Building Microskills for Effective Engineering Communication

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Abstract

A set of skills has been identified for developing engineering communication based on a model called the Microskills Hierarchy (Ivey and Ivey, 2003). These microskills are implemented through instructional and learning materials for both faculty and students.

The goal is to implement this approach beginning in Winter 2012. The current challenge is related to assessing the effectiveness of the microskills for communication and teamwork outcomes in the context of authentic engineering scenarios.

Project Based Learning Community

Introduction and Objectives

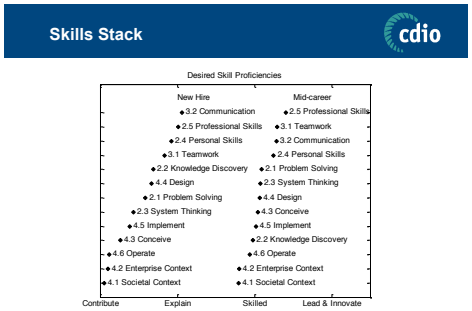
The objective is to develop communication skills for engineers. This includes general oral and interpersonal communications, as well as providing for effective teamwork, and ultimately professional engineering proficiency.

These skills apply to all engineering disciplines. They can apply across almost all engineering courses, especially if they are interwoven with communication objectives.

Developmental History of Innovation

The motivation for developing this innovation was grounded in both practice and theory. From practical situations, the need for effective communication styles in engineering projects was observed. A need exists for being able to assess both teamwork and communication objectives and outcomes.

Two specific systems engineering stakeholder surveys confirmed. the critical importance of effective communication skills.



Niewoehner, Robert, "CDIO Syllabus Survey: Systems Engineering an Engineering Education for Government", Systems Engineering Lessons Learned Conference, Naval Postgraduate School, Monterey, CA, 23 Sep 2010

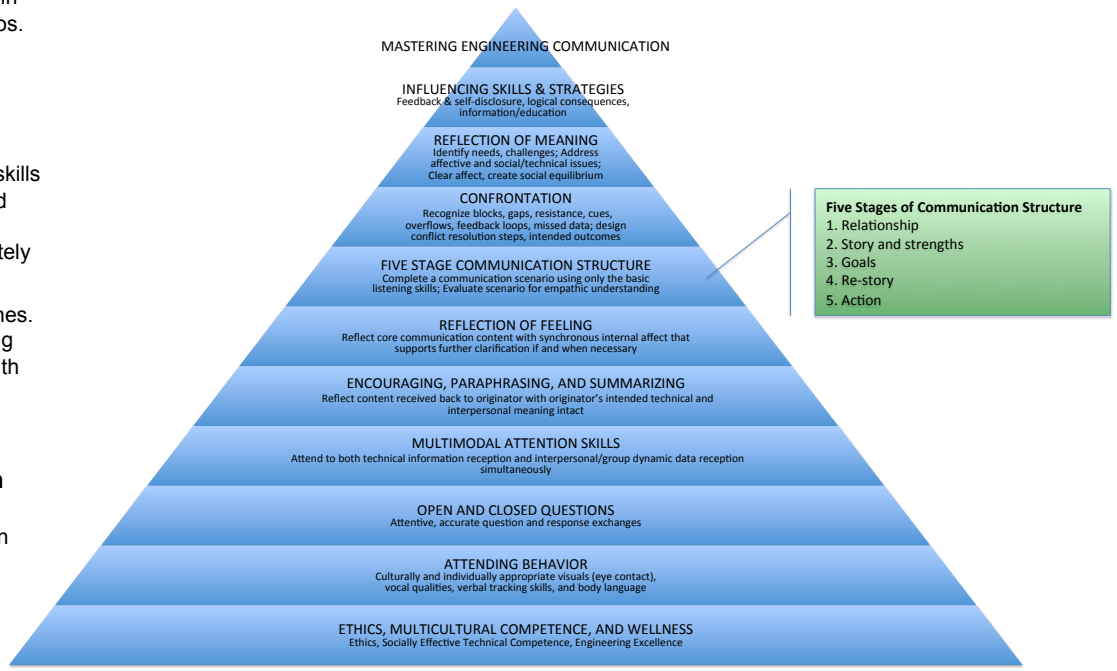
Learning Activities and Materials

Learning activities are under development, along with associated assessment strategies and rubrics.

A description of the implementation within a project-based learning environment has been drafted.

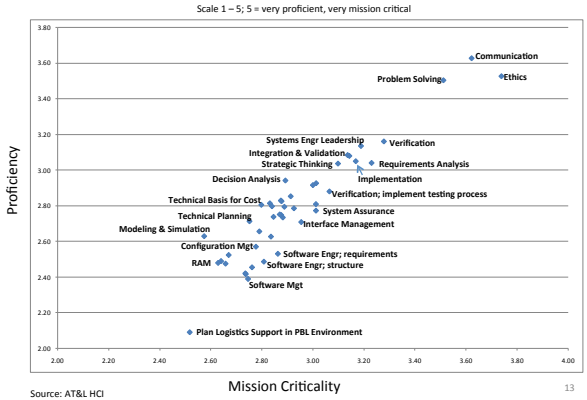
Execution

The model has not been implemented in classroom settings, but this is planned starting Winter Quarter 2012, in conjunction with a project-based learning systems engineering curriculum pilot.



Intentional Interviewing Pyramid adapted to Engineering Communication Attributes, from Ivey, A., Ivey, M., and Zalaquett, J. (2010), Pacific Grove; Brooks Cole

Competency Assessment – SPRDE
Plot of DoD-Wide Proficiency and Mission Critical Ratings



Source: AT&L HCI

13

Major Issues to Resolve

The main issues deal with implementing learning objectives related to Affective versus Cognitive domains. The approaches are designed for project-based learning, as informed by the International Conceive, Design, Implement, and Operate (CDIO) Initiative syllabus. Precisely how to best assess the communication and teamwork ABET outcomes in criterion 3 through a well defined set of performance indicators remains to be determined.

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Discussion

Developing engineers who can work together in multidisciplinary teams, overcome interpersonal challenges, and become persuasive communicators is a critical need in the classroom and for the engineering profession.

These principles can be expanded to learning entrepreneurship and technical leadership in both classroom and professional settings. The effectiveness of the various techniques proposed, in both classroom and professional settings, needs to be studied. Submission of a proposal to NSF via the RIGEE or similar grant program is planned.

Acknowledgments

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Effective Communication Principles for Engineers, Clifford A. Whitcomb and Leslie E. Whitcomb, IEEE Professional Engineering Communication Series Series on Communication, Wiley-IEEE Press, (to be published in 2012).

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