Fusing Green Energy into Manufacturing Engineering Education to Cultivate Technical Success

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Fusing Green Energy into Manufacturing Engineering Education to Cultivate Professional Success through Leadership Workshops

This paper describes integration of green energy and manufacturing subjects using a technology-based, real-world problem-solving-focused educational strategy in a new manufacturing engineering program. There are a number of challenges facing green energy manufacturing from an industrial perspective. For example, green energy manufacturing is a complex and technology-concentrated set of processes; therefore, it requires a very specialized and experienced workforce. In this paper, four "Green Energy Manufacturing (GEM)" leadership workshops which are used to enhance student's professional success are introduced. Basically, two general leadership workshops and two technical leadership workshops were arranged and delivered during the Systems Engineering Day. The paper is aimed at integrating green energy into the manufacturing engineering curriculum and to cultivate leaders in the field among minority and female engineering students. Successful completion of the course will lead to excellence in green energy and advanced engineering education.

Introduction and Background

The United States (U.S.) is on the cusp of transformational changes in how energy is produced and used. Major investments are being made by the federal government and industry in clean energy technologies that will create entirely new industries, expand markets for solar, wind and other clean energy sources, and support weatherization and other energy efficiency efforts. A critical component of a national "green industries/green jobs" effort is to motivate our citizenry to become proficient in green science and technology and associated energy field and trades thus ensuring we have a 21st century workforce. Fusing U.S. clean energy innovation, green science, and manufacturing is an environmental necessity. Without new innovations and a robust Clean Energy Science and Technology (CEST) policy, the United States will not be able to reduce greenhouse gas (GHG) emission to needed levels unless the price of GHGs rises to politically unsustainable levels. As important as these environmental objectives are, clean energy innovation is also an economic imperative. Investments in the global clean energy industry are expected to grow from $200 billion in 2010 to approximately $600 billion by 2020. Government policy and public investment will be the critical determinants for the countries to lead in the race in order to attract the CEST investment, and the economic and job creation benefits these investments will bring[1-6].

The reformation needs of engineering education are driven by dramatic changes in the renewable energy practices of U.S. companies in recent years. Briefly, these changes can be summarized as follows: (1) Complexity – Green energy has become an extremely distributed activity; (2) Globalization – Most of the large U.S. energy industrial manufacturers have operations outside of the United States due to less cost of utilizing natural resources outside of U.S. regions and expanding to new markets, etc.; (3) Environmental Awareness – There is an increased perception of the need for environmental consciousness and renewable energy practices. Manufacturing operations are required by law to consider environmental impacts and to implement substantive clean programs and technologies to reduce those impacts; (4) Computerization and Integration -- Owing to globalization, complexity and environmental requirements, the coordination of

renewable energy activities must be carried out with extensive use of information technology (IT). In the U.S., business investment in renewable energy sector has been exponentially increasing since the early-2000s[7-12].

Traditional engineering curricula do not prepare students well for handling the problems related to renewable energy that arise from globalization of the industry. In the Critical Competency Gaps Report[13] on "Their Future Is Green Energy" published by *the American Society of Engineering Education (ASEE), Professional Knowledge and International Perspective* are the two most cited areas where newly hired graduates do not meet expectations for professional competence, and the knowledge of renewable energy or so called "green energy" is one inadequacy among technical competencies. Many large multinational companies are cognizant of impending overseas growing renewable energy demand for a new generation of green energy products, and they are beginning to formulate their response to such growth. Some have embraced the notion that green energy products and production techniques are a competitive weapon. But many energy manufacturers, especially smaller ones in the United States, are far behind in acknowledging and addressing the renewable energy concerns of governments and consumers.

Today, we need a comprehensive industrial strategy to rebuild manufacturing — and by extension, "Main Street" — across the United States. A critical component of a new industrial policy will be a program to make the United States. the world's leading manufacturer of new, green technologies and components. This is not a pie-in-the-sky goal. It makes good economic sense and we have the capacity to do it. Renewable energy technologies provide three to six times as many jobs as equivalent investments in fossil fuels, when manufacturing, installation, operation and maintenance jobs are taken into account. The report *Building a Clean Energy Assembly Line*[14] examines how the U.S. manufacturers can realize significant economic benefits from clean energy development. It draws on research conducted by the Renewable Energy Policy Project (REPP), in collaboration with the Blue Green Alliance. The central findings show that a national Renewable Electricity Standard (RES), and other policies that can increase the U.S. electric generation share to 25 percent renewable content by 2025, would stimulate enough demand for the component parts needed to make wind turbines, solar panels and other clean energy technologies to create 850,000 jobs in *existing* U.S. manufacturing firms across the country.

Due to the aforementioned needs in knowledge and skill relevant to Green Energy Manufacturing (GEM), the authors have developed the leadership workshop series to support minority engineering students through the Systems Engineering (SE) Day (see Figure 1) at University of Texas at El Paso (UTEP) in Spring, 2013. On April 25, and 26, 2013, the general and technical leadership workshop series (see Figure 2) has been carried over. Information of the ethics and technical leadership workshop series has been announced two weeks ahead of the symposium and there is a webpage allowed the participants to early registration (see Figure 3). On April 25, 2013, there are 64 students sign-on and 59 students actually showed up on the SE Day event. Note that some of them only attended one day while the others showed up on both days. Moreover, the participants will be granted a certificate if he/she completes all four workshops on the SE day.

Figure 1. The flyer of the 5th Annual Systems Engineering Symposium including a leadership workshop series at UTEP on 4/25 & 4/26, 2013

5TH ANNUAL SYSTEMS ENGINEERING DAY
INNOVATIVE GREEN SYSTEMS OF SYSTEMS
UNIVERSITY OF TEXAS AT EL PASO

GREEN ENERGY MANUFACTURING WORKSHOP SCHEDULE *(Sponsored by the U.S. Department of Education)*			
THURSDAY, APRIL 25, 2013			
Time	**Location**	**Description**	**Presenter(s)**
1:00 – 2:30pm	EPNGCC	Essential Ethics for Leadership Workshop	**Dr. Louis Everett** *Program Director, NSF Professor, Mechanical Engineering Dept., UTEP*
2:30 – 2:35pm	EPNGCC	Break/ Networking	
2:35 – 4:05pm	EPNGCC	Green Lean Manufacturing Workshop	**Mr. Conrad Soltero and Mr. Jesus Reverol** Engineers, *TMAC*

GREEN ENERGY MANUFACTURING WORKSHOP SCHEDULE *(Sponsored by the U.S. Department of Education)*			
FRIDAY, APRIL 26, 2013			
Time	**Location**	**Description**	**Presenter(s)**
8:30 – 9:00am	EPNGCC	Registration/ Networking/ Breakfast	
9:00 – 10:30am	EPNGCC	Life Cycle Assessment and Green Sustainable Design Workshop	**Dr. Richard Chiou and Dr. Radian Belu** *Associate/Assistant Professors, Drexel University*
10:30 – 10:35am	EPNGCC	Break/ Networking	
10:35 – 12:05pm	EPNGCC	Globalization and Human Ethics: Transformative Intellectual Leadership and Democratic Praxis Workshop	**Dr. Cesar Rossatto** *Associate Professor, Teacher Education Dept., UTEP*
12:05 – 1:00pm	EPNGCC	Closing/ Lunch	

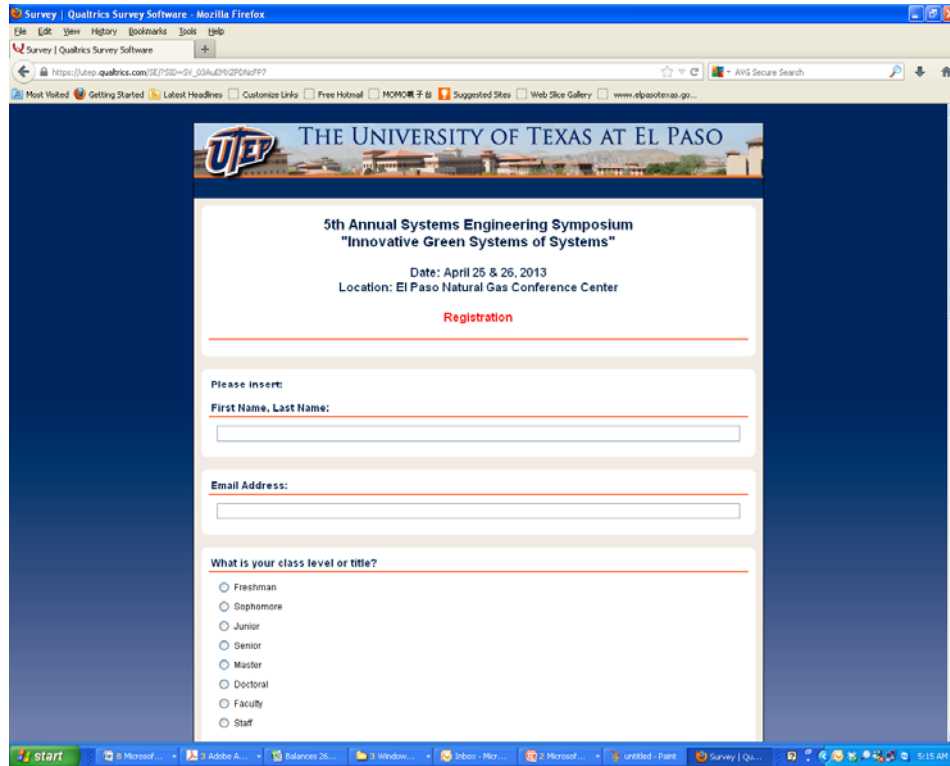Figure 2. The workshop agenda on the SE Day

Figure 3. The registration webpage of the leadership workshop series

The Program of the Leadership Workshop Series

Basically, there are four workshops in this series. Two general leadership workshops are related to ethics while the others technical leadership workshops are relevant to GEM. More workshop details could be found below.

Workshop – 1
Title: Essential Ethics for Leadership
Instructor: NSF DUE-TUES Program Director and Professor of Mechanical Engineering at University of Texas at El Paso
Abstract: This workshop covers the common ethical standards and some basic tools for making ethical decisions. Participants will identify ethical problems and use the tools to make decisions based on an ethical standard.

Workshop – 2
Title: Green Lean Manufacturing
Instructors: Engineers of Texas Manufacturing Assistant Center at University of Texas at El Paso
Abstract: This 90-minute workshop will introduce participants to the systems of systems attributes of Lean Manufacturing. The participants will be led to a comprehensive approach to sustainable manufacturing that will also prepare them for a leadership role in sustainable manufacturing and environmental stewardship. In general, the following objectives will be achieved after this workshop – (1) Introduce Lean Manufacturing concepts, (2) Use Lean

Manufacturing to identify environmental waste and (3) Apply Value Stream Mapping (VSM) as a systems of systems approach to analysis.

<u>Workshop – 3</u>
Title: Life Cycle Assessment and Green Sustainable Design
Instructors: Associate/Assistant Professors of Engineering Technology Program, at XXXX University
Abstract:

Life Cycle Assessment (LCA) is a framework for describing the possible lifespan environmental impacts of material/energy inputs and outputs of a product or process. LCA is used in evaluating the environmental impacts of energy technologies, and its results are increasingly used in decisions about R&D funding and energy policies. LCA aims at comparing and analyzing the environmental impacts of products and services to improve them to contribute to better and more efficient product and process design. The International Organization for Standardization (ISO) has standardized the basic principles. An LCA consists of four steps. The *goal and scope definition* describes the underlying questions, the system boundaries and the definition of a functional unit for the comparison of different alternatives. The flows of pollutants, materials and resources are investigated and recorded in the *inventory analysis*. The elementary flows (emissions and resource consumption) are described, characterized and aggregated for different environmental problems during the *impact assessment*. Final conclusions are drawn during the *interpretation*. Normally LCA aims to analyze and compare different products, processes or services that fulfill the same utility (e.g. photovoltaics against nuclear power or diesel generators). It is used for hot spot analysis, product or process improvement, marketing and environmental policy.

<u>Workshop - 4</u>
Title: Globalization and Human Ethics: Transformative Intellectual Leadership and Democratic Praxis
Instructor: Associate Professor of Teacher Education at the University of Texas at El Paso
Abstract:

Ethics according to whom? In a globalizing world where the market dictates the norms, rather than searching for what people are doing wrong and working from a disciplinable stand and ethical codes, this presentation examines democratic practices where people can construct together ethical modus operandi and/or modus vivendi. As opposed to a version of ethics driven by the market or corporate power, where standards and competitiveness push humans against each other, this new version of ethics proposed analyze how the exercise of transformative intellectual leadership with its democratic praxis, can embrace the totality of citizenship and cultural experiences. After all, it is not what one does that is wrong, but what one becomes as a consequence of it. This is in a broad sense the rationale and objective of this presentation.

Basically, in the beginning of each workshop, the facilitator will distribute "**Pre-Quiz**" to the participants to understand their background. After the workshop is completed, the facilitator will distribute "**Post-Quiz**" followed by the speaker evaluation form. Such appraisal mechanisms are listed in **Appendix A**. The surveys have been collected and the results have been analyzed using SPSS. In general, these workshops are also good venues for us to meet like-minded educators

from other higher education institutions to exchange ideas and to disseminate the results of this activity.

Leadership Workshop Evaluation

Preamble
This report provides the results of the activities conducted during the 2013 spring semester by the Green Manufacturing Education and Leadership grant directed by Dr. Bill Tseng. One of the primary project's goals is the development and implementation of a series of workshops directed to address key issues related to green manufacturing education and the related issues that allow for the expansion of current educational modes of preparing a new technologically skilled workforce for the 21st century.   For the most part, the evaluation of the grant activities will focus on the active role played by the Green Energy Manufacturing (GEM) team in the 5th Annual Systems Engineering Symposium held for 2 days (April 25-26, 2013) on the campus of the University of Texas at El Paso. The purpose for this program evaluation report is to evaluate and assess the quality of the workshop presentations and the level of new knowledge acquisition by the Workshop Program participants. There were four major workshops delivered by regional, state and nationally recognized experts in the field of Ethics for Leadership, Green Lean Manufacturing, Life Cycle Assessment and Green Sustainable Designs, and Globalization and Human Ethics.   The results of these activities are predicated on the expectations that each workshop presentation was to be of the highest quality and utility for the symposium participants, mainly undergraduate and graduate students in the department.

Two key valuable aspects of the symposiums were targeted by targeting the quality of the delivery of the workshop and the gains of new concepts acquired by the workshop participants. Thus, the research questions to be address in this report include:
1. *Were the individual workshops presentations met the expectations of quality as reported by the program participants and symposium organizers?*
2. *Were the symposium's participants able to gain important set of content knowledge concepts, and skills from each of the workshop presentations?*

Method
Participants.   The targeted program participants were undergraduate and graduate master's students at various stages of their program with major emphasis on upperclassman.
Research Design. The design used to address the research questions was a cross-sectional design which allows for the gathering of individual's perceptions and opinions about fundamental aspects of a program, issue, or intervention. This type of design is very effective since it provides a quick "snapshop" of current behaviors, attitudes, and beliefs in a particular population.
Instruments. As a means of assessing the quality of the individual workshop presentations, a workshop evaluation scale was developed. This evaluation scale consisted of 15 separate items that addressed the particular aspects of the four symposium's workshops, see Appendix A. In order to assess the utility of each workshop four content-based or "knowledge-based" tests were developed for each workshop presentation addressing the key concepts delivered by the workshop presenters. A pre-test and a post-test research design were implemented to assess the

amount of information acquired by the workshops' participants. Appendix B presents these tests for each of the delivered workshops.

Data Analyses. Descriptive and inferential statistics were performed to address both the quality of the presentations and the tapping of participants' new levels of acquired knowledge derived from the workshops presentations. Means, standard deviations and percentages were used across the various scales' totals and subtotals.

The following section presents initially the findings obtained on how the participants rated the quality of the four different workshop presentations. Secondly, the section includes the findings gathered from the participants' gain levels on the four workshop presentations' conceptual content and skills.

Results and Discussion

Quality of Workshop Presentations

A total of 68 total valid responses were obtained from all 4 workshop presentations with each presentation receiving an almost equivalent number of participant's evaluation ratings reported for each presentation workshop. An almost equal gender representation (30%) was observed with 27 (39.7%) of the participants not reporting this demographic information. The large majority of the participants (51.5%) were Master's and Doctoral level graduate students and they identified themselves as being in the programs of industrial engineering, manufacturing, and systems (32.3%). Table 1 presents these observed distributions of participants' response rates for all workshops in the symposium.

Table 1. Frequency and percentages of the observed set of respondents who rated each of the workshops

Presentation Workshops	Frequency	Percent	Valid Percent	Cumulative Percent
Workshop # 1	17	25.0	25.0	25.0
Workshop # 2	18	26.5	26.5	51.5
Workshop # 3	13	19.1	19.1	70.6
Workshop # 4	20	29.4	29.4	100.0
Total	68	100.0	100.0	

Note: To avoid naming actual titles or names of presenters the reader is referred to the program handout for detailed information as to each workshop.

In order to determine the perceived level of quality of all of the presentation workshops, Table 2 presents the percentages for each evaluation item in the scale. These finding allows for the examination of how program participants perceived the delivery of the workshops in general. It is clearly observed that for almost all the evaluative items, the participants overwhelming rated the presentations as either "good", "very good", or "excellent". In focusing on the scale's item # 14 and # 15, the participants' percentage ratings exceed more than 75% of them rated these presentations as well organized and very good in their quality. No major issues of concern were obtained or observed from these participants' responses with the exception of items 10 and 11 which dealt with issues of queries from audience and conveying the topics efficiently.

Table 2. Percentage of participants' responses to individual items for all workshops presentations

Statements (Internal Consistency for the overall scale was 0.97)	Poor %	Fair %	Good %	Very Good %	Excellent %
1. Presentation clarified topic objectives	0	2.9	17.6	35.3	44.1
2. Presentation covered topic content or information	1.5	2.9	17.6	23.5	54.4
3. Presentation related topic to various project challenges	0	1.5	20.6	33.8	45.6
4. Presentation topic help apply theory to solve problems	0	1.5	20.6	33.8	44.1
5. Presentation facilitated to develop new set of skills	0	4.4	23.5	30.9	41.2
6. Presentation aided in the understanding of new concepts	1.5	1.5	14.7	27.9	54.4
7. Presenter's delivery strategies	0	4.4	23.5	22.1	50.0
8. Presenter's comprehensive knowledge of topic presented	0	0	16.2	25.0	58.8
9. Presenter's style of communicating information	0	2.9	17.6	23.5	55.9
10. Presenter's response to questions/queries by audience	1.5	5.9	13.2	19.1	60.3
11. Presenter's effectiveness in conveying topic concepts	1.5	4.4	10.3	29.4	54.4
12. Presenter's material or handouts during workshop	2.9	0	25.0	22.1	50.0
13. Presentation met GEM's program goals and objectives	0	5.9	11.8	29.4	52.9
14. Overall organization of workshop session	0	5.9	17.6	27.9	48.5
15. Overall rating of this workshop session	1.5	1.5	19.1	25.0	52.9

Upon examination of the total scale values using means and standard deviation scores, it is observed that participants' rated these fifteen scale statements as "very good" and "excellent" with very stable levels of variability, see Table 3.

Table 3. Descriptive statistics for each evaluation item by participants on all workshop presentation

Scale Statements	Mean	SD
i1 Presentation objectives were proficiently clarified	4.21	.839
i2 Presentation covered the topic or information	4.26	.956
i3 Presentation related concepts to several challenges	4.22	.826
i4 Presentation topic helped apply theory to solve problems	4.21	.821
i5 Presentation facilitated the development of new set of skills	4.09	.910
i6 Presentation aided in the understanding of new concepts	4.32	.888
i7 Presenter's delivery strategies of concepts was	4.18	.945
i8 Presenter's comprehensive knowledge of topic presented	4.43	.759
i9 Presenter's style of communicating the information was	4.32	.871
i10 Presenter's response to questions/queries from audience was	4.31	1.011
i11 Presenter's effectiveness in conveying topic/concepts was	4.31	.935
i12 Presenter's materials or handouts during workshop	4.16	1.002
i13 Presentation met program goals and objectives (expectations)	4.29	.899
i14 Overall organization of this workshop session	4.19	.935
i15 Overall rating of this workshop session	4.26	.924
Overall Effectiveness of Session Valid (N=68)	63.7647	11.53595

To further determine if there were differences between and among the four different workshop presentations, a breakdown across individual workshops was performed and Table 4 reports on these differences among workshops. The only presentation that received a moderate or fair average score in overall level of quality and was rated by the lowest number of participants was presentation workshop # 3 with the rest of the presentation receiving "good" to "very good" score averages.   Figure 5 illustrates these descriptive statistics results graphically.

Table 4. Descriptive statistics of participants' perceptions about the overall quality of the workshop presentations

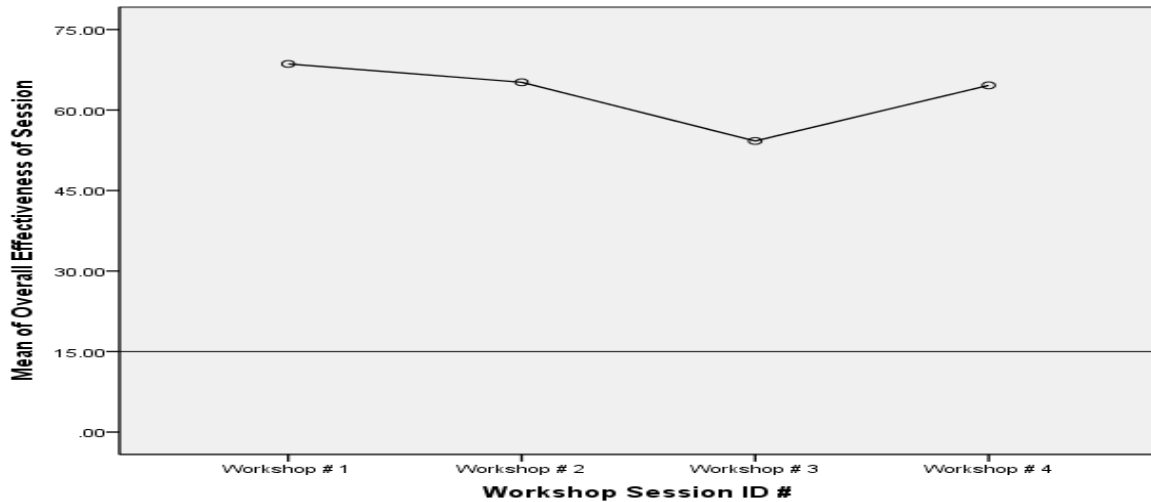| Workshops	N	Mean	SD	Std. Error
Workshop # 1	17	68.5882	8.19343	1.98720
Workshop # 2	18	65.1667	12.07939	2.84714
Workshop # 3	13	54.2308	11.64155	3.22878
Workshop # 4	20	64.6000	10.53515	2.35573
Total	68	63.7647	11.53595	1.39894

Figure 5. Depiction of overall level of effectiveness in all workshop presentations

Participants Conceptual Knowledge Acquisition from Symposium Presentations
In efforts to determine the degree of new learning or knowledge acquired by the symposium's participants, individual statistical analyses were performed for each workshop presentation. The use of baseline (pre-test) data before the presentation is compared to data gathered after each presentation workshop (post-test).

Workshop # 1 Findings (Essential Ethics for Leadership)
This workshop presentation had a simple goal of delivering a survey of general concepts related to ethical leadership and decision making by leaders. Professor Louis Everett presented a little over an hour the various ethical concepts that a leader has to have in order to make appropriate decisions. Participants were allowed to ask questions during and after the presentation.   This workshop received the highest overall average (M = 68.59, SD = 8.19) in meeting the various aspects of a well-delivered presentation.   Although, participants (n = 21) had only a limited amount of time to acquired and discern the myriad of new concepts that Dr. Everett delivered the results of the knowledge test (pre- and post-tests) were found statistically non-significant [t(12) =

1.03, $\underline{p}$ = 0.32]. The mean difference for this workshop presentation was actually found to decrease from pre-test to post-test (M = -5.29, SD = 18.56, and r = .15). In examining the overall participants' performance for this event, it was noted that 6 students who provided pre-test information did not gave their post-test performance and vice-versa 2 student who did not provided pre-test data took the post-test, thus skewing the overall results of this examination. Furthermore, these two assessments were considered equivalent forms of the same tests and not identical reproduction leading to the low correlation value which indicated low of relatedness between the two exams. Finally, the loss in gain scores was found to be statistically not significant for the final small sample of participants who provided full and valid data for these analyses. In looking at just the post-test which exemplified the concepts taught in the workshop, the overall average performance was at the middle range of the scale (M = 54.81, SD = 3.67). All in all, the large amount of material presented and the different groups who participated during the workshop session appear to indicate that some of the concepts presented were captured but also indicate the need to over-emphasize them in a more structured and curriculum-based format, thus, giving the students the opportunity for a much greater assimilation of these important concepts related to ethical leadership. Furthermore, there is a need to improve the degree of relationship that exist between exam measures to make them more equivalent or parallel in their intent to assess students' level of concept acquisition. The two different forms of the exam did not help in assessing any type of "gain" that could have been observed if the two forms had been somewhat equivalent or parallel. See Appendix C for complete SPSS output results.

Workshop # 2 Findings (Green Lean Manufacturing)
Professors Jesus Reverol and Conrad Soltero were in charge of delivering the presentation focused on issues of lean manufacturing concepts with great emphasis on efficiency models, maximum flow, waste reduction and responsible or clean manufacturing for any process and production of a product and its global impact. Again, the workshop participants were given the opportunity to ask questions and they were also given a brief demonstration to illustrate these concepts.   This presentation was well received by the participants and received the second best score in terms of overall quality (M = 65.12, SD = 12.08) in meeting the various criteria for any presentation workshop. As in the previous workshop, the students were exposed to a large number of new concepts. The participants (n =14) performance on the knowledge test was found to be statistically significant between the baseline data points and the post-test administration [t(13) = 2.94, $\underline{p}$ < 0.01]. Although, there were 24 recorded data pieces between the pre-test and the post-test points, only 14 participants provided valid data for both test administrations.   The overall gain scores for these participants in this workshop yielded a mean of 16.67 points with a standard deviation of 21.24 points. The overall correlation index for these test administration was r = 0.32 which is considered moderate given the span of time allotted between test administrations.
In examining the overall participants' performance for this event, it was noted that 10 students provided pre-test information did not gave their post-test performance and vice-versa 1 student who did not provided pre-test data took the post-test, thus slanting the overall results of this inferential examination of gain scores. The use of the same exam for both occasions may have led to the inflation of the difference scores for the sample given that it happened within one to two hours. All in all, the large amount of material presented and the different groups who participated during the workshop session appear to indicate that some of the concepts presented

were well captured and indicated that participants (students) brought some prior knowledge on the subject covered by the workshop. Furthermore, there is a need to improve the degree of relationship that exist between exam measures to make them more relevant to the concepts presented in their intent to assess students' level of concept acquisition. See Appendix D for complete SPSS output results.

Workshop # 3 Findings (Life Cycle Assessment and Green Sustainable Designs)
This workshop presentation had a primary goal of delivering an overview of general concepts related to life cycle assessment, green, and sustainable product designs. Professors Radian Belu and Richard Chiou from Drexel University presented a little over an hour the various processes and activities typically required to develop a product. Aspects dealing with the examination of the "cradle to grave" chain of a product's life were defined and explained to that audience. Participants were allowed to ask questions during and after the presentation. Unlike the other previous presentation workshops, this workshop did not received a high overall averages (M = 54.23, SD = 10.64) in meeting the various aspects of a well-delivered presentation. Although participants (n = 26) had only a limited amount of time to acquired and discern the numerous set of new concepts presented by Professors Belu and Chiou, the participants (n = 18) provided valid data that yielded results on the knowledge test (pre- and post-tests) to be statistically non-significant [t(10) = 1.44, p = 0.18]. The mean difference for this workshop presentation was actually found to decrease from pre-test to post-test (M = -12.12, SD = 27.97, and r =.10). Although, there were 26 recorded data pieces between the pre-test and the post-test points, only 11 participants provided valid data for both test administrations. The overall gain scores for these participants in this workshop yielded a mean of 11.4 points with a standard deviation of 27.98 points. The overall correlation index for these test administration was r = 0.10 which is considered low given the pretest and posttest were basically the same and short span of time allotted between test administrations may have produced some carry-over-effects.
Examination of the overall participants' performance for this particular event, it was noted that 7 students provided pre-test information but did not gave their post-test performance and vice-versa 8 student did not provided pre-test data took the post-test, thus skewing the overall results of this inferential examination of gain scores. The use of the same exam for both occasions may have led to the some degree of increase on the difference scores for this particular sample given that it happened within one- to two-hour period. Overall, the large amount of material presented and the different groups who participated during the workshop session appear to indicate that various important concepts presented were captured; however, there may be still a need for a more structured curriculum that allows students to the better acquisition of the same. Even though, there was not statistical significance the participants were able to produce more than 11 point gains between pre-test and post-test administrations. Again, there is a need to improve the degree of relationship that exist between exam measures to make them more relevant to the concepts presented in their intent to assess students' level of concept acquisition. See Appendix E for complete SPSS output results.

Workshop # 4 Findings (Globalization and Human Ethics: Transformative Intellectual Leadership and Democratic Praxis)
Professor Cesar Rossatto from the College of Education at the University of Texas at El Paso delivered the last presentation and focused on issues of Human ethics and globalization. The major tenets emphasized included issues of power and ethical codes as well as transformative

intellectual leadership under the context of cultural responsiveness and democratic praxis. Yet again, the workshop participants were given the opportunity to ask questions and open up discussion issues pertinent to the presentation. This final presentation was well received by the participants and received the third best score in terms of overall quality (M = 64.60, SD = 10.54) in meeting the various criteria for any presentation workshop in this symposium. As in the previous 3 workshops, the students were exposed to a large number of new concepts and ideas. The participants' performance on the knowledge test was found to be statistically non-significant between the baseline data points and the post-test administration [t(9) =0.22, p = .83]. Although, there were 24 recorded data pieces between the pre-test and the post-test points, only 10 participants provided complete valid data for both test administrations. The overall gain scores for these participants in this workshop yielded a mean of 1.67 points with a standard deviation of 24154 points. The overall correlation index for these test administration was r = 0.34 which is considered moderate given the span of time allotted between test administrations and the possible influence due to practice effects.

In examining the overall participants' performance for this event, it was noted that 6 students provided pre-test information did not gave their post-test performance and vice-versa 9 student who did not provided pre-test data took the post-test, thus skewing the overall results of this inferential examination of gain scores. Additionally, the administration of the same test for both occasions may have led to the inflation of the difference scores for the sample given that its administration happened within one to two hours. All in all, the large amount of new material presented and the different groups who participated during the workshop session appear to indicate that some of the concepts presented were well understood. The gains were so minimal that it is difficult to ascertain with any degree of certainty how much of an impact the presentation itself may had had on the student level of new knowledge acquisition in this area of ethics and leadership. Furthermore, there is a need to improve the degree of relationship that exist between exam measures to make them more relevant to the concepts presented in their intent to assess students' level of concept acquisition. See Appendix F for complete SPSS output results.

Conclusions

The organization and implementation of the annual symposium appear to have been a success given that a large number of participants were able to attend, if not all of the workshops, a good number of them. A total of 68 different participants were able to provide their views and perceptions as to the quality of the workshop presentations. Of the 15 items found in the evaluation rating scale, the majority of the evaluative criteria received very high ratings by the participants with an overall effectiveness mean rating of 4.25 in a scale of 1 to 5 with high indicating an "Excellent" rating. The two-day symposium set of workshops were also able to attract a good number of undergraduate students with a larger representation derived from the Master's level group. Some of the qualitative open-ended questions elicited similar comments and observations as indicating that the participant was satisfied or had received new "knowledge" and "skills" but these were few and sparse across the different workshop presentations. There is a need to refine the various content knowledge exams administered for each of the presentations by checking their individual psychometric properties which allow for

more solid and defensible set of data results and conclusions. The director and organizers of the symposium should be congratulated in providing the means and support for student success in this important area of study.

Acknowledgement

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Appendix
Appendix A – Pre/Post Quizzes and Speaker Evaluation
General Concepts on Ethical Leadership

Pre-Quiz   **Student ID#**_____

Complete to your best of your knowledge and experience the following matching items.

☐ Organization Ethics

☐ Occupational Safety and Health government "stake" or claim in some markets, industry, and outcomes. affected by a firm's actions.

☐ Stakeholder

that

☐ Social Responsibility

☐ Sexual Harassment that including consumers, competitors, and the community.

action to

a any repeated, unwanted behavior of a sexual nature perpetrated upon one individual by another; may be verbal, visual, written, or physical and can occur between people of different genders or those of the same sex.

b customers, investors and shareholders, employees, suppliers, Administration Act (OSHA)   agencies, communities, and many others who have a aspect of a company's products, operations, These groups can affect or be

c enforces the mandates that employers provide safe and healthy working conditions for all workers; makes regular surprise inspections to ensure businesses maintain safe working environments.

d the principles, values, and standards that guide behavior in an organization.

e business ethics model that includes values, norms, and expectations reflect the concerns of multiple major stakeholders, employees, shareholders, suppliers,

f codified into law, incentives to reward organizations for taking prevent misconduct.

Select the best choice on the following multiple choice items. Circle your choice.

1. Means used by many employees to resolve ethical issues
   a. Obedience to authority
   b. Discrimination
   c. Business ethics
   d. Integrity

2. The beliefs, values, and voluntary contractual obligations of an organization
   a. Virtue ethics
   b. Voluntary practices
   c. Optimization
   d. Accounting fraud

3. Formal systems of accountability, oversight, and control within an organization
   a. Corporate governance
   b. Reputation

    c.   Opportunity
    d.   Corporate intelligence
4. The quality of being just, equitable, and impartial
    a.   Fairness
    b.   Fraud
    c.   Responsibility
    d.   Honesty

5. An owner of an organization because they own shares or stocks in the firm. One model of corporate responsibility claims that all actions must be decided based on the interest of these owners only, and they are only interested in profits, so an organization must act primarily to increase or ensure profitability.
    a.   Deontology
    b.   Shareholder
    c.   Teleology
    d.   Common law

True/False items.
1. _____ Abusive/Intimidating behavior can include physical threats, false accusations, being annoying, insults, yelling, harshness, ignoring someone, and unreasonableness. Not limited to gender or race-based behavior or victims.

2. _____ Virtue ethics posits that what is moral in a given situation is not only what conventional morality or moral rules require but also what the mature person with a "good" moral character would deem appropriate.

3. _____ Corporate intelligence consists of a formal system of accountability, oversight, and control within an organization.

4. _____ Conflict of interest refers to a set of values, norms, and artifacts, including ways of solving problems that   members of an organization share.

5. _____ Ecosystems Protection Agency was created to coordinate environmental agencies involved in enforcing the nation's environmental laws; the major area of concern relates to air, water, and land pollution.

6. _____ Social responsibility is and ethics model that includes values, norms, and expectations that reflect the concern of multiple major stakeholders, including consumers, employees, shareholders, suppliers, competitors, and the community.

7. _____ Utilitarianism is a theory that seeks the greatest good for the greatest number of people by making decisions that result in the greatest total utility and that achieve the greatest benefit for all those affected.

Thank you
Adapted from the Quizlet company webpage; http://quizlet.com/14924804/ethical-leadership-exam-1-flash-cards/

Ethics and Decision Making for Leaders

Workshop Knowledge (Post) Quiz   **Student ID# _____**

For the following closed-ended multiple choice questions, select the answer or choice that best reflect the stimulus question or statement. Circle your choice.

1. There are several important elements of good decision-making, which one are two characteristics of a leader's good and consistent decision-making process.
    a. Technically sound and arrogance
    b. Legal and virtuous
    c. Humanistic and legal
    d. Righteous and legal
    e. Technically sound and company-centered

2. As a leader you are continuously faced with a myriad of ethical decisions to make, what are 3 impediments that are typically found in this important process?
    a. Macroscopic vision, fear, tunnel vision
    b. Self-interest, self-deception, ignorance
    c. Obliviousness, anxiety, self-deception
    d. Abuse of authority, fear, self-concept
    e. Ignorance, power, microscopic vision

3. Another important impediment characteristic in ethical decision-making deals with "group think", which one of the following attributes, is one distinctive weakness of group think decision-making?
    a. Illusion of vulnerability
    b. Outsiders are to be relied on
    c. Illusion of morality, we are right
    d. Application of indirect pressure on those who disagree
    e. Protecting the group from "insiders"

4. There are several criteria use in moral theory. Of the following options which one defines the statement "rules should be rational"?
    a. The criterion of *useful*
    b. The criterion of *consistent*
    c. The criterion of *plausible*
    d. The criterion of *feasibility*
    e. The criterion of *justified*

5. There are several criteria use in moral theory, Of the following options which one defines the statement "Rules produce results that are commonly accepted"
    a. The criterion of *useful*
    b. The criterion of *consistent*
    c. The criterion of *plausible*
    d. The criterion of *feasibility*
    e. The criterion of *justified*

6. "All actions are right that further the egotism of a person and/or company" This is a description of a type of ethics on.
    a. Self-altruism
    b. Self-concept
    c. Self-absorption
    d. Self-interest
    e. Self-fishness

7. In regards to the use of natural law ethics, what are four of the accepted human inclinations or dispositions?
   a. Life, Procreation, Knowledge, Sociability
   b. Life, Recreation, Happiness, Sociability
   c. Procreation, Being, Awareness, Sociability
   d. Recreation, Happiness, Awareness, Openness
   e. Life, Procreation, Fair, Sociability

8. Of the several implications of natural law on duty, which one is described best by the statement "Must promote the four self-interest values on any one's life"
   a. Duty to God
   b. Duty to family
   c. Duty to society
   d. Duty to self
   e. Duty to others

9. For an utilitarian rule, what exactly makes a "good rule?". Select the option with the best criteria for a good rule.
   a. Relevance, Easy application, Broad domain
   b. Relevance, General applicability, Broad domain
   c. Fair, Just, Relevant
   d. Fair, Just, Applicable
   e. Relevance, Applicable, Just

10. What is a short definition of "utility" when dealing with ethical decision-making by leaders? _____

_____

_____

11. Using the concepts and information you have learned from this session, what decision would you have taken to determine if Jack, who has a "once in a lifetime" job opportunity, should get a satisfactory grade on the course he f needs to graduate but failed? Explain. _____

_____

_____

_____

12. Using the concepts and information you have learned from this session, what decision would you have taken to save the crew on the stranded submarine in an enemy controlled waters? Explain. _____

_____

Thank you

Green Energy Manufacturing (GEM) Project
Workshop Evaluation Scale

Workshop Title: _____Essential Ethics for Leadership_____

Presenter:_____XXXX_____ **Date:**___April 25, 2013___

Instructions: In efforts to provide the best learning experiences through this workshop series, provide your candid and truthful appraisal of this particular presentation by rating the following statements or aspects of the workshop using the following 5-point scale values, circle your rating:

1 = Poor
2 = Fair
3 = Good
4 = Very Good
5 = Excellent

	Statements	1	2	3	4	5
1.	Presentation clarified topic objectives	1	2	3	4	5
2.	Presentation covered topic content or information	1	2	3	4	5
3.	Presentation related topic to various *GEM* project's challenges	1	2	3	4	5
4.	Presentation topic help apply theory to solve problems in *GEM*	1	2	3	4	5
5.	Presentation facilitated to develop new set of skills	1	2	3	4	5
6.	Presentation aided in the understanding of new concepts	1	2	3	4	5
7.	Presenter's delivery strategies linked to *GEM*	1	2	3	4	5
8.	Presenter's comprehensive knowledge of topic presented	1	2	3	4	5
9.	Presenter's style of communicating information	1	2	3	4	5
10.	Presenter's response to questions/queries by audience	1	2	3	4	5
11.	Presenter's effectiveness in conveying topic concepts	1	2	3	4	5
12.	Presenter's material or handouts during workshop	1	2	3	4	5
13.	Presentation met *GEM*'s program goals and objectives	1	2	3	4	5
14.	Overall organization of workshop session	1	2	3	4	5
15.	Overall rating of this workshop session	1	2	3	4	5

Additional items/questions on next page

How would you rate your knowledge of the subject matter or topic presented **prior** to the workshop? (Check one)

_____Not very knowledgeable about the topic(s)
_____Somewhat knowledgeable about the topic(s)
_____Very knowledgeable about the topic(s)

How would you rate your knowledge of the subject matter or topic **after** having attended this workshop session? Check one)

    Remained not very knowledgeable about the topic(s)
    Turned somewhat knowledgeable about the topic(s)
    Became very knowledgeable about the topic(s)

Please provide your opinion on the following open-ended statements concerning this presentation.

What was the most valuable aspect of this workshop about *Ethics in Leadership*? Please explain.

What was the least valuable aspect of this workshop about *Ethics in Leadership*? Please explain.

What kind of behavior changes do you envision making as a result of this workshop, if any?

How will information gained in this workshop change/influence how your views *Green Energy Manufacturing* issues and career goals?

Additional comments or suggestions.

Demographics: Circle or fill.

Gender: M F   Level: Undergraduate   Graduate

Classification: Major: