

Engineering Leadership Studies and the Robe Leadership Institute Model in the Russ College of Engineering and Technology at Ohio University

David J. Bayless*, Jerrel Mitchell, and T. Richard Robe

Robe Leadership Institute in the Russ College of Engineering and Technology at Ohio University
 bayless@ohio.edu, mitchejl@ohio.edu, robe@ohio.edu

Abstract - As technology's influence grows, it is critical that engineers take a greater role in public and private leadership. Most engineering students, however, are not exposed to formal studies in leadership development. For the past 12 years, the Robe Leadership Institute (RLI) has encouraged effective leadership for the college's students, faculty, and staff through a wide variety of activities, classes, and guest speakers. The focus on leadership concepts, styles, self-realization, and personal interactions with established leaders develops each student's own leadership style in preparation for future opportunities. This paper will summarize Institute progress in leadership education, focusing on the yearly course offered to the Russ College's most promising student leaders. This course includes a literature survey, studies of emotional intelligence and leadership styles, team building, interactions with invited leaders, and journaling on each activity. The course structure, pedagogy, assignments, speaker interaction, alumni surveys, and future goals will be presented.

Index Terms – Leadership education, leadership models, leadership survey.

INTRODUCTION

Leadership is difficult to define, but many consider it important for engineers to understand and develop leadership for future individual and societal success. [1,2] From the desire to produce engineers who can lead in the public and public policy sectors to a real need for leadership in technical commercial ventures, several institutions have developed engineering leadership courses, certificates, minors, and integrated curriculum-wide programs. [3-11] Most of these efforts focus on development of skill sets to improve a student's ability to perform as a successful manager in a technical field. The engineering leadership studies described in this paper focus instead on fostering understanding of leadership concepts, emotional intelligence, personal leadership styles, team building, and self-realization. They use the tools of personal interactions and discussions with established leaders and the application of journals for reflection on each course activity to develop the student's own leadership style and prepare them to maximize future leadership opportunities.

Starting with the idea that leadership is the ability to create a viable vision of the future and to work with and through others to bring that vision to fruition, the Ohio University Board of Trustees, with key contributions from Mr. Gerald Loehr and Mrs. Beth Stocker, established and endowed the T. Richard and Eleanor K. Robe Leadership Institute (RLI) within the Russ College of Engineering and Technology in 1996; Robe was appointed to be its first director and was the architect of its initial initiatives during the first eight years. The Institute was envisioned to promote and encourage effective leadership for the college's students, faculty, and staff through a wide variety of leadership activities, classes, and guest speakers, and annual leadership awards that would allow and incentivize them to reach beyond their professional competence and prepare them for future leadership roles. After twelve years, the Robe Leadership Institute continues to provide a special opportunity to students, faculty, and staff members with leadership potential: the opportunity to gain the knowledge and skills necessary to help positively influence and contribute to one's own profession, peers, colleagues, community, and world.

COMPARISON TO OTHER ENGINEERING LEADERSHIP MODELS

At the time of the Institute's founding, no similar engineering leadership efforts were known. However, it was found later that the Penn State Engineering Leadership Development Minor was underway. [3] This model, now well-established, offers students the chance to pursue an academic minor through coursework and projects. Similar efforts can now be found at the University of Maryland's A. James Clark School of Engineering's Minor in Engineering Leadership program, Iowa State University's Engineering Leadership Program (which is a full four-year program), the University of Michigan's Engineering Global Leadership Honors Program, the University of Central Florida's Center for Engineering Leadership and Learning, and the Leadership Studies Program at Indiana University – Purdue University Indianapolis (which is a certificate program.) [4-9]

The model of the Robe Leadership Institute has as its center-piece a Leadership Seminar course. Single engineering leadership courses can also be found at the

Rensselaer Polytechnic Institute and the University of Kentucky (which was partly based on the RLI model), among others. [10-11] Such courses also stress leadership, personality awareness, and highly interactive learning.

RLI LEADERSHIP SEMINAR MODEL

The RLI Leadership Seminar is a ten-week, four-hour course (quarter system) offered in the fall of each academic year. While many of the same elements of leadership as the previous examples are discussed, ranging from communication skills to leadership styles, the focus is differentiating leadership development from the improvement of management skills. The course does not intentionally prepare students for assuming managerial positions. Instead, it helps students understand the basis for their leadership styles and helps them understand the various roles involved in being an engineering leader and innovator.

I. Selection of Students

Students are selected in the spring prior to the fall seminar. Undergraduate students who will be in their last year of academic work are eligible. In rare circumstances, graduate students are considered. Department chairs and RLI advisory board members from each engineering department are asked to recommend students for the class. These students must have some leadership experience, preferably in leading a team of volunteers, and must show interest in learning about leadership styles and theory. In addition, the RLI Director visits student organizations seeking interested students to apply. Finally, RLI Scholars from the previous year are asked for recommendations; they generally hold student leadership roles and more easily identify “rising stars” within their organizations.

Once the recommendations are made, students are asked to prepare their schedule for the fall quarter including the seminar. This is done to prevent time conflicts and to ensure that each candidate understands the seriousness of the attendance policy. Candidates are then interviewed by the RLI Director, who asks questions about their previous leadership roles and what they would hope to gain from the class. The candidates are also told of the expectations for the class, including no excused absences, the culture of the class as a team, the substantial required reading, the general class assignments, expected time requirements, and the expectation for them to apply the concepts learned in their duties as student organization leaders. The selected students are then given readings and an assignment to critically evaluate aspects of the readings before the start of class in the fall. [12-16]

II. Speaker Invitations

The heart of the fall seminar is the interaction between the RLI Scholars and the guest speakers. Because these speakers are often active CEOs, presidents, or executives of various

operations, and because there are typically ten speakers per seminar, scheduling is critical. The order of speakers matters significantly to the development of the scholars. More seasoned leaders, who have developed methods for “teaching” leadership to the students, are scheduled for the latter part of the seminar. The director typically contacts them first. Less experienced leaders or leaders who are comfortable making a specific point (or points) to emphasize recent learning in the classroom are scheduled earlier in the seminar. While speaker schedules ultimately dictate their availability, if done properly, the order of guest speakers will create a leadership story and proper reinforcement of concepts to maximize learning of leadership characteristic and leadership development for the students.

III. Seminar Structure and Learning Outcomes

Before the first day of class, students are given electronic access to the class information and their own electronic journal (e-board) for their daily leadership reflections. The class information, including the syllabus and structure of the seminar, expected daily activities, brief biographies of the visiting speakers, and pictures of 2008 scholars can be found at <http://www.ent.ohiou.edu/~bayless2/RLI/RLIBooklet2008.pdf>.

The course learning outcomes are also explicitly given to the students before the class. They include

- Differentiate between leadership and management.
- Learn the fundamentals of leadership and the skills needed to become real and effective leaders.
- Learn lessons of leadership by listening to and asking probing questions from a select group of speakers who have served in various leadership roles in their careers.
- Interact and bond with other members of the class.
- Improve the class with your studies, reflection on the class, and recommendations.
- * Learn to be better observers and learners of leadership lessons in all your current and future venues

IV. Class Assignments and Activities

In addition to the requirement that the students make daily electronic journal entries, and the critical reviews of the leadership texts assigned over the summer, the students are also asked to prepare an autobiography of themselves before the first day of class. The autobiography is the first of several assignments to help the students more fully understand themselves and their leadership styles. They also take the Bolton Behavior Inventory and the Myers-Briggs Type Indicator test and discuss both results in class. Further, students are given a general listing of additional assignments for the quarter. These exact assignments from 2008 can be found at <http://www.ent.ohiou.edu/~bayless2/RLI/XX.doc>. The individual assignments can be viewed by replacing “XX.doc” in the web address with “Assignment1.doc,” “Assignment2.doc,” etc.

The first two lectures of the class are devoted to reviewing the general principles of leadership as found in the

summer reading and discussions of the autobiographies. As the class is highly interactive, the discussion is generally student-led, with the instructor generally acting only as facilitator. These in-depth discussions are critical for the students to develop a common framework for understanding leadership and learning about other members of the “team.” At the conclusion of the review of the summer reading, the students are provided an overview power-point presentation summarizing some of the key leadership characteristics and concepts. These slides, developed over the years by Drs. Robe and Mitchell, can be found on the web at <http://www.ent.ohiou.edu/~bayless2/RLI/LeadershipSlides2008.ppt>.

The pace of the discussion and overall seminar has been described as “fast and furious.” Without proper context and personal experiences, understanding is limited and it is likely to overwhelm some students. That is one of the key reasons that students with previous leadership experience, not just leadership potential, are selected for the seminar. That leadership experience gives each scholar context to the abstract discussions of leadership characteristics and styles.

As soon as can be scheduled after the first week, the students participate in a four-hour team-building exercise, often referred to locally as the “Challenge Course.” The exercise, run by Ohio University’s Campus Recreation Department, is one of the most important events of the entire class. Generally speaking, before the exercise, the students know little about almost everyone else in the class. After the course, the class with this intense common experience comes more closer together, making it easier for them to envision themselves as a team and thereby consequently resulting in class discussions immediately improving.

The team concept is a fundamental building block of the seminar. Not only is the concept of team used to emphasize the importance of participation and interaction, but it is critical in the early guest lectures. It is usually very intimidating for the students to ask probing and sometimes uncomfortable questions of company executives that could be their boss’s boss’s boss next year. Understanding that they are “in it together” takes the pressure off the individual student and makes it easier to learn together. Further, the team culture emphasizes that no one wants to be the weak link in the discussion, and therefore encourages the participants to prepare thoroughly for each speaker and assignment so that they can make a relevant contribution to the overall effort in validating their understanding of leadership from their readings and discussions.

Following the Challenge Course, the instructor begins preparing the students to interview the upcoming guest speakers; discussing proper etiquette as well as general types of questions they could pose to learn more about the leadership style of each speaker. Immediately after that preparation, a “practice” guest speaker comes to the class, usually discussing the importance of emotional intelligence to quality leadership and finalizing the discussion on the work each student has done to classify their leadership style.

By the time of the first executive speaker, the students have done a personality inventory and the results have been discussed. This makes it easier for the students to consider the “type” of leader/person the guest speaker might be and to include a discussion of that consideration in their reflections on learning from the speaker.

In addition, before the executive guest speakers are interviewed, a significant discussion of the differences between leadership and management are presented. This element differentiates the two aspects in several ways, but also emphasizes the inherent symbiotic relationship. Successful leaders cultivate quality managers to execute their vision. Therefore leaders must be knowledgeable of the role of managers and help foster them as potential leaders for their organization. Yet it is highly stressed that leadership can be demonstrated by non-management personnel (anyone) and that leadership and entrepreneurial spirit must be fostered in any organization member indicating potential.

As mentioned previously, the key component of the seminar experience is the interaction between the students and the guest speakers. By the time of the first speaker, the students have developed a framework for understanding leadership styles and are very eager to engage the speakers. However, what makes the seminar truly successful is the willingness of the speakers to help educate the next generation of leaders. Nearly to a person, the speakers share the belief in the importance of leadership development – not only for their organization, but for the nation. This makes for an ideal learning experience – a group of eager future leaders interviewing a seasoned leader who wants to share “real world” experiences with the students and further their knowledge of leadership.

In addition to the classroom interviews, the speakers generally agree to attend a supper with 3-6 of the students from the class in a less formal environment. This setting generally facilitates more open discussion of personal experiences, and often leads to a greater sense of awareness for the students of what it means to be a leader. Anecdotal evidence from student journals indicates that opinions of the speaker’s styles may change dramatically over the course of the supper because of the different setting.

Two class periods and several assignments are devoted to critically evaluating the speaker’s styles, leadership characteristics, and lessons learned from the interviews. This generally requires the students to not only evaluate their daily journal reflections, but also to review the key aspects of the summer reading to frame their responses. The classroom discussion is held after the students submit initial answers to the critical review questions. The students then hold an open discussion on each question, allowing everyone to make their answers known and present justifications for those answers. These review sessions tend to be quite lively, with very well-reasoned debates. Students generally have reflected that these sessions helped them focus their understanding of the speakers to a level beyond even what they attained through their journal reflections.

In addition to the other assignments, the students are asked to provide a critical review of other leaders or leadership development programs. The review has often taken the form of a written biographical sketch of an engineering leader in the student's discipline. However, in 2008, students were asked to review specific engineering leadership programs at other universities and help assess the quality of the RLI seminar over the years.

V. Alumni Survey

A course survey was distributed to the network of 126 former RLI scholars. The survey involved both numerical ratings of success with respect to course objectives, but also asked for direct responses to questions and request for course-specific feedback. The survey tool was used for continuous improvement of the seminar and as a way for the current students to involve the alumni in the class. The content of the survey is given here:

Rate (1-5) from lowest to highest the value of the class with respect to

- a. Development of critical thinking about leadership
- b. Learning leadership styles
- c. Understanding the role of emotional intelligence in leadership
- d. Teambuilding skills
- e. Interfacing with others as you lead
- f. Differentiating between leadership and management
- g. Listening skills
- h. Leadership application in your profession
- i. Leadership applications in your personal life
- Do you have any personal leadership experiences that the RLI seminar helped shape?
- What did you find positive about interfacing with the speakers?
- What was negative (or could have been improved) about interfacing with the speakers?
- Do you have any suggestions regarding how to improve the course based on your experiences?

VI. Results of the Survey

The numerical results of the 38 responses to the survey are given in Table I. This data represents the first year of survey, providing the basis for future longitudinal analyses. Taken by themselves, the data appear to indicate that the alumni found past RLI seminars a useful tool in understanding and developing leadership characteristics and styles. However, the surveys also indicate that there is room for improvement.

TABLE I
RESULTS OF THE ALUMNI SURVEY

Question	Average Response	Standard Deviation
a.	4.35	0.73
b.	4.21	0.98
c.	4.21	0.91

d.	3.71	1.17
e.	4.12	0.88
f.	4.41	0.92
g.	4.24	0.78
h.	4.18	0.80
i.	3.97	1.06

The survey data indicate that the seminar appears to have strengths in helping the students apply critical evaluation to the field of leadership studies, as well as in differentiating between leadership characteristics and management skills. This result was expected because those two areas of development were consistently stressed throughout each seminar over the last twelve years.

The data also indicate some strength in helping the students to learn to discern different styles of leadership, to understand how to apply the concepts of emotional intelligence and personality styles to leadership, and to be better listeners. Some weakness appears in the areas of teambuilding skills, interfacing with others, and applying leadership skills to personal concerns.

While the survey only provides anecdotal data regarding the four application questions, the responses from the alumni were useful and interesting. A considerable number of suggestions were provided for improvement of the course, and many alumni offered to return to talk with the scholars in the seminar.

VII. Seminar Conclusion and Outreach

The capstone event of the RLI Seminar is the exit interview of the individual scholars with the RLI Director (and course instructor). The students are given a general listing of questions to prepare themselves for the interview. They are told it is comprehensive and anything may be asked to probe their understanding of leadership. It is also recorded (as are all the guest speaker interviews) and available for future scholars to review. This interview covers details the students may have addressed in their daily journal reflections or in their papers or about a key leadership concept described by one of the speakers. While it is not meant to fully assess the student's comprehension of the material, it does give a strong indication of the effort the student has put into the class, and it assists the instructor in helping the student address perceived deficiencies in both their understanding and in their current leadership development.

ADDITIONAL ROBE LEADERSHIP INSTITUTE EFFORTS

In addition to the annual RLI seminar, the Institute exists to provide a focal point in the Russ College of Engineering and Technology for the understanding of leadership and to promote effective leadership among students, faculty, and staff. The ultimate purpose is to encourage the constituents of the Russ College to practice leadership in their personal lives and professional practice in order to better serve their professions and society. In order to facilitate these objectives, the Robe Leadership Institute provides resources

and orchestrates the awarding of leadership recognition within the Russ College of Engineering and Technology.

The Robe Leadership Institute's Gerald Loehr Leadership Resource Center provides a library of books, audio materials, and video materials on leadership and prominent leaders, emphasizing leaders with engineering backgrounds. In addition, the Annual Reports of RLI from each academic school year and the Five-Year review Reports of the Institute (in 2002 and 2007) for Ohio University are available.

Each year, the Robe Leadership Institute recognizes an outstanding senior student leader in each department of the college. From this group, one student receives the Gerald Loehr Senior Leadership Award, the highest leadership honor for a Russ College graduating senior. The Institute also sponsors a faculty and staff leadership/service award, given by the Russ College Board of Visitors, to recognize and encourage exemplary faculty and staff contributions above and beyond their regular duties and responsibilities in their professional areas and/or in the greater community.

ROBE LEADERSHIP INSTITUTE ADVISORY BOARD

Continuous improvement of the quality of the Institute would not be possible without the diligent efforts of the RLI Advisory Board, which consists of faculty representation from each engineering department in the Russ College as well as representatives from the Russ College Board of Visitors, guest speakers, the Director of the Ohio University Voinovich School of Leadership and Public Affairs, and the Co-director of the Manasseh Cutler Scholars Program at Ohio University. The RLI Board serves as a key link to the Institute's constituents as well as orchestrating the efforts in selecting the leadership awards.

FUTURE WORK

In addition to continuing the RLI Seminar and the general mission of the Institute, several improvements are planned for the near-term. The alumni outreach effort will be expanded with mentoring opportunities provided for former scholars to help current scholars. Further, follow-up is needed to begin implementation of alumni suggestions for seminar improvements, especially bringing in younger leaders to help the current scholars in transition to their first leadership opportunities.

Greater exposure to entrepreneurial development and sales are planned for incorporation into the curriculum to offer a different perspective on leadership other than through purely technical competence.

ACKNOWLEDGMENT

The authors would sincerely like to thank the Russ College Board of Visitors and the fund-raising efforts of Pamela Siemer for establishing and endowing the Robe Leadership Institute, as well as all the leadership speakers who have

generously volunteered their time to mentor the classes of Robe Scholars throughout the years. Special thanks go to Mr. Richard Daubenmire, former VP of Personal Computer Manufacturing and private consultant for 26 years working with IBM, who has kindly discussed leadership with all twelve RLI classes. We would also like to thank each of the Robe Scholars for their dedication to this learning experience and for fostering future scholars.

REFERENCES

- [1] National Academy of Engineering. 2004. *The Engineer of 2020: Visions of Engineering in the New Century*. The National Academies Press, p. 50.
- [2] "ABET Engineering Accreditation Criteria." 2009. abet.org. <http://www.abet.org/forms.shtml>. Accessed: 16 March 2009.
- [3] Burton, L.C., J. Soper, and J. Matson, "Penn State's Engineering Leadership Development Minor." In *Frontiers in Education Conference*. 6-9 November 1996. *Proceedings of the 26th Annual Frontiers in Education Conference, 1996*. Vol. 3. Piscataway, NJ: IEEE, pp. 1129-1131.
- [4] "Engineering Leadership Program, College of Engineering, Iowa State University." 2009. iastate.edu. <http://www.eng.iastate.edu/leadership/>. Accessed: 15 March 2009.
- [5] Rover, D., K.S. Athreya, S. Walter, and L. Zachary. "An Engineering Leadership Program for the Future." In *Frontiers in Education Conference*. 28-31 October, 2006. *Proceedings of the 36th Annual Frontiers in Education Conference, 2006*. Piscataway, NJ: IEEE, pp. 23 - 24.
- [6] Athreya, K.S., D. Rover, S. Walter, S. Mickelson, G. McGrath, et al. "Progression of an Engineering Leadership Program for the Future." In *Frontiers in Education Conference*. 10-13 October, 2007. *Proceedings of the 37th Annual Frontiers in Education Conference, 2007*. Piscataway, NJ: IEEE, pp. T2J-15 - T2J-16
- [7] Richerson, S., S. McAteer, M. Spencer, and S. Scheibler. "A Portfolio Approach to Learning Professional Skills." In *Frontiers in Education Conference*. 10-13 October, 2007. *Proceedings of the 37th Annual Frontiers in Education Conference, 2007*. Piscataway, NJ: IEEE, pp. F3B-1 - F3B-4
- [8] "Center for Engineering Leadership and Learning," University of Central Florida, 2009, <http://www.engineeringleadership.us/>. Accessed 21 March 2009.
- [9] "Leadership Studies Certificate at IUPUI," 2009, Indiana University - Purdue University Indianapolis, http://uc.iupui.edu/uploadedFiles/Checksheets/Engineering_Technology/Organizational_Leadership_and_Supervision/LSCert.pdf. Accessed March 21, 2009.
- [10] McCloskey, L.T., J. Reel, and G.A. Gabriele. "Teaching Engineering Leadership at Rensselaer." In *Frontiers in Education Conference*. 6-9 November 1996. *Proceedings of the 26th Annual Frontiers in Education Conference, 1996*. Vol. 3. Piscataway, NJ: IEEE, pp. 1116-1119.
- [11] "University of Kentucky's College of Engineering Leadership Program", 2009, University of Kentucky, <http://leadership.engr.uky.edu/courseinfo/outline.html>. Accessed March 21, 2009.
- [12] Lee, Blaine. 1997. *The Power Principle*. New York: Fireside (Simon & Schuster), pp. 1-348.

- [13] Maxwell, John C. 2002. *Leadership 101: What Every Leader Needs to Know*. Nashville, TN: Thomas Nelson Publishers, pp. 1-108.
- [14] Sample, Steven. 2002. *The Contrarian's Guide to Leadership*. San Francisco: Jossey-Bass, pp. 1-192.
- [15] Bolton, Robert and D. G. Bolton. 1996. *People Styles at Work: Making Bad Relationships Good and Good Relationships Better*. New York: Amacom, pp. 3-46.
- [16] Goleman, Daniel. March-April 2000. "Leadership that Gets Results." *Harvard Business Review*. Vol. 78 (2), pp. 78-90.

AUTHOR INFORMATION

David Bayless is the current Director of the Robe Leadership Institute and Loehr Professor of Mechanical

Engineering in the Russ College of Engineering and Technology at Ohio University, bayless@ohio.edu.

Jerrel Mitchell is the Associate Director of the Robe Leadership Institute, former RLI Director (Jan.2005-2007), Russ Professor of Electrical Engineering, and Interim Dean of the Russ College (2000-2002), mitchej1@ohio.edu.

T. Richard Robe is the founding Director of the Robe Leadership Institute (1996-Dec. 2004), Dean Emeritus of the Russ College of Engineering and Technology (1980-1996), Moss Professor of Engineering Education Emeritus in the Russ College, and currently serves on the RLI Advisory Board as well as an advisor to the NAE Selection Committee for the Fritz J. and Dolores H. Russ Prize, robe@ohio.edu.