EFFECTIVE INTERPERSONAL AND TEAM COMMUNICATION SKILLS FOR ENGINEERS
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CLIFFORD A. WHITCOMB

LESLIE E. WHITCOMB
For Our Children
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PREFACE

This book is about learning effective interpersonal and team communication skills that are useful for engineers in the practice of their profession. Examples and exercises help you learn how to put together the basic units of effective engineering communication. Learning these basic units called microskills of communication, to use in your practice of engineering gives you options for handling issues that arise. Classic examples of these issues include moments when you are stuck with a project task that presents seemingly unresolvable technical issues or when you are stuck with a teammate who simply will not perform, or whose performance disrupts your own. In the process of learning how to handle these situations you will become an effective engineering communicator and you will be a better engineer. You will learn how to engage others. You will learn how to listen to others. You will learn how to manage conflict and influence others in highly constructive, repeatable communication exchanges.

The engineering field you have chosen as a profession holds as a primary purpose the benefit of society. The professional societies and tenets that will guide and bound your practice hold ethics, societal benefit, and the improvement of engineering effectiveness as their foundation. Our book guides you in the development of a significant new benefit to both your own profession and society. We give you this potential through our invitation to you to participate in a cutting edge engineering innovation—a skill set for effective interpersonal and team communication.

Throughout its history engineering has been nurtured by inventors and innovators who could see beyond the current limits of their field in order to...
create opportunities for social benefit. The steam engine was seen as a gadget that would never compete with the power of a horse. The computer was viewed as a sideline in relation to the real work that could be done by mechanical machines. Engineers saw beyond initial limitations and pulled together seemingly irrelevant and potentially disastrous elements to transform these nascent opportunities into full functioning contributions. They engineered these elements effectively and created technologies that contributed profoundly to benefit society for generation after generation.

Technical and nontechnical interpersonal communication is currently perceived as an almost irrelevant and minor component of the engineering process and engineering education—given short shrift even though it is continually required by professional societies and accrediting bodies, such as the Accreditation Board for Engineering and Technology (ABET). The ABET EAC 2010 Criterion 3 Student Outcomes lists several aspects for successful engineering education:

(a) An ability to apply knowledge of mathematics, science, and engineering.
(b) An ability to design and conduct experiments, as well as to analyze and interpret data.
(c) An ability to design a system, component, or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
(d) An ability to function on multidisciplinary teams.
(e) An ability to identify, formulate, and solve engineering problems.
(f) An understanding of professional and ethical responsibility.
(g) An ability to communicate effectively.
(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, societal, and environmental context.
(i) A recognition of the need for, and an ability to engage in, life-long learning.
(j) A knowledge of contemporary issues.
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Outcomes (d), (f), and (g) include aspects that require a learner’s curriculum to address development of an understanding of professional responsibility, working on teams, and communications. These “soft skills”, now sometimes referred to as professional skills, are given minimal space in
already crowded engineering education curricula because they are often the 
hardest to teach, to learn, and to assess. The skills related to these elements 
are not necessarily best learned through classroom lecture, but through 
practice in authentic engineering contexts, such as capstone design projects. 
They are crucial none-the-less. Their foundational quality is also highlighted 
by the United Nations Educational, Scientific, and Cultural Organization 
(UNESCO) which has defined four pillars of education.

- Learning to know
- Learning to do
- Learning to live together
- Learning to be

The skills related to interpersonal communications primarily fit the intent 
of the Learning to be—which includes all aspects of human development—they also directly support Learning to live together.

Taking this global perspective and translating it into high quality engineer-
ing educational deliveries, the International Conceive, Design, Implement, 
and Operate (CDIO) initiative has sought to bring a more holistic view for the 
education and development of engineers.

*There is a growing recognition that young engineers must possess a wide array of personal, interpersonal, and system building knowledge and skills that will allow them to function in real engineering teams and to produce real products and systems, meeting enterprise and societal needs.*

(Crawley et al., 2011)

The CDIO initiative defines a syllabus for engineering education that 
addresses a broad span of competencies, technical and non-technical, for 
engineers, that should address

*Specific, detailed learning outcomes for personal and interpersonal skills, and product, process, and system building skills, as well as disciplinary knowledge, consistent with program goals and validated by program stakeholders.*

(Crawley et al., 2007)

In addition to being important for global competencies, communication is 
often cited as one of the most highly desired and important traits of a 
successful engineer in the US defense workforce. Figure 1 shows the results