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# Online Engineering Education: Learning Anywhere, Anytime

In “Online Engineering Education: Learning Anywhere, Anytime,” a comprehensive examination is conducted regarding the current status of online engineering. The authors are John Bourne, who has a more than 35 year history of work in engineering education, including the last decade of work with online education; Frank Mayadas, program director for the Sloan Foundation’s program on “Learning Outside the Classroom”; and Dale Harris, who has a long history of work with distance education courses, programs, and technologies.

The paper reviews the history of online education in general and then moves to investigation of the state-of-the-art in engineering education. A compendium of degree programs and innovative online courses are examined. One finding is that most complete online degree programs are at the master’s level with few bachelor’s degrees underway in 2005. This finding contrasts with the national need for matriculating more undergraduate engineering majors. Online programs in the context of accreditation are examined, finding that most, if not all, of the requirements from ABET can be satisfied in online venues. Continuing engineering education is examined in depth, finding that continuing education, offered at a distance, is widely used to satisfy the need for engineering education beyond the undergraduate level. Traditionally, laboratories have been thought to be the most difficult barrier to overcome in making online undergraduate engineering education ubiquitous. We examine what has been done with online laboratories, finding that significant work has been accomplished in providing engineering laboratories online. We also find that much work remains. We discuss the challenges involved in developing online labs with the attributes required for accreditation.

The paper discusses what we *need to know* and what we *need to do*. What we need to know includes securing more knowledge about methods for blended learning (in-class and online), different pedagogies for teaching and learning in online engineering education, and assessment methodologies. What we need to do includes improving quality of teaching and learning, enhancing faculty satisfaction, creating partnerships, and using technology wisely. Finally, the paper concludes with a discussion of trends and recommendations, focusing on quality, breadth and scale of online education.

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