

A Systematic Web and Literature Search for Instructional and Assessment Materials addressing EC 2000 Program Outcomes

Susan Haag¹, Rita Caso², Emily Fowler³, Russ Pimmel⁴, Pete Morley⁵

ABSTRACT- *The engineering accrediting body (ABET) has identified the skills and competencies in which engineering students are expected to be prepared by their engineering programs (EC2000, Criterion 3, a-k). These competencies include several often characterized as ‘soft’, open-ended, or non-traditional (i.e., communication, teaming, awareness of global and social impact, etc.), which engineering faculty often profess feeling ill prepared to teach, and less prepared to assess, as classroom or programmatic outcomes. Typically, the traditional sources of engineering assessment tools and models (i.e., test suggestions from engineering texts, and examination problems borrowed and adapted from other faculty members) are poor in resources addressing the ‘soft’ ABET competencies. For these reasons a group of engineering educators and assessment and evaluation professionals from four NSF Engineering Foundation Coalition partner universities, undertook comprehensive, systematic web and print literature searches, and a survey of first hand information about instructional and assessment materials being used to address the ABET a-k competencies. This paper confines itself to describing the methodology used and the results obtained in the systematic web and literature searches. The paper discusses (1) the extent to which relevant instructional and assessment materials, for each particular ABET a-k category, were found to be publicly accessible online and in libraries; (2) the systematically cumulated impressions of investigators about the utility of the available materials; (3) the extent to which a-k instructional or assessment materials could be readily extrapolated from articles and presentation papers addressing ABET assessment; (4) the work undertaken to develop a web-searchable, database of categorized and annotated references to refer engineering educators to appropriate and available materials; (5) the efforts to select, systematize and implement uniform methods for searching, documenting, classifying and compiling search information.*

Index Terms — ABET, EC 2000, assessment, instructional materials, teaching materials, literature search, web search

The Discovery Study

¹Susan Haag, PhD, Arizona State University, susan.haag@asu.edu

²Rita Caso PhD, Texas A&M University, TAMU FC A&E, 347 Zachry, TAMU MS 3405, College Station, TX 77843-3405, dr-rita@tamu.edu

³Emily Fowler, University of Massachusetts – Dartmouth, efowler@umassd.edu

⁴Russ Pimmel, PhD, University of Alabama, rpimmel@coe.eng.ua.edu

⁵Pete Morley, PhD, University of Alabama, l.morley@ieee.org

ACKNOWLEDGMENT: This project was funded in part by NSF EEC-9802942

The eleven ABET EC2000, Criterion 3, a-k processing skills are often characterized as technical or non-technical skills. Engineering faculty often refer to the technical as the ‘hard’ or ‘traditional’ skills and the non-technical as the ‘soft’ or ‘non-traditional’ skills. In order to have some confidence that their graduates will demonstrate acceptable levels of performance in these areas of competence targeted by the engineering accrediting body, programs must provide instruction and must assess their students in these skills. What instructional and assessment materials are being used in engineering programs to teach and measure competency in a-k processes? How useful and effective are the materials which are being used to teach and to assess a-k processes in engineering programs across the country? Can we identify, organize and characterize these materials? Is there a gap between the demand and the general availability of materials to teach and assess each of the ABET a-k competencies? These were questions posed by the NSF Foundation Coalition Discovery Study Team as it reflected upon instructional materials and assessment tools which had been generated by the FC project over the years. These were the questions the team attempted to answer, in part, through comprehensive, systematic web and print literature searches and through the organization and examination of search findings. An additional survey of first-hand information about instructional and assessment materials was also undertaken, but is not within the scope of this paper.

Early analyses and examinations of web and literature-search findings indicate that the body of instructional materials for teaching processing skills is not consistently well developed across a-k categories, nor are materials documented, widely accessible, systematically organized, or systematically characterized. This is particularly true for the non-technical or ‘soft skills’. Similarly, available materials to assess a-k competence are not evenly distributed across a-k areas, are not well documented, are not organized in reference a-k competencies, and are not readily accessible. In addition, tools for assessing perceptions and attitudes far outnumbered materials for deeper, more complex assessments.