DLR Meeting May 22, 2009

Dr. Varanasi (University of North Texas)
Dr. Oscar Garcia (University of North Texas)
Dr. Richard Alan Cheville (Oklahoma State University)
David L. Soldan (Kansas State University)
Dr. Cynthia Furse (University of Utah)
Dr. Asha Balakrishnan (National Science Foundation)
Gary A. Ybarra (Duke University)
Tom Fitzmaurice (Volunteer—University of North Texas)
Eric Ayeh (Graduate student—University of North Texas)
Jennifer Williams (Undergraduate student—University of North Texas)

Welcome from UNT faculty (Dr. Varanasi)

- The University of North Texas started the College of Engineering in 2003 with 3 departments including engineering technology and materials science in engineering.
- The department anticipated 200 students in 2011, but we have already reached that goal in 2009.
- The Masters program began in 2007.
- A proposal for a PhD program has been made, with an anticipated start date in 2010.
- 24 students have graduated the Electrical Engineering program thus far.
- The department anticipates ABET accreditation.
- In addition, 2009 has been a busy faculty-recruitment year.

--Dr. Oscar Garcia: "The faculty is an exemplary group of people."

STPI Report (Dr. Asha Balakrishnan)

I. Background:
   a. Dr. Balakrishnan attended Washington for studies in Science Policy after obtaining her PhD.
   b. She conducted research for the President of the Office of Science Policy.
   c. Mention of Science and Technology Office of Science Policy for the Federal Government
   d. Mention of teammate Stephanie—PI (unable to attend)

II. NSF: National Science Foundation
   a. The NSF holds 6 billion constant dollars as an independent federal agency, created by congress in 1950.
   b. The foundation is reanalyzing their funding decisions, with goals of supporting new fields.
   c. Mention of Engineering Education and Centers Funding.
   d. The foundation has invested $52 million for research and education grants, with $60 million requested for 2010.

   --Dr. Garcia: What are the Science and Learning Centers?

III. EHR is committed to education, allowing for engineering itself to have an education center.

IV. STPI Tasking: Thought Leaders' Conference
   a. There are three active grants: IREE (international), DLR, and HPLE.
   b. Purdue and Virginia Tech, among others, attended the meeting of Thought Leaders.
   c. The goal is to develop a plan for evaluating current engineering education funding.

V. NSF-EEC: Active Grant programs of interest April 2008
   a. HPLE seeks the answers to: What is it that makes engineering education unique? How do people learn the sciences in a different way than other areas?
   b. IREE offers International Research experiences by sending graduates and undergraduates overseas for study.
   c. DLR focuses on the department-level reform of undergraduate engineering education programs.

VI. Thought Leaders' Convened May 2008
   a. Session 1 focused on the background and introduction to NSF evaluations.
   b. Session 2 discussed emerging issues in engineering education research and its evaluation.
   c. Session 3 analyzed evaluation methods of probable interest to engineering education.
   d. Session 4 was more of a "thought experiment" with interest in strengthening the evaluation process within engineering education research. The RFP need to be clear about what they want and how to measure it for effective evaluations. Such measures could include outcomes and goals, progress reports, etc.
   e. Research in engineering has fed into the education community by learning and contributing to other communities, leading to recognition by other communities.
      --Dr. Garcia: "Engineering has not articulated [its goals] to the world, ASEE may be the only group that *can* do this but has not yet."
      --OSU Rep: Mention of Yahnis (there are science and math standards for the states, but no engineering standards). We need to get engineering standards into k-12. K-12 engineering education has been ignored thus far.

VII. Workshop findings:
   a. "If you want something to go forward, you need to communicate it."
   b. "The time is right for engineering education researchers to work more closely and effectively with evaluation."
   c. We need to not only communicate concerns, but communicate successes between communities.

VIII. DLR Grants:
   a. The goals of the DLR grant are to reformulate, streamline, and update degree programs.
   b. The additions in 2004 to the 2002 RFP include: improved learning outcome, introduction of diversity, and emphasis on critical thinking skills, communication skills, and inter-personal skills.
   c. From the DLR grants, the foundation aspires to increase the relevance of the undergraduate engineering curricula to modern practice, and increase the number of engineering degrees by "encouraging more students to complete the degree programs (retention) and to encourage more women and underrepresented minorities to major in engineering"
   d. Up to 2006, the number of awarded BSEE has been decreasing.
      --OSU Rep: The number has started going up, based on the studies at OSU.
      --Dr. Garcia: Who has taken the lead in getting more US citizens into engineering?
         --NSF: DOD has taken the lead as they can only hire US citizens. However, they are considering hiring foreign nationals.
      --OSU Rep: For the traditional BSEE 86% were US citizens and 14% were international.
   e. "Making engineering more accessible, more relevant."
      --Dr. Garcia: "Freshman-level introduction of engineering is too late."
      --OSU Rep: As a community we must put pressure on the states to adjust the standards; time is wasted by not introducing engineering in the k-12 group.

--**Dr. Garcia:** The action must be a national thrust to go to the high school community nation-wide. "DLR is coming in too late!" We cannot make a national impact.

f. The PI offers suggestions for improvements including: extend the grant time-frame from 3 to 5+ years; provide supplementary grants to allow dissemination of the findings of the DLR grants and a complete assessment of the program; focus NSF conferences on specific topics; provide trained interaction with the DLR teams; and link undergraduate reform to graduate-level reform.

g. Short-term indicators of success include: the DLR projects met NAE and ABET criteria; faculty buy-in to adopt new teaching methods; student enthusiasm and improved perceptions of the role of engineers in society; increased quality of student's design projects; and incorporating formative and summative assessments into the engineering curriculum.

h. Long-term indicators include: An ongoing interest in curriculum refinement and the attraction of new students to the program are long-term indicators of success for the DLR. In addition, the student's retention in engineering programs has increased. There has been increased diversity and "employer recognition that interns/graduates from these revised programs are valued."

i. Many new themes emerged from the discussion of learning about student learning. One theme was making students an active role in the changes the department is making. Initially students were resistive to teamwork and active engagement, however "we all learn by doing." Starting early was another "key best practice," where Columbia served as a good example, beginning reform in the freshman year.

--**Dr. Garcia:** Is anyone doing distance learning to motivate high school students?

--**Stephanie via phone:** The University of Central Florida has facilitated students, not necessarily high school, through online and commuter bases.

j. Based on the current grant, the best practices included: starting early (freshman year) and incorporating engineering throughout the curriculum. Furthermore, collaboration with the community (e.g. Columbia) and the incorporation of hands-on projects have become best practices for the department.

--**Duke Rep:** Please define "service learning."

--**NSF:** The idea is very broad—not only are you going into the community and communicating the needs of the community to drive the curriculum, but you are also doing the hands-on projects to help you work together and consider some of the recent events, such as Katrina.

--**Stephanie:** Some examples are small projects—projects that were working with the community, and working on the projects throughout the semester instead of cramming at the end. [Mention of UNT and their alternative to service learning] suggest that service learning is defined by the school.

--**Duke Rep:** A community can be anything surrounding your local environment to a wide reach. A suggested definition is: students physically interacting in engineering in a community outside the university.

--**OSU Rep:** Service learning started at Purdue—they have formed a great example, moving into engineering for social justice.

k. Current events and issues have begun reaching the high school level, with interest in engineering, to help meet these issues.

--**Dr. Varanasi:** We create things to better humanity.

l. Collaboration across faculty and other departments is critical. For example, Columbia partnered with the Architecture department. In addition, the engineering departments should also communicate with other universities, even those overseas.

m. Industry partnerships offer increased quality to the engineering department. Credit must be given to Purdue, who use an advisory board to integrate industry into the reform. Lehigh University serves as a good example of cultivating industry partners.
n. Another excellent practice is hiring dedicated staff. Such staff may include dedicated lab mangers, like at Duke and RPI; evaluation staff who assists faculty in incorporating evaluation along the way; outreach staff; and experts from education departments.
o. For easier facilitation of learning, "teach the teachers, not the students." Reform efforts should involve students by documenting changes electronically and by using web-based training for preparing students for class. Online training can lead to students teaching each other.
p. However, untenured faculty felt their efforts would not be recognized towards earning tenure.
   --Dr. Varanasi: The DLR grant team at UNT had untenured faculty that felt they would not be recognized.
q. Time commitment and cost to revise curriculum are large, posing great challenges for the DLR. Buy-in and support is necessary from the faculty, administration, and students.
   --OSU Rep: We need someone outside of our culture to look at our engineering curriculum.
r. All DLR teams accomplished significant curriculum reforms to make engineering more relevant.
s. DLR grants demonstrated that curriculum reform requires an infusion of funding as well as support of administration, dedication and leadership of faculty, dissemination of curriculum reform, modules, lessons learned and best practices
t. "We have a new website coming out with a new report."
   --Dr. Garcia: With regard to having an impact on engineering in k-12, the major point is EHR. Is there any other group?

Updates from Duke and OSU—focus on what worked and what didn't

Duke Representative (Gary A. Ybarra, Co-PI of DLR): Theme-Based curriculum redesign

I. Things that have been done:
   a. Deconstruction, reconstruction, and rebalance of core courses, all of which now include major project-based learning experiences.
   b. Creation of Freshman Fundamentals of ECE course, shifting to a foundation of strong but rigorous introduction to computer engineering utilizing a Bo-Bot by Parilax. By offering a broader understanding of ECE, the course provides a "road-map" for choosing upper level electives.
   c. Use of tablet PCs for laboratory notebooks and engagement in the classrooms.

II. Duke replaced the Circuits course with Fundamentals of ECE, which then leads to Circuits & Devices. The focus of the Fundamentals course was rebalanced to introduce the material of subsequent courses.
   a. Duke's Lab Manager, Kip Coonley, participated in the design and implementation of new laboratory experiments and projects. With a masters in Electrical and Computer Engineering, the Lab Manager trained, mentored, and supervised all Teaching Assistants for the department.
      --OSU Rep: Are you struggling with the balance between professional and personal relationships of the TAs?
         --Duke Rep: It will always be a struggle; the ongoing mentoring is more of a small one-on-one role.

b. In addition, Duke looked into the development of instruments for assessing the laboratory experience. An example assessment topic was: "This laboratory helped me think critically about course material."

--Utah Rep: Do you have formal documentation for the mentoring practices of the TAs? We would be interested in this training material.

--Duke Rep: We will need to check with Kip Coonley for this request.

--OSU Rep: We would like this material as well. "Managing the perception to remove favoritism is a challenge."

c. With respect to the recruitment and oversight of Teaching Assistants, typical problems were: language barriers, absence of priority, and passing the preliminary exams. Another major issue was that the TAs weren't well prepared for teaching laboratories.

d. The curriculum reform included the designation of a faculty member as the Director of Undergraduate Labs, Lisa Huettel. In addition, the department hired an Undergraduate Laboratory Manager, Kip Coonley, with a master's degree in ECE."

   i. The first use of undergraduate TAs was in 1993.
   ii. Duke has been researching the trajectory of the number of TAs, graduates, and undergraduates from the Fall semester of 2003.
   iii. The Regression Analysis for 2009 showed improvement.
   iv. Duke has been using instruments to gauge the perception of the students in the labs. For example, surveys asking the student about their perceptions of the TAs and their learning experience in the lab.

OSU Representative: Engineering Students for the 21st Century

I. OSU is now a state university, land-grant college with department heads who do not control the first 2 years of the curriculum. Instead, these critical years are controlled by the Dean.
II. As a whole, the university structure has not changed from when it first began.
III. What needs to be done? We need to reconcile "new" roles of the university with "traditional roles" of teaching.
   a. Removing "legacy material" from the curriculum served as an ineffective solution because there exists no accepted way to identify legacy material. "It depends on context rather than intrinsic merit" to determine such material. For example, it is much harder to name the twelve months of the year in alphabetical order than to do so in chronological order.
   b. An interesting comparison is between the "Factory Model" and the "Hospital Model."
   c. The overall goal is to apply treatment to multiple domains. "Gaining a depth in understanding in a limited number of topics is of greater importance than covering a lot of electrical engineering. Quantitative is crap." You need to be able to identify and measure the areas in which you aspire to achieve gain. The department has conducted studies on breadth versus depth in the curriculum.
   d. The department follows a Step-by-Step Strategy, a six-step model, for developing engineering students. This model was based on Bloom's Taxonomy.
   e. Goal #1 was to increase the depth of student learning by restructuring ten courses in the electrical engineering program using a developmental model.
      i. The reform of Freshman-level coursework failed.
      ii. However, the Senior Design course was successful; having teams comprised of students from different ECEN sub-disciplines.

iii. Additional successes are: students can check out equipment, labs are 24-7, and a dedicated technician supported by the ECEN department supervises the labs.

f. The second goal was to engage both current and future faculty in bringing scholarship back into teaching.
   i. Our concept of "Fifth Year Mentorship" was a failure.
   ii. However, we did provide professional development that engaged faculty in the scholarship of teaching and publicized this project state-wide.
   iii. Out of the funds used to support undergraduate laboratory facilities, "one-quarter was set aside for..."

g. The assessment of the DLR was of the College of Education.

h. In regards to dissemination, the OSU faculty is struggling. We are currently researching YouTube options—and seeing results!

i. What worked that OSU didn't expect?
   i. Design Day worked. The day is a mass invitation for design open house and project presentation with goals of reaching out to high school students without excess faculty time.
   ii. Our web-based peer evaluation, STEAM, was a success as well. The evaluation is fully customizable by the instructor and allows anonymous feedback, accessible to students, during teamwork in the course. The code is under constant development and is available at http:/peereval.okstate.edu/.

j. Engineering Taxonomy begins with classifying learning.
   i. We found that Bloom's Taxonomy did not really apply to engineering, so we wrote our own version.
   ii. The new version consisted of: understanding, applying, analyzing, and designing
   --Dr. Garcia: If OSU could publish this version, it would be quite helpful.
   iii. We feel that "students get zero experience during research." Therefore, we should focus on conceptual learning as well.

k. We know how to teach and we know how students learn—the problem is structural. "Role-playing games could serve as a model for a complete reboot of the undergraduate curriculum."

Updates from UNT and Utah—focus on what worked and what didn't

Dr. Varanasi (UNT): A Design-and Project-Oriented Innovative Electrical Engineering Program

I. Since the engineering building offered merely carpet, UNT's partnership between the Dean and the faculty has invested heavily in furnishing.

II. The DLR grant was awarded before we had a Dean, so Dr. Varanasi and Dr. Garcia, among others, were responsible for deciding the focus of the program in forming the grant.

III. The Electrical Engineering department of UNT was very fortunate in equipment funding from various sources, leading to its classification as "equipment-heavy."

IV. UNT achieved several major accomplishments through the DLR grant. Our program emphasized problem solving and design-oriented experiences in every course. Early in the team-based curriculum, such practices include "Learning-to-Lean" concepts with an "ethics" component. The department has integrated innovative projects each semester of the curriculum. Not only did this result in outstanding student satisfaction, the department achieved excellent student diversity: 47% underrepresented groups, 41% African-American, 15% Hispanic, 3% American Indian students, and 24 women.

--Dr. Garcia: These statistics were achieved through outreach. We hired an assistant dean for outreach to minority groups. In addition, the computer science department has continuously concentrated on high school organizations. So, it was a college-wide effort.

a. Furthermore, UNT has developed a partnership with local high schools through the NSF RET program and is applying for an RET center. The faculty disseminated the results through journals, conferences, and worldwide web at www.ee.unt.edu/dlr. We are also proud that we created a major design project environment with state-of-the-art CAD tools for our students.
b. The EE department also recognizes the importance of globalization and business courses in the curriculum, such as Operations Management and Entrepreneurship.
c. The purpose of the design projects and state-of-the-art equipment is to minimize the amount of retraining required after graduation. Each of the EE graduates from UNT have been employed after graduation.
d. The residual effect on the program is 100%, striving for stability in the nature of the curriculum.
e. We would like to make a special mention of Yomi Adamo as a dedicated member of the faculty.

--Dr. Garcia: The department currently uses BlackBoard, but is considering introducing Turning Point, a clicker-based technology. Through the automation of learning, the department is looking at continuity and sustainability of the program.

V. The DLR grant has taught us that reform calls for constant involvement of faculty. In addition, we have learned that state-of-the-art CAD tools are expensive and technology is constantly changing. Students like the hands-on experiences and opportunity to work in teams. The department found difficulty in recruiting industry adjuncts to develop projects. The greatest challenge after the grant is over will be recruiting industry adjuncts. Unfortunately, transfer students will need more time to complete the project sequence, resulting in delayed graduation. We have an upcoming faculty meeting to address this issue.

--Dr. Garcia: For recruiting purposes, we offer a substantial start-up package as incentive.

VI. "The addition of faculty…directly benefits the students."

--Dr. Garcia: "Students can learn that other group members may not contribute, and the remaining members must fill in the gaps."

VII. We hang project posters along the EE corridors and have extended hours for the students.

VIII. "One of the best satisfactions that I have, is that the students are always there [on campus]." Therefore, we are looking into 24-hour access to the labs.

Dr. Cynthia Furse (Utah): ECE—Integrated Project-Based Design Curriculum

I. Although the ECE program is a three-year curriculum, it actually takes four years to complete.

II. We have an integrated design project between multiple courses, a component design project, individual course design, capstone design project, and multiple departments, such as business, communication, and bioengineering. One of the projects is overseen by four professors, entitled Telemetry for Cardiac Pacemaker. The design components in various courses lead to the final integration of the parts.

III. There are nine courses for design projects, beginning in the Spring of Freshman year when the ECE students take Intro to ECE. The students study power supply in the Electric Circuits course in the Fall of their sophomore year, then a magnetic levitation control system in the Spring, prior to the signals and systems course. Eventually, the students work on a Mini Computer and then the Pacemaker Telemetry System in the Fall of their Junior year.

IV. We are considering restructuring in cooperation with students who attend part-time or with interrupted enrollment.

V. One of the department's greatest successes is collegiality: funding brought faculty together, responsibilities were buffered by associate professors. Continued improvement translates to new hires and multiple curriculum reviews per year. Student perception has also improved through the DLR. However, individual course reviews were, and are, inconclusive. We noticed that lab ratings dropped sharply in the first year, but we "don't penalize the professors." The lab ratings steadily increased thereafter. The exit interviews for seniors improved teaching overall: 85% encouraged the lab experiences and the students offered improved confidence with professional preparation. Furthermore, EM projects are used around the world, probably due to improved dissemination. Our design curriculum concepts and process is being used by the ME department and has mentoring for CCLI proposals college-wide. The initial funding for the lab engineer position has been converted to a full time position, and a second position may be created. Therefore, additional support for the TAs has been "institutionalized." There is a new ECE Writing Curriculum focusing on laboratory reports. Freshman year focuses on writing methods, sophomore concentrates on the data within the reports, and so on. New undergraduate business courses have been integrated college-wide, focusing on engineering aspects rather than business in general. Utah now has a new student-initiated MS/MBA program instituted college-wide, making it easier to obtain a minor in Business. We have an upcoming Service Learning project-based course college-wide. In addition, the Student Resources page has a section of ECE with TA training resources, laboratory tutorials, and Writing and Speaking Resources at www.ece.utah.edu.

VI. However, challenges still remain, including: dissemination; continued 'upkeep,' mostly the training of new instructors; continual lab improvement, where students can be paid for improvements they make to previous lab experiments.

--**Dr. Varanasi:** Self tutorial is available through presenting student work on the department website.

--**OSU Rep:** SharePoint may be an option for student portfolios.

VII. The greatest challenge of the grant was PEOPLE: "We need funding for the PIs. It is critically important…have been underfunded." We also feel that three years was too short for reformation.

Discussion—How can program momentum be sustained?

OSU: We need to ask for more funding in the project courses. "One of the things that binds us all today, is projects…they are key to what an engineer is." For an assessment, how do we compare what has worked and what hasn't? Focusing on engineering education can boost economic development.

Dr. Garcia: Project oriented curriculum is labor-intensive.

Utah: There is almost no trouble in preventing the repetition of senior projects. The first two years in our curriculum focus on verbal communication between groups, then the focus shifts to writing.

OSU: We give the message that the bar must be raised from the previous groups.

Utah: NSF should consider a dissemination grant for spreading the findings of the DLR grant.

Collaborative: The Lab Technician is the key to the project-oriented curriculum. They need to be responsible for more than equipment upkeep and aid to graduate students.

OSU: There is no documentation for teaching practices.

Utah: We have seen greater success in having an ECE writing curriculum versus a writing department curriculum, due to the increased understanding of technical writing in engineering. A rubric for reports is presented early-on, then is still expected to be followed when it is not provided in latter courses.

OSU: Pre-submission reviews provide feedback so that students can do better on their reports. Each Project Manager is responsible for identifying problems early in the project. They meet with the faculty to present their findings and are graded separately from the other group members. Team members wanting to be Project Manager submit resumes and go through an interviewing process to ensure that the most appropriate person is selected as the Project Manager.

Utah: The circle of management is another approach. Each member reports to one other member, serving as the Project Manager. Essentially, each group member is a Project Manager in addition to the assigned duties for the project itself.

Utah: We posted lectures on You-tube before and after the lecture time, and compared lecture attendance. More students attended class when the lecture was posted prior to the class time than after, because they wanted to be present for the difficult material.

OSU: We offer Camptasia for in-class recording of lectures.

Collaborative: Open-courseware is expanding. Are there Intellectual property issues? Is there a loss of student enrollment as a result?

OSU: We didn't experience any loss of student enrollment because the viewers still need an institution to provide the equipment, mentorship, and interaction in challenging areas.

Utah: Our program required minimal support for faculty in the beginning, then increased support as the program begins to grow.

OSU: It would be helpful to develop a template for project-based programs to make it transferable between institutions.

Dr. Garcia: We should also develop a database of projects so that there is enough variety that you can pick and choose.

OSU: Perhaps organizations like Connections, Agilent, NEDS, and others could produce a database.

Dr. Garcia: There may be difficulty in adopting someone else's project because it is not your own. For example, it is very difficult to teach from someone else's powerpoint slides.

OSU: We are struggling with TA issues. The new idea is to set aside a TA office staffed M-F from noon to six pm. The TAs will become certified in multiple courses allowing them to receive an increase in pay rate.

Utah: Virginia Tech has this technique in progress. There are scheduled TAs so that the students can choose when to attend the lab for aid. They have industry funded senior design projects that are used to pay the TAs, so the students are then "earning" the money used for the TAs that they have been using all along.

Discussion and working lunch—dissemination of information

Dr. Varanasi: We need to organize our thoughts so that we can submit these discussions to NSF.

Utah: Ask NSF to fund a company such as Agilent to set up a project library.

OSU: NSF will not fund a digital library. NEDS, Connections, and NSDL would be the best route. The goal should be transferable projects and the communication of ideas.

Dr. Garcia: The problem is that these projects are creator specific. Everyone explains things in their own way. It would be hard to effectively share projects because of the great detail involved.

Dr. Varanasi: "If someone knows the URL, they can find my project." But if they don't, then they do not even know it exists. Therefore, we need to advertise such a site.

STPI: Does NSF have a list of the DLR Grantees on the DLR website?

Utah: NSF should consider sending faculty of great impact in the program to surrounding communities for dissemination of techniques.

OSU, Dr. Varanasi: FIE (Frontiers in Education) is better.

Utah: FIE serves electrical engineering.

Dr. Garcia: Variation in dissemination methods is necessary.

Collaborative: ASEE, FIE, EE Dept Head Association—we have tried all of these with only limited success. We need more.

Dr. Garcia: We need something that will achieve a cultural change. How do we advertise this project-oriented method?

OSU: We did it meso-scale. The changes were made department-wide.

Utah: "I don't believe that the depart-wide changes we have made are enough to make the global sweep necessary to increase attention for electrical engineering education."

STPI: Regional efforts of dissemination as a group may help.

Kansas State: If presented as a group to EE Department Head Association, it is worth pursuing as the group will have more impact.

Identify Best Practices & Major Accomplishments (Residual effects—how to sustain strengths for the future)

Peer Review
Recruitment
Retention

Utah: "I prefer a candidate who is specialized in Optics, rather than the person ranked the best Optics instructor in the nation. Specialty is the cake, while teaching ability is icing on the cake."

OSU: We need to open new pathways.

Collaborative: We should pursue NSF funding for a one week educational workshop to recruit other programs to a project method.

Dr. Varanasi: PhD attendees will not get much out of the content of these workshops.

Utah: Take the projects from various DLRs and form a course for the workshop. Produce a series of short courses at a number of engineering venues, spreading out effectively by sending just two representatives to each venue. The content could then be on the DLR library.

OSU: How will students respond to having their labs/interviews recorded for these workshops?

Collaborative: ASEE Prism, Spectrum, IEEE could be forums for workshops and communication.

Dr. Garcia: We are in need of a three page summary that is compelling that we can present to somebody.

OSU: "How does this change faculty? They are burnt out, don't teach students, are disassociated…"

Collaborative: We need to find the "fun-zone" between faculty enjoying teaching and the students enjoying learning. The curriculum needs to be "fun" for the staff and the students. The content may remain the same, but the way it is presented will provide motivation and satisfaction.

Outline of experiences and plans to sustain and disseminate best practices

a) **NSF Report—developed onsite—RFP?**
b) **Conference paper (ASEE)—other dissemination materials/methods**
c) **Compendium**
   i. Recommendation: A DLR Program
   ii. Proposal: "The rule of 3" (3 pages, 3 ideas, etc)

1. Library
   a. Collect the information about what reforms are taking place on electrical engineering education and the effects, goals, and challenges involved (assessment).
   b. Provide an interface between k-12 and university programs by offering project ideas to k-12 teachers as guidance
   c. Define the best practices for implementation, teaching, development, etc.
2. Workshops/Short-course funding (creating a mentoring community)
   a. Pre-dissemination, Pre-content: case studies, material, online discussions
   b. Workshop: a series of short-courses/demonstrations (Offer weekend workshops over a year to help keep the enthusiasm after each meeting)
   c. Post-Workshop: feedback on the effectiveness, peer evaluation

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Summary

Collaborative: "Creating a more engaging culture that focuses on educating the students." We should measure the attitude of the faculty as well as the attitude of the students in the program.

Collaborative: Rich Felder's course could be a guide for teaching. DLR could provide the guideline for implementation of effective pedagogies.

Dr. Garcia: We need to create Champions for EE.

OSU: "Collect the message. The library is to get the ideas out there. The workshops put the ideas into action."

Assignments

Jennifer: email notes to Eric, Eric emails the combined notes to Tom

Tom/Dr. Varanasi: Collection of meeting notes and ideas

OSU Rep: Tell Sue that we have group with a treasure of projects and ideas backed by commitment and we would like to know if she suggest a program for our proposal? Should we consider an unsolicited proposal? We want to target electrical engineering, specifically.

Utah Rep: Check with Lisa to see if she would be able to take the lead in this proposal.

Kansas State Rep: communicate with the Chair Association

Dr. Garcia/Dr. Varanasi: Special Projects with IEEE

Would IEEE be interested in participating in an educational library?