

AC 2009-1676: DEVELOPING STUDENTS' ABILITIES IN TECHNICAL LEADERSHIP: THE ROSE-HULMAN LEADERSHIP ACADEMY

James Hanson, Rose-Hulman Institute of Technology

James Hanson is an Associate Professor of Civil Engineering at Rose-Hulman where he has been teaching since 2002. Among the courses he teaches is the capstone design course where he mentors team leaders. He has received several teaching awards including the ASEE Illinois-Indiana Section Outstanding Teaching Award and the ASEE Outstanding New Mechanics Educator Award. He has four years experience as a US Army officer where he led combat ready units. Recently he helped initiate the Rose-Hulman Leadership Academy.

Julia Williams, Rose-Hulman Institute of Technology

Julia M. Williams is Executive Director of the Office of Institutional Research, Planning and Assessment & Professor of English at Rose-Hulman Institute of Technology, Terre Haute, Indiana. Her articles on writing assessment, electronic portfolios, ABET, and tablet PCs have appeared in the Technical Communication Quarterly, Technical Communication: Journal of the Society for Technical Communication, The International Journal of Engineering Education, Journal of Engineering Education, and The Impact of Tablet PCs and Pen-based Technology on Education. She is the recipient of the 2007 HP Technology for Teaching Award and the 2008 Rose-Hulman Board of Trustees Outstanding Scholar Award.

Developing Students' Abilities in Technical Leadership: The Rose-Hulman Leadership Academy

Introduction

The importance of leadership skills for engineers is reflected in the addition of “leadership” to the institutional student learning outcomes of our college. In recognition of that importance, the Rose-Hulman Leadership Academy was created to help develop leadership confidence in students with untapped leadership potential. This paper provides an overview of the objectives of the Leadership Academy, the curriculum used, and the impact on student confidence. Student self-assessment tools showed that students’ self-confidence grew over the course of the academy. Our conclusions indicate that the Leadership Academy provides skills development opportunities that are important for engineering students who will fill roles as technical leaders in the future.

Background

In the summer of 2007, engineering programs at Rose-Hulman were re-accredited under ABET, Inc. and the Engineering Accreditation Council. The receipt of re-accreditation was the culmination of a six year process, and the core of our work to be re-accredited included assessment of student learning related to a set of institutional outcomes. Results of assessment—conducted through our digital portfolio system—were used by engineering programs to plan curricular changes and make improvements. The end of the cycle in 2007, however, only meant the beginning of a new cycle of accreditation, and for many of us at Rose-Hulman, we saw this as an opportunity to review the institute student learning outcomes and revise them to reflect new challenges our graduates must meet as they move into the engineering workforce and to graduate school. Some of the institute outcomes, like communication, teams, and ethics, remained important outcomes to continue to assess, both for the purpose of our institutional focus and for program accreditation requirements. In addition, we saw new challenges for our students, reflected in important publications like *Rising Above the Gathering Storm* (Committee on Prospering in the Global Economy of the 21st Century, 2007) and *Educating The Engineer of 2020* (National Academy of Engineering, 2005), publications that pointed us toward revising our institutional outcomes. In a project taken on by our institute-wide committee responsible for maintaining our student learning outcomes process—the Commission on the Assessment of Student Outcomes (CASO)—we determined that adding a leadership outcome to our set of institutional outcomes would be a significant revision.

The decision to add leadership to the list was reinforced by the development of Rose-Hulman president’s Strategic Plan. This plan, designed to chart a course for the institution into the future,

marked out several new directions for our college, such as increasing students' experiences with global teams and creating new cross-disciplinary programs. Coupled to the plan was a new Vision statement that articulated the institution's Mission: "To be the best in engineering, mathematics and science education, to make an impact upon the world in which we live, and to be a leader in every aspect in the delivery of education and the development of tomorrow's leaders." The emphasis on leadership—both being a **leader** in education and developing our students as **leaders** in their chosen technical areas—has been reinforced in the president's public speeches, presentations to alumni, and discussions with representatives from industry. The emphasis was also incorporated into a fundraising campaign, a strategy to provide support for these new directions. The campaign was tied to the Strategic Plan under a marketing slogan: "Rose-Hulman Student of 2014—Excellence. Leadership. Impact."

Leadership Assessment and Development

While the importance of leadership skills to our students' futures seemed certain, the proper way to assess student leadership skills remained problematic. Like most engineering programs, the technical curriculum of every major on our campus is already at capacity; it would be impossible to gain faculty approval to add yet another course to every major, not to mention the difficulty of staffing it properly. In addition, we had no clear sense of the current state of our students' participation in activities through which they could develop leadership potential. For these reasons, we pursued two objectives concurrently as we tried to address the need for leadership skills development for our students.

To understand the current state of leadership activities on our campus, we began to collect data about our students and their co-curricular activities. Working with staff in the Office of Student Affairs, we developed a data collection method to determine what percentage of students help leadership positions in their campus activities. The collection method was a survey form that was required from all campus organizations that received funding from the Student Activities Board. The form specified that all officers in the organization be identified. These forms were collected in the fall of 2008 for the first time, and the data was compiled by the Office of Student Affairs.

We recognized that knowing the number of students who hold leadership positions would indicate the extent to which students have opportunities to develop their skills. What remained unclear, however, was the actual state of the skills our students possess and the direct training in leadership that students could expect to encounter in their co-curricular activities. For example, being president of one's social fraternity may provide a student the opportunity to be a leader, but the student may receive no training in leadership specifically. For this reason, the idea of creating a Leadership Academy emerged, a place where student could receive leadership training in such diverse areas as communication, team management, ethics, and other topics.

Leadership Academy Concept and Development

In embarking on the development of the Rose-Hulman Leadership Academy, we looked to a variety of models of leadership training conducted at colleges across the United States. Despite the strengths of these approaches (and we patterned our academy on several of their themes and topics), we shared a sense that our students required specialized leadership training.

The group that gathered together to develop the Leadership Academy concept and curriculum was drawn from diverse areas on our campus: faculty from engineering and the humanities, staff from Student Affairs and the Business Office, and staff and the associate dean from Rose-Hulman Ventures, our college's business incubator. All of these participants shared the belief that our students needed leadership training that was specifically designed for technical people. Despite the shared goal, each of us brought different strengths to the curriculum development project. These strengths determined how we would portion out the curriculum responsibilities: the communication faculty member would provide training in leadership communication, the financial officer would provide training in notions of privilege, the Student Affairs staff member would provide training in theories of leadership, to name only three.

As we developed the curriculum, we sought out a group of students who would be interested in participating in the inaugural class. We decided to circulate an announcement of the Leadership Academy to all enrolled students, inviting students to apply for admission. The brief application asked questions about the student's current leadership positions, experience in leadership training, and reasons for wanting to participate in the Leadership Academy. From this set of applications, 15 students were selected to participate.

The format for the inaugural Academy was weekly meetings over a six week period during the summer of 2008. Each session was conducted during the afternoon and lasted roughly 5 hours. For the second Academy class, begun in the fall of the 2008-09 academic year, the sessions met on three Saturdays—in October, in January, and in March. These sessions lasted from 9:00 AM to 4:00 PM.

The goals of the Academy are as follows:

Leadership Academy is a hands-on experience designed to build each participant's:

- Confidence in their ability to lead;
- Consciousness of various leadership approaches;
- Connection with leadership resources & mentors; and
- Civic awareness.

Curriculum

The curriculum of the Leadership Academy is as follows:

Session 1—Building a Definition of Leadership; Personality Assessment (“True Colors”); Communication Theory (including an exercise in which students played roles of good and bad office leaders); Leadership Theory I

Session 2—Leadership Theory II; Privilege and Leadership; Communication and Leadership; Generating Buy-in to New Ideas (a panel discussion with local civic and corporate leaders)

Session 3—Listening as Leadership; Character Development (including a scavenger hunt); Personal Leadership Development Plan; Awarding of Leadership Academy Certificates

In addition to the curriculum listed above, students were asked to write a Personal Reflection at the end of each session. This reflection was intended to help students synthesize the variety of topics covered during the day and to allow them time to self-assess their progress through the Academy.

Preliminary Assessment

In response to the addition of “leadership” to the institutional student learning outcomes of our college, we began polling all graduating seniors this year about the importance of leadership and their preparation for leadership. Note that Rose-Hulman only offers degrees in math, science and engineering, so all graduates plan to enter technical fields. The responses of the senior class of 2009 are presented in Table 1. Over half, 55.4%, of the senior class responded to the survey. The results show that even though leadership is seen as important, graduating seniors feel that their education only prepared them moderately to well in this area. These results underscore the importance of the Leadership Academy.

Table 1. Campus-Wide Survey Results from Senior Class of 2009

Senior Exit Survey Question	Very Important (5)	Important (4)	Moderately (3)	Somewhat (2)	Unimportant (1)	Average Response
How important is Leadership to your current position/activity?	79	85	33	12	4	4.0
	Very Well (5)	Well (4)	Moderately (3)	Barely (2)	Not at All (1)	Average Response
How well did your Rose-Hulman education contribute to your development of Leadership?	42	86	54	20	9	3.6

The first class completed the Leadership Academy in the summer of 2008. There were 14 participants. Therefore, the results presented here are not statistically significant, but are presented as preliminary assessment of the Leadership Academy training. Based on the first class’ responses to pre-course and post-course surveys, participants started and ended with a strong belief that they have the potential to be effective leaders (Table 2). Their responses also

indicated that they experienced increased confidence in skill areas associated with leadership (Table 3). When asked “Which of the following leadership areas do you feel you have improved the most as a result of this training?”, the most common answers were Communication, Vision, and Interpersonal Skills (Table 4). Based on these responses, we conclude that the Leadership Academy is achieving its first goal, “Build each participant’s confidence in their ability to lead.”

Table 2. Summary of Self-Assessment of Leadership Potential from Pre- and Post-Course Surveys of Leadership Academy Participants for the Summer 2008 Course

I have the potential to be an effective leader	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Average
Pre-Course	11	3	0	0	3.8
Post-Course	12	1	0	0	3.9

Table 3. Summary of Self-Assessment of Leadership Ability from Pre- and Post-Course Surveys of Leadership Academy Participants for the Summer 2008 Course

Rate your current ability to perform this compared to your peers:	One of the Best (5)	Above Avg (4)	Average (3)	Below Avg (2)	One of the Worst (1)	Average Response	Δ from Pre-Course
Conduct a meeting	7	3	2	0	0	4.4	+0.4
Inspire someone to take action	3	6	4	0	0	3.9	+0.3
Resolve a conflict between yourself and another person	10	3	0	0	0	4.8	+0.8
Make a presentation to a group of people	6	4	2	1	0	4.2	+0.7
Listen to other people's opinions	7	6	0	0	0	4.5	+0.6

Table 4. Summary of Responses about Improved Skills from Post-Course Survey of Leadership Academy Participants for the Summer 2008 Course

Leadership Areas Improved	Number of Responses
Character	3
Communication	10
Emotional Intelligence	3
Interpersonal Skills	7
Organization	3
Vision (Direction)	8

The second goal of the Leadership Academy is to “Build each participant’s consciousness of various leadership approaches.” Success toward this goal is evidenced in a variety of written comments from the Post-Course Survey:

“This training hasn’t changed my moral beliefs or what I think about certain issues. What it has done is enabled me to find a new way to express the same meaning through a method that shows more leadership ability.”

“It has opened my eyes to new ideas and ways of thinking about leadership that I had not thought of previously.”

“I thought that focusing on the desirable traits of leaders, as well as learning how to plan and structure communication, were valuable lessons.”

“The Academy didn’t use just one method. Instead they discussed many leadership theories and applications. It is important to understand that leadership is a combination of everything a person does.”

“[I really enjoyed] discussing the reasoning behind several methods I have seen people use in the field.”

The third goal of the Academy is to “Build each participant’s connection with leadership resources and mentors.” The instructors for the Leadership Academy are a blend of faculty and staff from a variety of departments from across the institution. One of the benefits of this blend is that it provides the students with a diversity of mentors who interact with the participants in exercises and small group discussions. The participants are encouraged to contact any instructor from the Academy for mentoring on specific leadership situations or on personal development in general. At this time, participants have not yet approached us for mentoring after the conclusion

of the Academy. This is an area we are reviewing. However, one comment from the Post-Course Survey did address our third goal:

“I also really enjoyed looking through and reading the books distributed to the class, which I would have probably never thought to have read otherwise.”

The fourth goal of the Leadership Academy is to “Build participant’s civic awareness.” The motivation for this goal is the recognized need America has for leaders who bring the special skills developed in a math, science or engineering degree program. It also reflects Rose-Hulman’s emphasis on service activities. In addition to “leadership,” Rose-Hulman recently added “service” to the institutional student learning outcomes. Thus, underlying theme in the Leadership Academy is that leadership skills are applicable in all areas of one’s life, not just at work.

In the Post-Course Survey, the participants were asked “In what areas of your life do you think this leadership training will help you?” Every participant identified at least one area in addition to work. Their responses included the following:

- Student
- Extra curricular
- Career
- Community
- Family
- Friendships
- Follower & Leader

Several comments from the Post-Course Survey support the conclusion that we achieved our fourth goal:

“The Leadership Academy really stressed the importance of interpersonal skills and communication in both personal and professional settings.”

“I whole heartedly believe that leadership training isn’t just about becoming a better leader. It is about becoming a better person.”

“I feel that this sort of teaching is highly lacking in today’s education, but it is central to both employment and daily life.”

“I believe that the character skills and good leadership habits that I have learned here, such as taking a personal involvement in my follower’s lives and being encouraging, will benefit me in all the areas of my life.”

“The Leadership Academy was one of the greatest experiences I have had here at Rose-Hulman. Not only has it helped me as a leader, but as a person in society.”

Conclusion

Recently, Rose-Hulman created the Leadership Academy in order to help students realize their untapped leadership potential. In the summer of 2008, the first group of students completed the Academy. Based on their feedback, it appears that the Rose-Hulman Leadership Academy is achieving at least three of its four goals. The second class is ongoing during the 2008-2009 school year, and data will be available from that class by summer 2009.

We have presented an overview of the development of the Leadership Academy and description of the curriculum to promote use at other math, science, and engineering schools. The authors welcome any inquiries for more information.

References

Committee on Prospering in the Global Economy of the 21st Century: An Agenda for American Science and Technology. (2007) *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*. Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine of the National Academies. The National Academies Press, Washington, D.C., 592p.

National Academy of Engineering. (2005) *Educating the Engineer of 2020: Adapting Engineering Education to the New Century*. The National Academies Press, Washington, D.C., 208p.