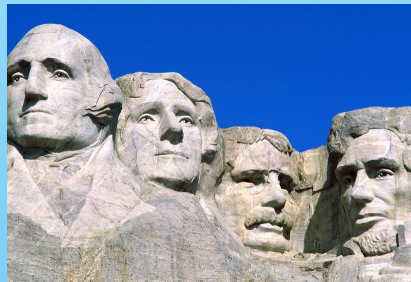


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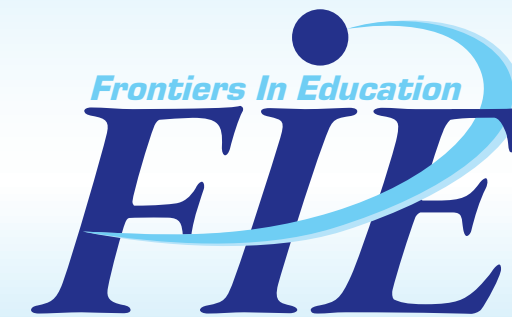
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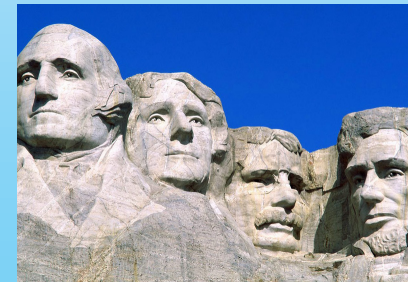
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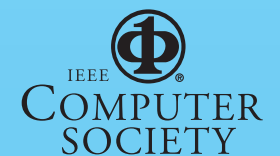
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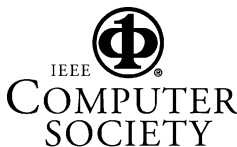
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## THURSDAY SESSIONS

### Session T1A: A Mini-Workshop on How People Learn

Chair: Louis Everett, National Science Foundation

Time: Thursday, October 13, 2011, 8:00 a.m. - 9:30 a.m.

Civic Center Room LaCroix C

#### ***A MINI-WORKSHOP ON HOW PEOPLE LEARN***

**Louis Everett, Susan Finger, Don Millard, Russell Pimmel, Janis Terpenney and John Yu**

Don't give me the theory, just show me how to do it! Have your students ever said that? Theory is what allows someone to know why something works and whether you might expect it to work in a new context. Education theory does the same, yet the theories and principles are difficult to gather, digest and apply. This workshop is intended to introduce a small but effective set of learning theories. You will not be an expert, but you should be able to develop proposal ideas that are founded on proven theories.

### Session T1B: Mini Workshop - Innovation for a Crowded Curriculum: Learning Modules for Tomorrow's Energy Engineers

Chair: Donna Riley, Smith College

Time: Thursday, October 13, 2011, 8:00 a.m. - 9:30 a.m.

Civic Center Room LaCroix D

#### ***MINI WORKSHOP - INNOVATION FOR A CROWDED CURRICULUM: LEARNING MODULES FOR TOMORROW'S ENERGY ENGINEERS***

**Donna Riley**

As energy technology evolves to meet demands for development and ecological sustainability, engineers need to have up-to-date skills and knowledge to meet the creative challenges our energy problems demand. However, current engineering thermodynamics textbooks are grounded in historical developments of the steam engine in Europe and subsequent fossil fuel technologies. A set of course modules has been designed to take a fresh look at the engineering knowledge and skills required for current and emerging energy challenges. Stand-alone modules facilitate integration with existing courses and curricula and are adaptable to a variety of settings. Modules employ innovative engineering pedagogies that foster student engagement. Because energy engineers will need the full range of capabilities outlined in ABET's learning outcomes, modules address outcomes not often addressed in conventional thermodynamics courses: design within realistic social and technical constraints, professional ethics, effective communication, understanding social contexts of engineering, lifelong learning, and a knowledge of contemporary issues. Modules also focus on policy analysis for energy technology selection, and incorporate contributions from the global South. The mini-workshop will demonstrate the use of the modules in core engineering courses. Participants will individually design a plan for implementing a module of their choice in one of their courses.

### Session T1C: Examples of Progress in Online Learning: Assessment and New Contexts

Chair: Manuel Castro, Spanish University for Distance Education

Time: Thursday, October 13, 2011, 8:00 a.m. - 9:30 a.m.

Civic Center Room LaCroix B

#### ***WORK IN PROGRESS - ASSESSING COGNITIVE SKILLS IN ASYNCHRONOUS ONLINE DISCUSSION: A CASE STUDY OF STUDENT CENTERED E-LEARNING ENVIRONMENT IN INDONESIA***

**Harry Budi Santoso, Oenardi Lawanto, Zainal Arifin Hasibuan and Rizal Fathoni Aji**

Asynchronous online discussion is used to facilitate communication between instructor and student, and also among fellow students. Although this communication tool is a frequently-used feature of e-learning systems, there is still a limited number of studies evaluating the cognitive implications of this online discussion. This study aims to evaluate students' discourse in online discussion by using a cognitive framework analysis. The goal is to identify factors that influence the construction of discussion patterns from a cognitive perspective. The discussion topics are selected based on several criteria, including the content of discussion topics, the person who initiates the discussion, the number of discussion threads, and the type of selected courses. This paper provides preliminary results of the data collection process from four courses in a Computer Science program available in the Student Centered E-Learning Environment: Database I, Foundation of Programming, Linear Algebra, and Discrete Mathematics II.

#### ***WORK IN PROGRESS - CLASSROOM AND DISTANCE COMPONENTS OF A GK12 PROGRAM PLACING GRADUATE STUDENTS IN HIGH SCHOOL CLASSROOMS***

**Justin Brough, Mary Baker and Dominick Casadonte**

As our national mathematics and science scores continue to fall below expectations, creating environments that

## Thursday Sessions

that engineering faculty members remain uncertain on how to teach students to effectively work in groups and that care and respect from peers is a key factor related to both short- and long-term student interest in engineering. The purpose of this qualitative study was to obtain verbal descriptions of how care and respect or the lack thereof is experienced in engineering peer interactions. Eighteen participant interviews were conducted. The results of this study provided a list of actions that demonstrate care and respect and a lack thereof among engineering peers. Five conceptual categories of actions were identified. Study participants indicated that a lack of care and respect had been repeatedly experienced and/or observed during group work. Participants described a lack of guidance from faculty on how to effectively work in groups. While there are many educational advantages to group work, it also introduces some troubling peer dynamics. The findings further highlight a need for engineering faculty to teach their students how to communicate with peers and work effectively in groups.

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### Session T4A: Special Session - Assessing Student Learning of Engineering Design

Chair: Monica E. Cardella, Purdue University

Time: Thursday, October 13, 2011, 3:30 p.m. - 5:00 p.m.

Civic Center Room LaCroix C

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#### **SPECIAL SESSION - ASSESSING STUDENT LEARNING OF ENGINEERING DESIGN**

**Monica E Cardella, William C Oakes, Carla B Zoltowski, Robin S Adams, Senay Purzer, Jim Borgford-Parnell, Reid Bailey and Denny Davis**

Design is a central aspect of engineering and engineering education, but is challenging to teach and even more challenging to assess. In this special session participants co-construct an understanding of design and what aspects of design should be (and can be) assessed. Additionally, the special session will review the instrument development process (including the process of validating instruments) and will provide examples of existing instruments for assessing learners' understanding of design. These instruments measure a variety of topics and concepts related to design, have been designed for many different audiences and have been developed for different purposes. This session will equip educators with tools that are useful for assessing and promoting students' understanding of design. Additionally, this session may benefit educators and researchers interested in adopting or adapting design assessments for use with K-12 populations.

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### Session T4B: Special Session - Attracting and Supporting Military Veterans in Engineering Programs

Chair: Susan M. Lord, University of San Diego

Time: Thursday, October 13, 2011, 3:30 p.m. - 5:00 p.m.

Civic Center Room LaCroix D

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#### **SPECIAL SESSION - ATTRACTING AND SUPPORTING MILITARY VETERANS IN ENGINEERING PROGRAMS**

**Susan M. Lord, Kathleen A. Kramer, Rick T. Olson, Mary Kasarda, David Hayhurst, Sarah Rajala, Robert Green and David Soldan**

The Post-9/11 GI Bill overhauled the educational benefits available to military veterans. Additionally, the Yellow Ribbon Program makes private institutions more affordable to veterans. Consequently, more veterans are seeking undergraduate degrees, and many schools are seeing significant numbers of veterans for the first time. The National Science Foundation (NSF) has recognized that veteran engineers may address shortages in the engineering workforce and has funded projects to develop models for helping veterans make the transition from active duty to successful student. This special session provides a forum for several awardees to describe their work and to engage a larger audience in discussions about engineering education for veterans. The goals for this session are to raise awareness in the engineering education community about the issues facing veteran engineering students, identify issues commonly encountered as veterans transition from service to the classroom, promote the dissemination of results from NSF-supported efforts to support veterans in engineering programs, provide a forum for sharing best practices related to the successful transition of a veteran from the military to engineering programs, and establish relationships between schools with the shared interest of serving military veteran students.

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### Session T4C: Informing Practice in Design and Implementation of Online Courses

Chair: Antonio Vieira de Castro, Instituto Superior de Engenharia do Porto

Time: Thursday, October 13, 2011, 3:30 p.m. - 5:00 p.m.

Civic Center Room LaCroix B

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#### **TEAM FORMATION BY REGION TO IMPROVE OUTCOMES FOR DISTANCE-EDUCATION STUDENTS IN A PBL COURSE**

**Andrew P. Wandel**

Because they are not able to meet face-to-face, distance education students find it more difficult to develop

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## Thursday Sessions

team-working skills: an important graduate attribute. In an effort to improve the development of this skill, (where possible) teams in a Problem-Based Learning (PBL) course were formed so that students were located in the same city or region. The expectation was that by being close together, the students would be able to communicate with each other more easily, thereby overcoming a barrier to performance. The results of a student survey show that they thought that their team's cohesion and performance were improved by being close together. All those whose team's performance was perceived to be improved wished to have the same opportunity to be close together in the future; many whose team's performance was not improved similarly wanted to work close together in the future. Analysis of the students' grades shows strong statistical significance that those students who were not geographically close to their teammates had lower grades on average. Efforts should be made to form teams relatively close geographically so that the ease of interaction leads to stronger interpersonal bonds, thereby improving the performance levels of the teams.

### ***IMPROVING EFFICIENCY IN ENGINEERING EDUCATION THROUGH ASYNCHRONOUS COMPUTER-BASED INSTRUCTION***

**Ronald D. Williams and Joanne Dugan**

The GOAL (Guided On-Demand Adaptive Learning) project produced three computer-based instruction modules for use in a course on Digital Logic Design. GOAL modules teach concepts interactively, provide exploratory interactive activities, and present material in a style that best matches the student's preferences. In addition, GOAL allows the student to set the pace, providing more detail and explanation when needed, moving quickly when possible. GOAL also can evaluate knowledge through assessment activities, allowing a student to earn validated credits for demonstrated mastery of material. Evaluation of the data collected during three semesters of student trials suggest that students using GOAL can achieve comparable learning in significantly less time. than traditional classroom lectures.

### ***WORK IN PROGRESS - DESIGN OF INTERACTIVE LEARNING OBJECTS FOR IMPROVEMENT OF DIGITAL ELECTRONICS TEACHING AND LEARNING IN HIGH SCHOOL AND DISTANCE LEARNING UNIVERSITIES***

**Sergio Martin, Jose Joaquin Fabuel, Elio Sancristobal, Manuel Castro and Juan Peire**

This paper introduces the use of interactive animations in a blended learning approach for a digital electronics course. These interactive animations help students in the concepts acquisition, thanks to their visual and interactive features. The designed animations include all kind of logic gates (e.g., OR, AND, NOR; NAND, EXOR), Boole's algebra, many combinational and sequential circuits (e.g., coders, decoders, multiplexors, demultiplexors, comparators, synchronous and asynchronous flip-flops, chronograms, synchronous and asynchronous counters, and shift registries). These interactive animations have been embedded in many examples, exercises and auto-evaluation exams, which facilitate the understanding of the different concepts. Besides, these interactive animations have been encapsulated as learning objects and included in a learning object repository. Thus, anyone in the Web can search, find and use these digital resources. Finally, these interactive animations have been used in two different environments: high school and distance learning university. A different methodology has been used in each one of these environments to fit its requirements.

### ***WORK IN PROGRESS - DEVELOPMENT AND PRACTICE OF NATIONAL COLLEGES OF TECHNOLOGY VERSION EMBEDDED TECHNOLOGY SKILL STANDARDS***

**Kazuhide Sugimoto, Kentarou Noguchi, Chikatoshi Yamada and Takahiro Yonamine**

Recently, demands for skillful engineers for developing higher application of embedded systems increase in the industry. In both universities and national colleges of technology, the higher education for embedded technology skill has been practiced in Japan. However, the systematization of the curriculum for embedded skill training is an item to be solved. Now, we are working on a project and developing skill standards with both educational contents and the new curriculum in cooperation with 10 national colleges of technology. Main objective of this project is to clarify what kinds of embedded skills should be learned and mastered in national colleges of technology. Here, skill standards have to be defined as a 'skill sheet', and based on the standards, mastered skills by each student have to be visualized to encourage their learning motivation. In this paper, two parts are mainly outlined. One is how to design embedded technology skill standards. And the other is how to construct the skill management system to guarantee student's skill level for embedded technology.

### ***WORK IN PROGRESS - ALTERNATIVE INTERFACES FOR E-LEARNING PLATFORMS USED IN REMOTE AREAS***

**Lilian Simao Oliveira, Didier Vega Oliveros, Maria Graca Pimentel and Jose Pinheiro Queiroz-Neto**

Several studies show that distance learning is a viable way to provide quality education in areas of difficult access. In