Proposal for Revising the Institute Student Learning Outcomes

Commission on the Assessment of Student Outcomes
March 2007

Proposal Summary

The Commission on the Assessment of Student Outcomes (CASO) proposes that the current Institute Student Learning Outcomes be revised. The proposed outcomes would restructure the current outcomes to reflect the needs of students and faculty, as well as changes in engineering, mathematics, and sciences professions since our current outcomes were instituted. While we would retain the RosE Portfolio as the primary data collection system, we believe the proposed domains and revised outcomes will produce more accurate information about our students and help us prepare more effectively and efficiently for our next accreditation cycle for both ABET and NCA.

Justification for a Proposal for Revising Outcomes

It is the opinion of CASO that several facts indicate that this is the proper time to make changes to the Institute Student Learning Outcomes.

First, we completed the six-year ABET accreditation cycle with the EAC/CAC site visit in October 2006. Thus, we will begin a new cycle in the fall of 2007. If we wish to make changes to our Institute Student Learning Outcomes, then we should so before we are too deeply into the next accreditation cycle.

Second, there is some degree of faculty dissatisfaction with the current outcomes and associated performance criteria. Even though we have used the ten outcomes for over six years, faculty members have found that the current outcomes do not seem appropriate to their majors or their courses, and thus some departments feel excluded from the student learning outcomes process. For instance, some departments do not see the Design outcome as integral to the education of their students or to the nature of their disciplines.

Third, changes in engineering, mathematics, and science professions and graduate school programs indicate that we should adapt and revise how we prepare students for their careers and further education. Reports like the National Academy of Engineering's *The Engineer of 2020*, as well as recent globalization trends, indicate that we should prepare our students for a new set of challenges. For example, when CASO first formulated the Global outcome, there was not a pronounced emphasis on globalization and cross-cultural teams within industry. Changes in the world have led CASO to conclude that changes at Rose-Hulman are now necessary.

Fourth, as President Jakubowski has observed, Rose-Hulman must continue to improve its processes if we are to remain competitive with our peers. Retaining a leadership role in the area of engineering, mathematics, and science education necessitates that we continue to improve our student learning outcomes assessment process.

Description of the Current System

In 1998, the CASO group, with input from the faculty, defined a set of ten outcomes that reflected both the skills defined by the ABET Engineering Criteria, as well as skills we regarded as important for all graduates of Rose-Hulman:

RH 1. Ethics - A recognition of ethical and professional responsibilities

RH 2. Contemporary Issues - An understanding of how contemporary issues shape and are shaped by mathematics, science, & engineering

RH 3. Global - An ability to recognize the impact of global societies on citizens and professionals

RH 4. Culture - An ability to understand diverse cultural and humanistic traditions

RH 5. Teams - An ability to work effectively in teams

RH 6. Communication - An ability to communicate effectively in oral, written, graphical, and visual forms

RH 7. Problem Solving - An ability to apply the skills and knowledge necessary for mathematical, scientific, and engineering practices

RH 8. Interpreting Data - An ability to interpret graphical, numerical, and textual data

RH 9. Experiments - An ability to design and conduct experiments

RH 10. Design - An ability to design a product or process to satisfy a client's needs subject to constraints

The Institute Student Learning Outcomes process has been in place since 1998 when the first student portfolios created for a pilot project were evaluated.

In 2000 with the agreement of the faculty, the ten outcomes were divided into two domains: the Professional (“Soft”) Six and the Core Four. This division left the definition, collection, and assessment of student learning in the Core Four to the technical departments. Evidence of student learning in the other six outcomes was collected through the RosE Portfolio System and evaluated annually by a team of trained portfolio raters from the faculty.

Description of the Proposed System: Domains and Outcomes
The structure of the new system is comprised of three Domains and nine Outcomes.

Domain: Rather than dividing outcomes into two domains, the new system divides them into three that are pertinent and descriptive:

- **Technical Knowledge**
- **Interpersonal Skills**
- **World Citizenship**

We are using the term "domain" to provide an organizing structure for what we believe are the three dimensions of a Rose-Hulman student's education by the time of graduation. The three domains also reflect what we see as crucial to a Rose-Hulman student's success: disciplinary expertise, the ability to work and communicate with others, and the ability to perform that work in a global context while contributing to the world at large.

There is a further advantage to using the domain concept to organize the process. We see in these domains their potential to provide a bridge to the ABET "Program Educational Objectives," those measurable traits that graduates of a program demonstrate in their professional careers or graduate school experiences. Data are already being collected regarding the three domain areas. For example, current measurements employed in the Institute-wide Academic Alumni Survey ask alumni to report on their educational and professional activities (such as continuing education and service activities), data that indicate continuing development in the three domains. Departments are also collecting data for Program Educational Objectives from other sources, such as feedback from Department Advisory Boards and focus groups and surveys with employers.

Outcomes: As is the case with the system currently in use at Rose-Hulman, student learning outcomes are what students must know or be able to do by the time of graduation. We propose a set of nine student learning outcomes:

Domains	**Student Learning Outcomes**
Technical Knowledge	1. Discipline-appropriate knowledge 2. Problem definition and solving skills 3. Analysis and synthesis skills
Interpersonal Skills	4. Leadership 5. Teamwork 6. Communication
World Citizenship	7. Cultural and civic awareness 8. Ethics 9. Service

Some of these outcomes are new, like an outcome for leadership; some of the outcomes are similar to the current system. In revising the list of outcomes, we have taken into account both changes in the technical professions and graduate schools, as well as accreditation demands (ABET Engineering Criteria).

As is the case with the current system, we propose that each academic department on campus define the Technical Knowledge domain as is appropriate to their disciplines. This should allow departments that do not need to meet ABET requirements to have more flexibility in defining their program outcomes and mapping them into the Institute outcomes. Departments who are required to meet ABET requirements will find it a simple process to map their current program outcomes into the proposed Institute outcomes as well as to the ABET Engineering Criteria. In both cases, all departments will continue to collect evidence of student learning and to rate that evidence using their own evaluation processes in order to show that they fulfill the Technical Knowledge domain.

While the Technical Knowledge domain remains the province of each department, CASO will continue to work on issues related to data collection and evaluation processes for the other two domains. Collecting evidence of student learning in Interpersonal Skills and World Citizenship will continue at both the Institute level and the department level. We also foresee the potential for data collection through co-curricular activities for the Leadership and Service outcomes. In addition, the work to devise evaluation tools for each outcome will go on during the summer of 2007 by CASO and members of the faculty. By the start of the fall academic quarter in August 2007, the new evaluation tools will be in place and ready to be used.

Additional Document
Attached to this proposal is A Map of Current and Proposed Institute Student Learning Outcomes with ABET A-K. This document should help faculty members visualize the impact of the proposed outcomes revision on their own programs.

This proposal is submitted to the faculty of the Institute by the members of the Commission on the Assessment of Student Outcomes