinking skills essential for professional success.