

118b Troubleshooting in the Engineering Curriculum: an Integrated Approach in a Process Fluids Transport Course

Z. Otero Gephardt

Troubleshooting skills are an important component for a successful practicing engineer. They require strong critical thinking skills and an ability to make multivariate comparisons. These skills allow engineers to identify problems and develop suitable solution scenarios that lead to the design and implementation of an optimum solution. In general, the undergraduate engineering curriculum does not include a troubleshooting component. Although experience is an important aspect of troubleshooting, these skills can be introduced in the classroom to offer students a more realistic engineering experience. In addition, undergraduates introduced to troubleshooting early are likely to integrate more critical and creative thinking into their problem solving. Engineering troubleshooting was integrated throughout a junior level fluid mechanics course. Process Fluids Transport is a second semester course in fluid mechanics and focuses on engineering process applications including pipe networks, pumps, complex fluids, and multiphase flow systems. Troubleshooting was a part of in-class problem solving, examinations and laboratories. Troubleshooting activities included identifying and correcting errors in problem solutions and identifying and correcting problems with laboratory equipment. They also involved laboratory situations in which the problem could not be corrected in a timely manner. In this case, students developed alternative approaches to obtain the necessary information. In-class and examination troubleshooting examples will be presented. A troubleshooting example using a pumps in series and pumps in parallel laboratory, requiring the development of alternate strategies to obtain information, will be discussed in detail. The troubleshooting approach led to improved grades in standard class examinations, more substantive and energetic class discussions and a better understanding of the subject matter discussed and its relevance. Students also reported that they enjoyed the class more. The types of activities developed for this work can be used in any class to increase student involvement and understanding of the subject matter.