

Flip your Class!

Prof. Daniel R. Lewin, Technion

Daniel's teaching, evolved over almost 30 years, has involved retaining and improving features that work well, discarding those that don't, and more recently, integrating teaching technology and approaches that have revolutionized and significantly improved his results. The most recent addition to his arsenal is the **flipped classroom**, involving the following sequence of activities, repeated every week of each course:



- (a) On-line Materials** – Produced by converting lectures to pre-prepared, on-line lessons composed of 5-15 min video clips and on-line quizzes. Students are expected to cover these materials on their own as homework, in advance of each week of activity, and are given course credit for doing so.
- (b) Class Meetings** – Moving from *teacher-centered lecturing* to *student-centered meetings in the classroom*. A typical class meeting combines quizzes, class discussions and open-ended problem solving, with the focus being to keep the students active. Giving students the opportunity to prepare ahead increases their effective participation in class, and impacts positively on the degree to which they learn, and master the application of what they have learned.
- (c) Active Tutorials** – For students to master course content, they need to apply themselves to independently work problem sets covering the curriculum. In active tutorials, students working in teams solve the classwork (previously referred to as homework) in class time. This ensures that:
 - All students who participate in the sessions are actively involved in working problems.
 - Assistance can be provided by staff and from students, helping each other.
 - Students, assistants and the lecturer all receive feedback in a timely fashion (in real time).



Prof. Daniel R. Lewin holds the Churchill Family Chair at the Faculty of Chemical Engineering at Technion. He is the co-author of the book, *Product and Process Design Principles*, published by John Wiley and Sons, whose fourth edition appeared in 2017, which is a widely-used teaching text in chemical process design. From 2019, the enhanced eBook of the 4th Edition includes approximately 90 videos clips and associated quiz questions, in a sense making it the first flipped textbook on process design. Daniel has been consistently active in continuing the development of his courseware, which promotes student awareness and competence in all aspects of Process Systems Engineering. He has twice received *Muriel and David Jacknow Awards*, as well as the *Weissman Award* for his innovative teaching methods. In 2009, he was the recipient of the American Institute of Chemical Engineering's *David Himmelblau Prize for Innovations in Computer-based Chemical Engineering Education*.

In 2015, he was the recipient of the *Yannai Prize* for teaching excellence at the Technion. Apart from his above-average teaching load, he also served as the *Assistant to the Technion Senior Vice President for the Promotion of Teaching at the Technion*, for eight years (2008-2015).