AC 2010-1119: DEVELOPMENT OF A LEADERSHIP AND ENTREPRENEURSHIP SKILLS ASSESSMENT INSTRUMENT

Andrew Gerhart, Lawrence Technological University

Andrew Gerhart is an Associate Professor of Mechanical Engineering at Lawrence Technological University. He is actively involved in ASEE, the American Society of Mechanical Engineers, and the Engineering Society of Detroit. He serves as Faculty Advisor for the American Institute of Aeronautics and Astronautics Student Chapter at LTU, and serves as chair for the LTU Leadership Curriculum Committee.

Donald Carpenter, Lawrence Technological University

Donald Carpenter is an Associate Professor of Civil Engineering at Lawrence Technological University. He is actively involved in ASEE, is a Kern Fellow for Entrepreneurial Education, and serves as Director of the Center for Teaching and Learning at LTU. His research interests involve academic integrity, assessment tools, and stream restoration.

Melissa Grunow, Lawrence Technological University

Melissa Grunow is the Coordinator for the Leadership Curriculum at Lawrence Technological University and is an instructor in the Department of Humanities. She has eleven years of experience working with student organizations and teaching undergraduates, including identifying needs and developing new initiatives and curricular and co-curricular programs. Her research interests include activist pedagogies and empowering students through creative teaching methods.

Katie Hayes, Lawrence Technological University

Katie Hayes is the Entrepreneurial/Leadership Assistant Coordinator. She oversees the junior and senior year requirements, and is an instructor for the Department of Humanities. Additionally, she assists in carrying out the initiatives outlined in the Kern Grant, which aims to inspire an entrepreneurial mindset in undergraduate engineering students throughout the educational experience.

Development of a Leadership and Entrepreneurship Skills Assessment Instrument

Abstract

Lawrence Technological University has implemented a required four year leadership curriculum for all undergraduate students. Because of the consequential overlap of leadership and entrepreneurial skills, the curriculum also addresses many aspects of the "entrepreneurial mindset" which includes communication, teamwork, ethical decision-making, opportunity recognition, persistence, creativity, innovation, creative problem solving, and critical thinking.

Individual components of the curriculum will be assessed as well as the curriculum as a whole. As one part of the assessment, a Leadership Self-Perception Assessment Instrument was developed. The instrument will aid in answering the following research questions:

- How do students perceive their own leadership traits and skills?
- Are students' self-perceptions demonstrating growth in confidence in their leadership abilities because of the experiences and education from each component of the curriculum?
- What impact do all the courses in the four-year leadership curriculum have on this perception?
- What modifications are necessary to the curriculum to adequately address the student learning outcomes?

As implied by these research questions, the instrument will be used for both formative and summative assessment, as well as a longitudinal study of the leadership growth of the students.

Instrument development included conducting a focus group for validation, a test-retest to ensure temporal stability and internal consistency, and pilot testing in the second year component Leadership Models and Practices course. The instrument was administered at the beginning and end of the semester to determine the shift in perception of their leadership/entrepreneurial skills.

1. Introduction

Entrepreneurship

Lawrence Technological University (LTU) has offered engineering students entrepreneurial education programs for many years. Recognizing that graduates entering industry will require business and entrepreneurial skills, the College of Engineering developed an entrepreneurial certificate program and founded the Lear Entrepreneurial Center. The entrepreneurial certificate program develops student skills in communication and business components in the engineering profession and includes a multi-disciplinary capstone design experience for which teams are eligible for student venture grants administered by the institution. Several multi-year grants have strengthened the program through workshops, keynote speakers, faculty curriculum awards, student venture grants, and faculty incentives to work with industry sponsored student teams. Specifically, the College of Engineering received an invitation to participate as part of a larger initiative to develop the Kern Entrepreneurship Education Network (KEEN). The invitation also

provided funding to develop and integrate entrepreneurial (and leadership) education across the curriculum.

The goal of KEEN is to make entrepreneurship education opportunities widely available at institutions of higher learning, and to instill an action-oriented entrepreneurial mindset in engineering, science, and technical undergraduates. The network is limited to private institutions with ABET accredited engineering programs and is by invitation only. As of January 2010, KEEN has grown to include twenty institutions across the U.S. The KEEN program provides access to vital resources for building quality entrepreneurship education programs that engage engineering and technical students including grants, faculty fellowships, capacity building workshops, networking opportunities, and resources. At Lawrence Tech, the grant provided the funding to integrate the existing entrepreneurial programs into a new innovative interdisciplinary program focused on developing the "entrepreneurial mindset" on campus. The skills associated with the entrepreneurial mindset are communication, teamwork, leadership, ethics and ethical decision-making, opportunity recognition, persistence, creativity, innovation, tolerance for ambiguity, risk analysis, creative problem solving, critical thinking, and business skills (including marketing, financial analysis, and strategic planning).[1, 2]

Leadership

A leadership education program was initiated at Lawrence Tech in 2007 based on assessment and program evaluation. First, a survey of employers of Lawrence Tech graduates indicated that employers were very satisfied with the ability of the graduates to "hit the ground running." The new employees had the skills to start directly into their duties with very little to no training or transition period from the academic world to the industrial world. Likely this is due in large part because the faculty and staff at Lawrence Tech seriously embrace the school motto, "Theory and Practice," and incorporate many real world and hands-on activities into the student studies. Therefore employers have been very happy with Lawrence Tech graduates. On the other hand, the employers indicated that graduates do not often advance into management and leadership positions, but rather stay at the entry-level operations position. Second, Lawrence Tech administration noted the shift in the global economy and that students were looking for added value beyond a traditional education. Finally, with the entrepreneurial program (as related above) already in place, it was noted that the skills associated with the entrepreneurial mindset have a substantial overlap with the skills necessary for effective leaders.

In response, Lawrence Tech set the vision to develop and integrate a leadership education and development curriculum into every undergraduate degree program offered. This curriculum would be required by all undergraduate students, and at the time of its initial development was the only required leadership curriculum at a university (not counting the military academies). There are universities that offer an optional leadership development program to undergraduates, but none that was required by all undergraduates.

Lawrence Tech's leadership education goals are presented below. These are based on the university's approach to general education requirements for undergraduate students.

- Graduates will have had experiences that promote a high level of professionalism and integrity, responsible decision making, confidence in approaching opportunities, and pride in their abilities;
- Graduates will have had experiences that promote the understanding of themselves and others, sensitivity to other cultures in the context of globalization, and interpersonal skills;
- Graduates will have had experiences that promote the ability to analyze unfamiliar situations, assess risk, and formulate plans of action;
- Graduates will have been made aware of the importance of lifelong learning; and,
- Graduates will have had experiences that promote a global and societal perspective.

Lawrence Tech's student population is a thorough mix of traditional students, non-traditional students, part-time students, full-time students, working full-time students, and working part-time students. Therefore the idea of integrating a leadership curriculum into a variety of degree programs with a diverse student-base has been likened to the idea of trying to rewire a 747…while it is in flight! Attempting to integrate the curriculum as smoothly as possible, the four pieces of the curriculum (freshman-year component, sophomore-year component, etc.) were integrated one year at a time. At the writing of this paper, the freshman and sophomore components are firmly in place, the junior year component had just been integrated, and the senior year component is being integrated (i.e., piloted). In short, the first two years of the curriculum introduces the student to the foundations of leadership and allows for some "basic" training with some practice. The final two years of the curriculum are heavily experiential where the student will put to practice the skill sets learned during the first two years. In addition, the student can choose from a multitude of experiences that tailor-fit his/her strengths, interests, and skills. The intention is <u>not</u> to produce CEOs or presidents, but is to give each student the skills and confidence to use leadership in their everyday lives, and hopefully allow them to advance within their discipline.

The leadership model Lawrence Tech focuses upon is the Relational Model of Leadership.[3] In essence, it states that regardless of personality traits an individual can access leadership skills and take purposeful action to create positive, sustainable change. The model is comprised of five key elements: purposeful, process-oriented, inclusive, empowering, and ethical. Data from many studies "supported the value of those five elements, demonstrated how they connect in a developmental theory", and support focusing on this model for post-secondary education leadership development.[3, 4, 5]

The sophomore-year component of the curriculum (a course titled LDR 2001 Leadership Models and Practices) and its preliminary assessment was presented in an earlier paper.[2] The full curriculum and its formative and summative assessment, as well as a longitudinal study of the leadership growth of the students will be presented in future papers. This paper will focus on the initial development of a Leadership Self-Perception Assessment Instrument and a pilot investigation in the sophomore Leadership Models and Practices course.

2. Existing Leadership Assessment Instruments

To assess the self-perception of students during and after the leadership curriculum, Lawrence Tech seeks a self-administered leadership inventory instrument that will focus on the Relational Model of Leadership and the Lawrence Tech leadership education goals. In addition, because of class time constraints and the attention span of college students, an instrument is sought that is not lengthy and on the order of 30 to 40 questions/responses. Several instruments are available, and were examined to determine if they met these criteria.

The Leadership Skills Inventory – Karnes[6, 7] measures an individual's leadership abilities. For this instrument, nine domains are used to "assess strengths and weaknesses related to leadership." Participants "answer a series of competency statements and then several items using [a] 4-point scale" ranging from "Almost Always" to "Almost Never." The instrument is self-scored. Unfortunately, it is very lengthy and requires approximately 45 minutes to complete.[8] In addition, "Karnes's test manual data for validity could be more extensive to support [whether] the Leadership Skills Inventory does measure leadership skills. Scores for reliability are moderate to good," and over a specified time period of 4 weeks, the test-retest reliability was 0.49 and under in one of the samples. However, no standard error of measurement was reported in the manual. "The construct and concurrent validity was also absent,"[8] although Edmunds[9] has made some progress with validation.

The Leadership Skills Inventory – Anderson[10, 11] is designed for leaders to assess their own abilities in relation to a leadership model created by the author. "Anderson's model is based off of [four] dimensions: Self-Management Skills, Interpersonal Communication Skills, Consulting Skills for Developing Groups and Organizations, and Versatility Skills." Participants respond to a 56-item self-assessment using a 10 point scale. Responses range from "this skill is new to me" to "I can perform the skill well. I can teach others, too."[12] This instrument appears to focus on the corporate world or a business model of leadership and management. Many of the dimensions may be considered more managerial in nature as opposed to leadership oriented. Therefore this instrument does not meet the needs of assessing college-level leadership studies and development.

The Leadership Practices Inventory (LPI)[13] uses a 10-point Likert response scale in a 30 item questionnaire containing five subscales for each of "The Five Practices of Exemplary Leadership" – challenging, inspiring, enabling, modeling, and encouraging. "Leaders complete the Leadership Practices Inventory-Self, rating themselves on the frequency with which they think they engage in each of the thirty behaviors."[14] This particular instrument is intended for those that follow Kouzes' and Posner's Leadership Challenge program.[15] The Lawrence Tech curriculum, on the other hand, emphasizes the Relational Model of Leadership. While there are some similarities between these leadership models, the LPI was not deemed a fit for the leadership model we use.

Related to the LPI is the Student Leadership Practices Inventory.[16] This inventory is for those who follow the Student Version of the Leadership Challenge.[17] In addition, this instrument is best suited for students that already hold a leadership position/title (such as within a student organization). Lawrence Tech administered this survey a few years ago to a sample of

undergraduates across disciplines. Unfortunately, the results were fairly meaningless for our investigation, and it was not deemed suitable for assessing individual leadership style (or using leadership in everyday life) outside of a formal leadership position. In other words, the inventory will provide some measure, for example, for a student government president to become better at his position, but it does not provide for measuring more general attributes desired by the Lawrence Tech Leadership Curriculum.

The Leadership Skills Profile[18] "identifies which individuals have the best leadership qualities." Due to the customizable format, each organization can use this model for their specific interest. "Participants are asked to respond to 352 items using a 5-point scale ('Strongly Disagree' to 'Strongly Agree'). Approximately 40 minutes is necessary for completion"[19] – to lengthy for assessing the students' perception. "The Leadership Skills Profile uses three other instruments as its basis – Jackson Personality Inventory-Revised, Personality Research Form, and the Survey of Work Styles. Each of the three instruments is well-established showing convergent and discriminate validity." However, the author does not "provide data showing reliability," so research is "needed to support that the instrument is both reliable and valid."[19] In addition, it is considered best applied as "a pre-hire assessment for selection and placement of leadership applicants and high potentials," to determine "promotability of managers and executives," or as "a foundation for managerial and executive development and coaching."[18] The instrument appears best suited for assessing potential of positional leaders (e.g., CEOs or presidents).

The Alleman Leadership Development Questionnaire[20] measures mentoring activity between individuals in an organization or work unit. It is best suited to leadership in business.

The Campbell Leadership Descriptor is a self-assessment "designed to help individuals identify characteristics for successful leadership, recognize their strengths and identify areas for improvement."[21] While it focuses on many areas pertinent to the Relational Model of Leadership (e.g., personal style, multi-cultural awareness) and entrepreneurialism, it also focuses on management and relates better to business leadership.

The Socially Responsible Leadership Scale[22] measures the Social Change Model of Leadership. While that model and the Relational Model of Leadership do have much in common, they also have important differences.[3] In addition, the instrument is lengthy with 114 items. The revised version is also lengthy with 68 items[23] and has been tested for reliability and validation. Because this instrument has eight stages which can be used successfully piecemeal, some sections/stages of this instrument may be useful in informing the assessment of Lawrence Tech's leadership curriculum.

Considering that these existing leadership self-assessment instruments do not meet our needs, Lawrence Tech has set forth to create an instrument that will measure college-level student growth in leadership traits within the Relational Model of Leadership, as well as assessing the objectives of the curriculum and whether it is meeting the needs of the students.

3. The Leadership Models and Practices Course

Lawrence Tech's Leadership Self-Perception Assessment Instrument is intended for use throughout each component of the leadership curriculum (and its related future education programs). The instrument is being piloted in the sophomore component Leadership Models and Practices course. Details of the course are given in a 2009 ASEE paper,[2] but a brief overview will be given here to allow better interpretation of the development and pilot use of the new assessment instrument presented in subsequent sections of this paper.

The Leadership Models and Practices course is a one credit-hour course offered in a traditional semester style format. It is considered the flagship course for the entire curriculum where students really begin to envision leadership style and build upon their leadership skills. Since many assignments and exercises take place during class-time, the course is allotted two classroom hours each week. This additional hour also gives students the opportunity to meet with their groups on team-based projects.

To develop the course, it was first piloted with a small enrollment of sophomore through senior-level students. This allowed the instructor/course developer to administer the course material to some mature/advanced students who could better handle the "testing" period and give more informed comments and criticism of the course. The seniors, in particular, were soon graduating and did not have any subsequent courses, so their critical comments were made without feeling that they would be held against them in future courses. The course was revised based on the pilot trial and is now required for all sophomore-level undergraduates. As of Spring 2010, the course has been taught to 340 students in 20 sections over five semesters.

The objectives are that upon completion of the course, a student will be able to:

1. expand his/her understanding of leadership concepts that were introduced in the freshman component of the leadership curriculum (called University Seminar).
2. identify and develop their personal leadership philosophy and approach using written self-reflection and peer assessment.
3. be able to work in teams and use creative problem-solving to develop a project for the purpose of creating positive and sustainable change.
4. be introduced to the concepts of leadership beyond their academic studies (whether professional or personal), including entrepreneurship and intrapreneurship.

The primary course topics include:

- History of leadership theories
- Currently practiced leadership models (*e.g.*, relational, shared, situational, etc.)
- Individual responsibility and ethics
- Diversity and globalization
- Team building, working in groups, and inclusive practices
- Creativity and problem solving
- Organizational leadership
- Entrepreneurship and intrapreneurship

The required student texts for the course are *Exploring Leadership – For College Students Who Want to Make a Difference*, 2nd Ed. by Komives, Lucas, and McMahon[3], and *You Don't Need a Title to Be a Leader* by M. Sanborn.[24]

Various teaching and learning strategies are implemented to reach the course objectives. While there are some classroom lectures, a good portion of the classroom instruction is completed through games and hands-on activities that were developed and modified to align with the learning objectives and content for the assigned reading. The activities are interactive, engaging, and provide an opportunity for discussion of the topic for that week. In addition, students complete required assignments such as weekly reading and reflection journals, in-class experiential activities, interview with a leader, midterm and final projects, and peer and self assessments. Finally, multiple sections of the course require the use of multiple instructors. Therefore, for consistency, a training workshop, facilitated by the course developer and leadership curriculum coordinator, is required for all instructors, new and returning. Each instructor is given a course materials guidebook/instruction manual.

4. Initial Development of the Instrument

The instrument being developed is called the Leadership Self-Perception Assessment. In its original form, it consisted of 30 statements (see Appendix A), but after a focus group study, it was revised to contain 31 statements (one deleted and two added, see Appendix B). In addition, the students answer seven demographics questions. The instrument asks students to respond to the statements on a 5-point Likert Scale in which they examine how they perceive themselves in thinking and behavior pertaining to the leadership/entrepreneurial skills that are introduced and practiced in the leadership curriculum. For that reason, the statements are worded in first-person so that students respond in regards to their *perceptions* of themselves as leaders rather than their understanding what leadership "is" or "is not." While some students take as long as 15 minutes to complete the survey, it is estimated that the average time for completion is 8 minutes.

The statements were adapted from the Council for the Advancement of Standards in Higher Education ("CAS") Self-Assessment Guide for Student Leadership Programs.[25] The CAS Self-Assessment is intended for the program administrators to self-assess the program/curriculum and is not for a participant (i.e., student) to self-assess leadership skills. Therefore, the statements for the Leadership Self-Perception Assessment needed to be significantly modified from the CAS to allow for student self-assessment. In Part 2 of the CAS guide (titled "Program"), a table is given for "Relevant, Desirable Student Learning and Development Outcomes" with examples given of "evidence of achievement." It is from this table that the instrument's statements were developed, and only those examples of "evidence of achievement" which applied to the Lawrence Tech leadership education goals (see Section 1) and which reflected the skills important to the Relational Model of Leadership were used. It should be noted that the aforementioned CAS table is divided into 15 learning/development outcomes. Of those 15, ten were used for the instrument (resulting in 31 statements). Finally, the Lawrence Tech leadership program administrators anticipate using the CAS Self-Assessment Guide for Student Leadership Programs when reviewing their program/curriculum. Therefore a benefit of using the CAS to create the Leadership Self-Perception Instrument will be the ability to correlate program administrators' assessment to student perception assessments.

After developing the statements, many of them were arranged in a particular order so that a particular response would not be influenced by an earlier one. For this reason, the instrument is administered electronically in such a manner that each statement is given individually; once a response is submitted, the student cannot go back and change it.

The instrument is intended to aid in answering the following research questions:

- How do students perceive their own leadership traits and skills?
- Are students' self-perceptions demonstrating growth in confidence in their leadership abilities because of the experiences and education from each component of the curriculum?
- What impact do all the courses in the four-year leadership curriculum have on this perception?
- What modifications are necessary to the curriculum to adequately address the student learning outcomes?

As implied by these research questions, the instrument will be used for both formative and summative assessment, as well as a longitudinal study of the leadership growth of the students.

Before those assessments can be initiated, the instrument must be validated and tested for reliability. Figure 1 illustrates the process followed.

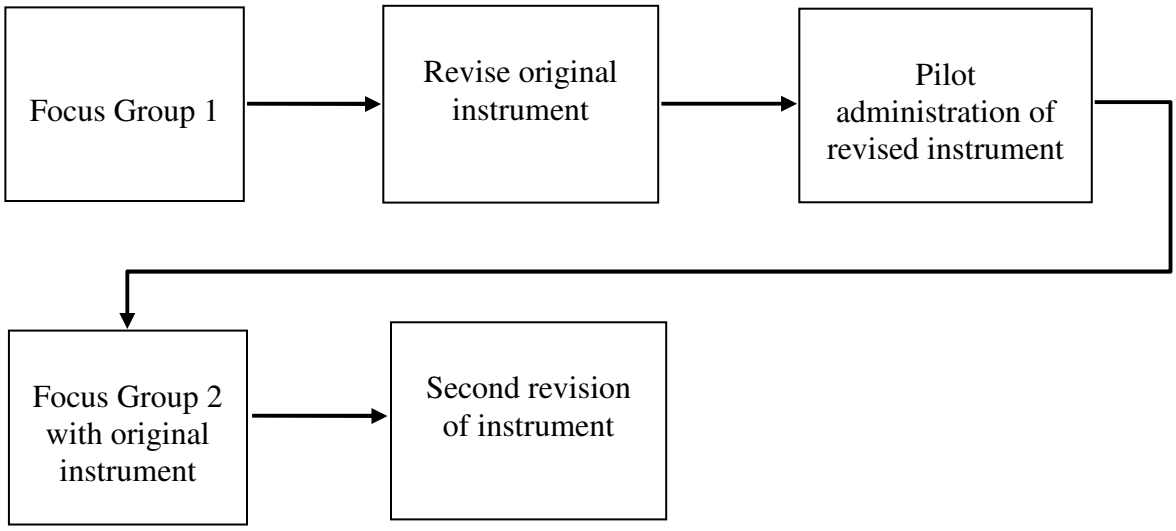

Figure 1. Block diagram of the validation and reliability process.

Focus Group 1

Just before the Fall 2009 semester began, a focus group study was conducted. Unfortunately, because of a general lack of students on campus at the end of the summer, only five students were available to participate – two were classified as sophomores, one as a junior, and two as seniors. None of the students transferred to Lawrence Tech, all were female, and all were considered full-time students (enrolled in 12 or more credit hours per semester) of traditional age. Each student's degree program was housed in a different department and each of the four

Colleges present at Lawrence Tech (Engineering, Architecture & Design, Arts & Sciences, and Management) were represented. Because of the small focus group size which was not a good representation of the entire student population, a second focus group study was conducted later in the semester and will be discussed later in the paper.

General comments relating to the entire instrument from the first focus group were useful to a second draft of the instrument. They noted that they would choose the response "neither agree nor disagree" when they did not understand the statement. The response option of "I do not understand the statement" was added for clarification. In addition, the students were concerned that their answers "depended on the situation." Therefore, the instructions now include "Please answer based on the situation or context that makes the most sense to you." The students clarified that they chose "strongly agree" over "agree" or "strongly disagree" over "disagree" when the item spoke to their core values or when they were passionate about the topic. They were concerned that some of the statements were phrased negatively, but several survey items were intentionally phrased in this manner to elicit responses that are sometimes agreeable and other times disagreeable. This is common on questionnaires to help identify respondents that reply to each item with the same answer without reading the statements. Finally, the students felt concerned about choosing a "correct" answer that would express their capabilities as leaders and not always a response that reflected their beliefs or actions. Although the instructions, stated "Please answer the questions below as honestly and fairly as you can in terms of how you think and/or behave the **majority of the time**. There are no right or wrong answers, only honest ones.", it is not uncommon that students will skip the instructions or simply forget them once they are engaged in the statements. Therefore, a final statement was added to the instrument: "I answered the previous questions as honestly and fairly as I could in terms of how I think and/or behave the majority of the time." With this statement, the investigators can determine how much merit to place on a given survey.

Specific statements were rewritten, deleted, or moved based on comments by the first focus group. Referring to Appendix A, statement 3 was deleted because the students believed actions were equally important to writing and speaking. Minor editing clarified statements 5, 6, and 7. For statement 14, the students were concerned what "values" meant (i.e., could values mean biases or core personal beliefs?). "Values" has been changed to "core personal beliefs." Because statements prior to 18 focused on leading, the students interpreted statement 18 as being negative (i.e., being a follower is bad) which is not the intension. This statement has been moved near the beginning of the instrument and is restated as "I am willing to be a follower." To further examine the attribute of being a follower, a second related statement was added: "I know when to lead and when to follow." Statement 25 was confusing because of its negative phrasing. It has been rewritten. The phrasing in statement 26 of "openly challenge" was too confrontational/threatening. The phrase has been changed to "confront." Statement 29 needed clarified since no two people are identical. It now contains the phrase "viewpoints that are different than my own." In addition, this statement was placed earlier in the instrument so as not to be confused with the statement referring to one's own identity and culture (i.e., to separate statements of viewpoints versus culture). Finally, the demographic question concerning age was extended to include those students under age 18. Appendix B contains all of the changes and was used for the pilot testing in the Leadership Models and Practices course; pilot testing results are given in Section 5.

Focus Group 2

Near the conclusion of the Fall 2009 semester a second focus group study of the original instrument was conducted because of the limited size and diversity of the first focus group. Unfortunately, it still proved difficult to recruit males to participate in the focus group, not necessarily because they were unwilling, but because of coincidental time-conflicts. As a result the second focus group contained six females and one male. One of the students was classified as a freshman, four as sophomores, one as a junior, and one as a senior. None of the students transferred to Lawrence Tech and all were considered full-time students. The students majors were Business Management, Media Communications, Architecture, Information Technology Environmental Chemistry/Math (double major), and Mechanical Engineering/Applied Physics (double major). Three of the students had completed the revised instrument (in Appendix B) previously in the semester in the Leadership Models and Practices course, so they also spoke about their reactions during the earlier administration regardless of the fact that they were reviewing the original (Appendix A) instrument.

Many of the comments by the focus group were similar to those expressed by the first focus group. For example, they were concerned that responses "depended on the situation." In addition, they were concerned about what is meant in the instructions by "majority of the time." This will be clarified with additional statements in the directions: "This includes how you think and/or behave in all environments, not just leadership situations. Examples may include work, classroom, student activities, home, social situations, etc." The students were concerned responses by students that were not interested in leadership (i.e., they may not answer thoughtfully). To address this, they suggested that the survey is completed during class time (which it is), near the beginning of class so students would not rush to complete it. In addition, so many students are asked to do on-line surveys, they felt that it would be taken more seriously if it was a pencil-and-paper format. Also, class credit should be given for completing the survey (it is given). They were not concerned that completing the survey during class would effect their responses to align with the course material nor and were they fearful that their responses would affect their course grade. They suggested that the instructor leaves the room during survey completion, which would help them feel they are responding more honestly and not in a way that the instructor or the course material would pressure them to respond. There was some concern that a few of the statements should not have responses of "strongly agree" to "strongly disagree," but instead should be "often," "sometimes," "never," etc. Four of the statements (11, 18, 27, and 29) were considered for the responses to be changed to "almost always, often, sometimes, rarely, almost never." A better alternative will be to split the instrument into two parts. Part one will measure students' thoughts on leadership using the "strongly agree" to "strongly disagree," while part two will measure actual student behavior using the "almost always" to "almost never" scale. This will allow similar statements between each part to be cross-correlated between thoughts and behaviors. This will increase the instrument's number of statements to approximately 45.

The second focus group suggested some specific changes to individual statements. Statement 1 appears as a double-negative when considering the responses. It will be re-phrased to eliminate the word "don't." They had similar concerns about the wording of statements 5 and 6 which have been changed. Statements 11 and 18 solicit a differing response based on the situation. This may be easily fixed with the "almost always-almost never" scale. For statement 22, they

were concerned that ethics are personal and different for each individual. This is acceptable for the measure needed for this statement; we only want to identify if the respondent stays within his ethics. It has been re-written as, "I think and behave ethically when I'm in a leadership positions." Statement 26 raised multiple concerns. First, the students felt that if a boss or instructor is being unjust, that they would not be able to confront the person directly. Second the students stated that they do not often encounter unfair, unjust, or uncivil speech, so they responded "disagree" even though they felt they would confront the person. To address these concerns, the statement will state "I appropriate action against…if the situation arises." The focus group had the same concerns for statement 30, which has be restated similar to statement 26. Finally, concerning demographic questions, many students do not know their "current class level." Is it based on number of years or number of credit hours? Because Lawrence Tech measures class level in credit hours completed, the statement will be re-phrased to specify levels based on credit hours. In addition, students will be allowed to choose multiple majors.

5. Results from the Preliminary use of the Instrument

Pilot testing of the instrument was conducted in the second-year Leadership Models and Practices course.

During the second class period, three of the four sections of the Leadership Models and Practices course completed the Leadership Self-Perception Assessment Instrument. Student responses were recorded using an on-line survey tool in Blackboard course management software. Two weeks later, the statements were scrambled and re-administered to measure test-retest temporal stability and internal consistency. Only a single section, with 15 students, completed the test-retest survey administration. During the last week of classes, the students completed the instrument again (unscrambled) to preliminarily determine the shift in perception of their leadership/entrepreneurial skills upon completion of the Leadership Models and Practices course.

Reliability

Two statistical estimates are commonly used to examine the test-retest reliability of survey instruments: Cronbach's coefficient, α, and Spearman's rank correlation coefficient, ρ. Cronbach's α measures the extent to which two or more variables measure a given latent construct, whereas Spearman's ρ measures the monotonic relationship between variables, or, in this case, whether responses exhibit temporal stability; in other words, it is a measure whether student responses remained consistent across time. To ensure robust tests, these estimates share a few statistical assumptions: first, that variables used to calculate an estimate have three or more conditions (response categories), and, second, that there is a sufficient number of observations that exhibit each of these conditions. Failure of either or both assumptions can lead to non-robust or unusually low estimates.

Given the small sample size (n=15), estimates should be interpreted with caution, but the results did indicated good reliability. 23 of 31 (74.2%) statements exhibit Cronbach's α estimates that were at least 0.6, indicating that these variables reliably measure the same concept at both test and re-test administrations. Three of the 31 (9.7%) have abnormally low estimates (0.0 to 0.07), but further inspection revealed that responses to these statements did not exhibit one of the two assumptions which generate robust estimates – specifically responses on at least one variable in each pairwise comparison were observed for only two conditions. Finally, 4 of 31 (12.9%)

statements exhibit marginal coefficients, and one (statement 3) exhibits poor reliability (α = 0.247).

Spearman's ρ estimates suggest that responses to statements were stable across time for most statements with 21 of 31 (67.7%) of the statements having ρ coefficients greater than 0.5. This indicates that most of the variance in responses to the statement at re-test is explained by variance in responses to the statement at the baseline administration. As with the estimates of Cronbach's α, 3 of 31 (9.7%) statements have extremely low Spearman estimates due to violations of statistical assumptions. The remaining statements (7 of 31, or 22.6%) exhibit marginal-to-poor Spearman's ρ estimates, indicating that the distribution of responses changed considerably from one test administration to the next.

Finally, Cronbach's α and Spearman's ρ estimates were jointly considered and five statements had both marginal Cronbach's α estimates (< 0.6) and marginal Spearman's ρ (< 0.5) estimates:

Statement 3: I think self-reflection is an unnecessary activity for personal development.
Statement 9: I need reassurance from others to feel confident about my decisions and actions.
Statement 13: My past experiences influence my decisions.
Statement 16: I know I am the leader when I am in a position of authority.
Statement 19: My personality and personal characteristics influence my leadership style.

Further inspection reveals violation of statistical assumptions for calculating estimates for statements 3, 13, and 19. In each case, only two conditions are observed on at least one variable in each pairwise comparison. One should consider the Cronbach's α and Spearman's ρ estimates for these three statements to be reasonably high in light of the violation. Therefore, only two statements – Statement 9 and Statement 16 – are deemed non-reliable. However, as previously mentioned, the small sample size is problematic for results interpretation, and a test-retest will be performed on the revised survey to determine if Cronbach's α and Spearman's ρ estimates would be higher with a survey conducted on a larger, substantially identical sample.

Pilot Test

The survey instrument was pilot tested in three sections of the Leadership Principles and Practices course with 41 students completing the survey at the beginning (pre-test) and end (post-test) of the course. While a detailed analysis of this data is beyond the scope of this manuscript, a brief discussion of results is included to show the survey was successfully pilot tested and that meaningful results were generated.

For purposes of statistical analysis, responses to the 31 attitude statements were assigned values of 1 (strongly disagree) to 5 (strongly agree). Paired t-tests were then conducted on each pair of pre- and post-test statements to determine statistical significance of difference in means. It was determined that eight statements had statistically significantly different means between post- and pre-assessment administrations at the 0.1 level:

Statement 5: I am comfortable making presentations or giving performances to varying audiences.
Statement 8: I am comfortable being assertive.

Statement 11: I am aware of my personal strengths and weaknesses.
Statement 20: I can identify by leadership strengths and weaknesses.
Statement 25: I solicit ideas from people with viewpoints that are different from mine.
Statement 26: I can articulate my personal leadership style.
Statement 27: I confront unfair, unjust, or uncivil speech and behavior of others.
Statement 28: I actively participate in service/volunteer activities.
Statement 31: I know when to lead and when to follow.

As such, there are leadership skills that the students felt were improved by the course, but less than desired. Finally, it should be noted that none of these eight statements had questionable reliability data.

6. Conclusions

An instrument for self-assessment of leadership skills has been developed that addresses the Relational Model of Leadership and the Leadership Education Goals of Lawrence Tech. The instrument has been revised based on two focus group studies. Preliminary evidence suggests that the instrument is temporally stable and internally consistent. In addition, a pilot test of the instrument revealed that the students perceived an improvement in some leadership skills upon completion of one component of the leadership curriculum.

The goal is to have a validated and reliable instrument that can be used in a longitudinal investigation to determine if the overall leadership curriculum has an impact on students' self-perception of leadership skills and traits, and which components in the curriculum have the greatest impact. As such, development of the instrument will continue during the Spring 2010 semester with one more focus group study and reliability/validity study. The longitudinal study will begin in Fall 2010. It is still to be determined how often and to how many students the instrument will be administered.

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Appendix A
Instrument in its original form, before revisions based on the Focus Group 1.

Leadership Self-Perception Assessment

Banner ID: _____
(Used for data-collection and tracking purposes only. Your responses will remain confidential)

Directions:

Please answer the questions below as honestly and fairly as you can in terms of how you think and/or behave the **majority of the time**. There are no right or wrong answers, only honest ones. Once you select an answer, you cannot go back and change it.

These 30 questions were adapted from the Council for the Advancement of Standards in Higher Education section on Student Leadership Programs. Questions were developed based on the course objectives and topics for this class.

Choose from:
Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree

Questions:

1. I don't make a decision until I have considered information from a variety of sources, including personal experience or observation and feedback from peers.

2. I think self-reflection is an unnecessary activity for personal development.

3. Writing and speaking are the most effective skills I have for influencing others.

4. I am comfortable making presentations or giving performances to varying audiences.

5. If I am unhappy about something, I complain until someone else makes an effort to improve the problem.

6. I am comfortable taking risks.

7. I am comfortable being assertive in most situations.

8. I need reassurance from others to feel confident about my decisions and actions.

9. My decisions and actions align with my personal values.

10. I am aware of my personal strengths and weaknesses.

11. I often seek feedback from others, such as peers and supervisors.

12. My past experiences influence my decisions.

13. I am willing to bend rules in order to accomplish what I think is important.

14. I am aware of how my values influence my decisions.

15. I know I am the leader when I am in a position of authority.

16. I have the capacity to be a leader.

17. I am more likely to achieve my goals if I have direct supervision.

18. I am comfortable being a follower.

19. My personality and personal characteristics influence my leadership style.

20. I can explain my personal leadership style to others.

21. As a leader, I need to be concerned about the environment and sustainability of natural resources.

22. I am ethical in my thoughts and behaviors when I'm in leadership positions.

23. When working on something new or unfamiliar, I ask others to be involved.

24. I actively contribute to the achievement of group goals in team situations.

25. I don't have a leadership style because I am not a leader.

26. I openly challenge unfair, unjust, or uncivil speech and behavior of others.

27. I actively participate in service/volunteer activities.

28. I understand my own identity and culture.

29. I actively seek involvement with people different from myself.

30. I confront or challenge the use of stereotypes or offensive language by others.

Demographic Information

What is your current age?
18 19 20 21 22 23 24 25 26 or older

What is your sex?
-Male -Female -Transgender

What is your citizenship status?
-US citizen -US permanent resident -Neither US citizen or permanent resident

How do you identify yourself racially/ethically? (Check all that apply)
__ African American/Black
__ Asian/Pacific Islander
__ Hispanic/Latino/Mexican American
__ Native American/First Nations
__ White/Caucasian

Did you transfer to Lawrence Tech from another college or university?
__ No
__ Yes, transferred from a two-year college
__ Yes, transferred from a four-year college

What is your current enrollment status?
-Full-time -Less than full-time

What is your current class level?
-freshman -sophomore -junior -senior -unclassified or non-degree seeking

Which of the following departments houses your academic major or expected major?
-Architecture
-Art and Design
-Humanities, Social Sciences, and Communication
-Mathematics and Computer Science
-Natural Sciences
-Undergraduate Management Programs
-Civil Engineering
-Electrical or Computer Engineering
-Engineering Technology
-Mechanical Engineering
-BSIT Program

Appendix B
Instrument as administered to the LDR 2001 students during Fall 2009, after revisions based on Focus Group 1 – Note that "I do not understand the statement" is an added response.

Leadership Self-Perception Assessment

Instructions
Please answer the questions below as honestly and fairly as you can in terms of how you think and/or behave the **majority of the time**. Please answer based on the situation or context that makes the most sense to you. There are no right or wrong answers, only honest ones. Once you select an answer, you cannot go back and change it.
The end of the survey contains some demographic data collection questions. Please answer these honestly.

Multiple Attempts
Not allowed. This Survey can only be taken once.
This Survey can be saved and resumed later.

Survey:

1. Enter your Banner ID (Used for data-collection and tracking purposes only. Your responses will remain confidential).

Choose from: Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree, I do not understand the statement

2. I don't make a decision until I have considered information from a variety of sources, including personal experience or observation and feedback from peers.

3. I think self-reflection is an unnecessary activity for personal development.

4. If I am unhappy about something, I wait until someone else makes an effort to improve the problem.

5. I am comfortable making presentations or giving performances to varying audiences.

6. I am willing to be a follower.

7. I am comfortable taking reasonable risks.

8. I am comfortable being assertive.

9. I need reassurance from others to feel confident about my decisions and actions.

10. My decisions and actions align with my personal values.

11. I am aware of my personal strengths and weaknesses.

12. I often seek feedback from others, such as peers and supervisors.

13. My past experiences influence my decisions.

14. I am willing to bend rules in order to accomplish what I think is important.

15. I rely on my core personal beliefs when making decisions.

16. I know I am the leader when I am in a position of authority.

17. I have the capacity to be a leader.

18. I am more likely to achieve my goals if I have direct supervision.

19. My personality and personal characteristics influence my leadership style.

20. I can identify by leadership strengths and weaknesses.

21. As a leader, I need to be concerned about the environment and sustainability of natural resources.

22. I am ethical in my thoughts and behaviors when I'm in leadership positions.

23. When working on something new or unfamiliar, I ask others to be involved.

24. I actively contribute to the achievement of group goals in team situations.

25. I solicit ideas from people with viewpoints that are different from mine.

26. I can articulate my personal leadership style.

27. I confront unfair, unjust, or uncivil speech and behavior of others.

28. I actively participate in service/volunteer activities.

29. I understand my own identity and culture.

30. I confront the use of stereotypes by others.

31. I know when to lead and when to follow.

32. I answered the previous questions as honestly and fairly as I could in terms of how I think and/or behave the majority of the time.

33. What is your current age?
Under 18 18 19 20 21 22 23 24 25 26 or older

34. What is your sex?
Male Female Transgendered

35. What is your citizenship status?
US citizen US permanent resident Neither US citizen or permanent resident

36. How do you identify yourself racially/ethically? (Select all that apply)
African American/Black
Asian/Pacific Islander
Hispanic/Latino/Mexican American
Native American/First Nations
White/Caucasian

37. Did you transfer to Lawrence Tech from another college or university?
No Yes, transferred from a two-year college Yes, transferred from a four-year college

38. What is your current enrollment status
Full-time (12 credits or more) Less than full-time (11 credits or fewer)

39. What is your current class level?
freshman
sophomore
junior
senior
unclassified or non-degree seeking

40. Which of the following departments houses your academic major or expected major?
Architecture
Art and Design
Humanities, Social Sciences, and Communication
Mathematics and Computer Science
Natural Sciences
Undergraduate Management Programs
Civil Engineering
Electrical or Computer Engineering
Engineering Technology
Mechanical Engineering
BSIT Program