

NOMINATION STATEMENT

Professor Daniel R. Lewin, of the Technion, is nominated for the 2009 AIChE David Himmelblau Award for Innovations in Computer-Based Chemical Engineering Education. Since 1998, Danny has led the development and distribution of the Wiley CD-ROM product, *Using Process Simulators in Chemical Engineering: A Multimedia Guide for the Core Curriculum* (Lewin et al., 2003). This CD-ROM has been distributed as a separate product by Wiley – as well as included with every copy of the second edition of the textbook, *Product and Process Design Principles: Synthesis, Analysis, and Evaluation* (Seider, Seader, Lewin, 2004). Since January 2009, thanks to increased bandwidth, it has become available for downloading from the Wiley web site associated with the third edition of this textbook.

Using the authorware, MACROMEDIA DIRECTOR, multimedia material was generated for self-paced instruction on the usage of the major process simulators, ASPEN PLUS and HYSYS, and on basic concepts in the usage of MATLAB. Sequences of instructional materials were generated using text frames, animations, and frames displayed by the simulators, often narrated by voice and accompanied by videos of the industrial processing equipment. These were presented in DIRECTOR movies that are easily navigated by the students. Furthermore, to facilitate the usage by inexperienced students, Danny introduced two interconnected formats: (a) an encyclopedia-like source of reference materials on several subjects (e.g., Principles of Process Flowsheet Simulation, Separators, Heat Exchangers, Chemical Reactors, ...), delivered on many subtopics in the form of instructional modules, and (b) as a series of tutorials that are used in a self-paced fashion (e.g., under Material and Energy Balances, tutorials on Ammonia/Water Separation and Ethylchloride Manufacture). Materials under (b) are provided to accompany the core courses in Material and Energy Balances, Thermodynamics, Heat Transfer, Separations, Reactor Design, and Process Design.

When used by the students, the multimedia materials often reside in one window on the computer monitor with one of the process simulators in the other window. In this mode, as inexperienced students receive instructions on completing the simulator input forms, they make entries into the simulator forms and run the simulations.

Although behind the scenes in the successful wide-spread usage of the multimedia materials, it is important to recognize some of the underlying computing features introduced by Danny and Eyal Dassau, his former doctoral student. Including the voice and video segments, which were created in the late 1990s (before advanced voice and video computer communications became widespread), Danny and Eyal used SHOCKWAVE files that were accessed over the Internet using the EXPLORER browser. They created a package that easily installed the entire contents of the CD-ROM (over 400 Mbytes, a large quantity in the early 2000s) on user PCs. This package eliminated the bulk of the installation problems encountered by users world-wide. Still, for those that experienced special problems, Danny provided assistance using e-mail.

On three occasions, at the ASEE Summer Schools for Chemical Engineering Faculty (2002 and 2007) and at the Austin Meeting of AIChE (Nov. 2004), Danny and I conducted hands-on workshops on teaching process design using the multimedia materials. Following his lead at the Technion, he recommended that students be introduced to problem-solving using the process simulators in a one-credit, computer-lab course at the junior level, either following or in parallel with many of the core courses in the chemical engineering curriculum. To facilitate problem-solving, while introducing selected features of the process simulators, he and I created recommended sequences to be followed by the students using these multimedia modules. For each of six courses (Material and Energy Balances, Thermodynamics, Heat Transfer, Separations, Reactor Design, and Process Design), a sequence through the modules was recommended, homework exercises suggested, and solutions provided. Subsequently, we packaged all of these modules in a 112-page document created for the instructors of these core courses.

Using these self-paced instructional materials in Danny's one-credit course, without taking significant class time for lectures, students learn to use the process simulators. Consequently, at the senior level, when solving their process design problems, they are able to examine various processing configurations and optimize their designs – which are more closely aligned to those in industrial plants.

In summary, over the past decade, Professor Daniel Lewin has led the development of a novel multimedia package for teaching the use of the computer simulators. Beginning in the late 1990s, this package was one of the first to use animation, voice, and video – in encyclopedia and tutorial formats – to provide detailed instructions for inexperienced users. Students have used it successfully at their own pace and have required relatively little assistance from their instructors and teaching assistants. In my view, Danny's multimedia package is an excellent example of the use of computers to improve chemical engineering education. In some respects, this package is comparable, to the extensive set of educational modules introduced by Professor David Himmelblau in his CACHE Project in the earlier 1980s. For all of these reasons, in my opinion, Danny is an excellent candidate to receive the first Himmelblau Award.

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