

AC 2007-651: CONDUCTING SKILLS ANALYSIS BETWEEN INDUSTRY, COMMUNITY COLLEGES, AND UNIVERSITIES FOR CURRICULAR REVISION AND GAP ANALYSIS

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Kathleen Alfano is the principal investigator of CREATE's NSF ATE Regional Center for Information and Manufacturing Technologies and has led CREATE (California Regional Consortium for Engineering Advances in Technical Education) since its development in 1996-1997. She previously served as Dean of Academic Computing and Professional Programs and is currently also a faculty member at College of the Canyons. She has over twenty years of successful faculty leadership, administration of technical departments, and leadership of State and Federal curriculum projects, especially in the areas of technical education. Dr. Alfano has a B.S. in Chemistry, M.S. in Education/Counseling, and a Ph.D. from UCLA in Higher Education, Work, and Adult Development. She also directs the Cisco Academy Training Center (CATC) for California and Nevada.

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Sharlene Katz is a co-Principal Investigator of CREATE and Professor in the Department of Electrical and Computer Engineering at California State University, Northridge (CSUN) where she has been for over 25 years. She graduated from the University of California, Los Angeles with B.S. (1975), M.S. (1976), and Ph.D. (1986) degrees in Electrical Engineering. She has served as both Associate Dean and Department Chair at CSUN. Recently, her areas of research interest have been in engineering education techniques and neural networks. Dr. Katz is a licensed professional engineer in the state of California.

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Conducting Skills Analysis between Industry, Community Colleges, and Universities for Curricula Revision and Gap Analysis

The California Regional Consortium for Engineering Advances in Technological Education (CREATE) was formed ten years ago as a joint consortium effort of seven community colleges and over 55 high tech engineering technology employers to develop a regional approach to the preparation and training of engineering technicians. Since its formation CREATE has emerged as a major education-industry partnership and was selected as is one of only 35 National Science Foundation Advanced Technological Education Centers of Excellence funded nationally (NSF ATE Regional Center for Information and Manufacturing Technologies www.create-california.org).

This paper and ASEE presentation will focus on the step by step process of soliciting industry input through focus groups and surveys and then comparing that data to curricula crosswalks for all CREATE community colleges. Next, we will showcase the experiences of a specific CREATE college that introduced a new degree program as a result of the skills gap analysis. Finally, a CREATE university partner, California State University, Northridge, will discuss the process begun to solicit industry feedback for a B.S. program in Engineering Technology.

In 1996, all of the seven colleges that worked together to form the CREATE consortium were having difficulty with a dichotomy between low enrollment in their credit electronics programs and a high demand from employers for highly skilled engineering technicians. At that time, an analysis using a modified DACUM procedure was used to assess the gap between industry skills needed and existing curricula in engineering technology. Each college then developed new or adapted courses and programs to reflect the emerging industry needs. This careful integration of industry skills into new and adapted community college curricula resulted in an increase in students for those colleges and their engineering technology departments of over 350%. Since then, yearly regional and college-specific industry advisory committee meetings have been held to continue the close working relationship with industry and government employers. In addition to these committees that promote more formalized input into the curricula, CREATE has promoted many other informal means for keeping curricula relevant to industry jobs. Student tours of employer sites, student internships, the use of industry speakers in classrooms, part-time teaching positions for industry employees, and classes for both industry and students at industry sites are other methods with which the CREATE colleges keep close ties with industry.

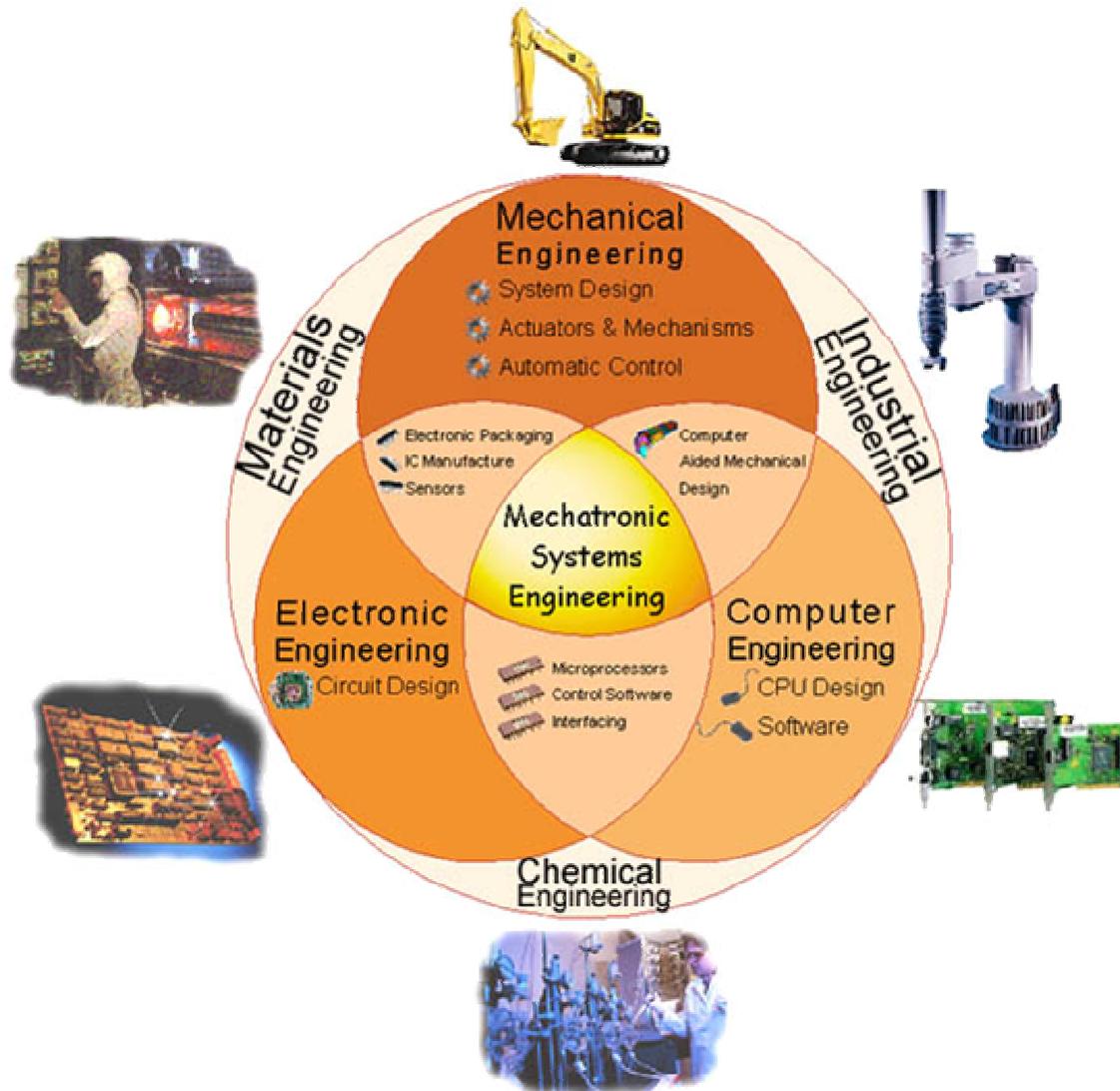
Ten years after the initial CREATE industry survey, in 2005-2006, CREATE again worked with faculty, employers and assessment consultants to conduct a major review of the region's skills needs and to cross-map these to the embedded technical and soft skills currently being taught at each of the CREATE community colleges. Surveys were developed or adapted from other sources and these surveys and results are posted on the CREATE website at www.create-california.org/skills surveys. One of the surprising differences between the results ten years ago and this set of surveys and focus groups are

the much higher priority that industry places on soft skills. Another important result was that employers felt that foundational skills such as electronics were being lost while colleges specialized curricula too much and focus groups from a wide range of industry segments advocated a more generalist curricula for their skilled technician needs.

Additionally, college industry groups worked with faculty to expand analysis into the specific needs of their industries. The CREATE Co-PI and Electronics faculty member at Allan Hancock College in Santa Maria, CA assessed industry requirements supported by funding from a NASA-CIPA grant. The grant monies were used to identify local industry requirements and possible transfer institution requirements, rewrite existing course outlines, and design new courses that supported the college's mechatronics focus. The faculty correlated technologies and skills identified by the industry partners and evaluated existing courses and programs; identified course areas that require modifications and identified topics that required the creation of new courses. They also evaluated programs and courses at four-year institutions for possible articulation opportunities.

Outreach to underrepresented groups was also a major focus in this grant. A summer institute in mechatronics was developed for high school students and a summer space camp experience was developed for junior high students. The industry partners wanted mechatronics skills taught at the technician's level. The faculty felt that the skills were scattered in multiple departments and students needed to complete multiple degrees and certifications to have the necessary job skills that the employer's are demanding.

The newly developed mechatronics degree at Allan Hancock College will be presented to elucidate how students are now able to complete one degree that is recognized by industry as meeting their entry level skill needs. This degree targets the wide range of technologies at the appropriate levels of training ensuring the required skills for career options and advancements. As the diagram below indicates, the mechatronics program meets employer needs for a multi-dimensional program that incorporates aspects of computer engineering, mechanics, and electronics. The full program will be presented as will a discussion on its implementation and success. All materials are available on the website: <http://nasa-cipa.hancockcollege.edu/>.



An employment study of aerospace companies at Vandenberg AFB (VAFB), located close to Allan Hancock College, was conducted this past December by industry partners Dr. Larry Gooch and Dave Richardson. Their study indicated that the companies interviewed at VAFB will hire 350 technical level personnel within the next 5 years. InDyne Corporation, for example, currently has 37 open requisitions for employment at VAFB.

In addition to improving the relevance of its Associate degree and certificate programs to industry, CREATE has also worked to improve the relevance of its degree programs to transfer institutions and has developed each new curriculum with both industry relevance and transferability to four year technology degree programs in the region as the highest priority. As of March 2006, there are 202 CREATE-developed and implemented credit technology courses currently being taught at one or more of six CREATE community colleges. Out of these 202 courses, 153 or 76% have now been revised and approved to be transferable to B.S. programs within the California State University system.

Not only does CREATE articulate with four year university technology degrees but it also helps fund new or adapted degree programs when those existing programs are too far distant to be accessible to CREATE college students. Twenty CREATE students are in the process of completing a 2 + 2 CSU Fresno B.S. in Industrial Technology online/hybrid. And in Fall 2005, eleven students started the new CREATE-sponsored in-person/on-line hybrid 2+2 B.S. Program in Information Technology at CSU, Channel Islands, with additional students admitted at Spring 2006 and Fall 2006. Currently, a study is ongoing to determine the feasibility of offering a new four year engineering technology program at California State University, Northridge. A major component of this study is to interview representatives of companies in the region to determine their demand for graduates of such a program and the process and impediments to this type of study will be discussed.