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Puget Sound Consortium for Manufacturing Excellence
2002-2003 Evaluation Report

Laura J. Collins and Shelley L. Balanko
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INTRODUCTION

The Puget Sound Consortium for Manufacturing Excellence (CME) is a dynamic education-industry partnership working towards building the connection between manufacturing technology education, student career goals, and private sector demand. The CME is working with its partners to modularize manufacturing technology curriculum based on existing industry skill standards. Modularized instruction will provide for customization of instruction for students potentially leading to degree obtainment. CME partner institutions and industry will have the ability to integrate CME modules into their programs.

The CME will also assist high schools, tech prep programs, colleges and universities in promoting manufacturing career opportunities to their students. Professional development activities will be offered to instructors on the design and implementation of the modularized curriculum system.

CME Program Objectives

Objective 1: Deploy a manufacturing technology curriculum that will ensure that graduates of manufacturing programs can meet national skill standards.

Objective 2: Promote professional development of high school instructors, college faculty and manufacturing trainers by providing high quality instruction on the use and application of CME instructional products.

Objective 3: Present a plan for curriculum articulation and interaction between high schools, community and technical colleges, four-year colleges and universities, and industry.

PROGRESS THE SECOND YEAR

Progress on Objective 1: Curriculum

Toward the achievement of objective 1, Dr. Dave Kim, the CME curriculum consultant, has completed a survey of curriculum used at CME partner institutions and mapped the outcomes of his investigation (see curriculum report). To provide further information, Dr. Kim compared the results of this investigation to nationally known skill standards (e.g., MTAG, NIMS, SC ATE, MSST, MSSC, UMCC, AIM). This process identified curriculum training gaps and has been the impetus for designing new curriculum modules.

Currently, Curriculum Design Teams are being established and will be charged with the redesign of MTAG curriculum modules. Each three-member design team will include a high school teacher, a community/technical college instructor, and an industry leader. The goals for each design team are to enhance the current MTAG modules to make them interesting to diverse students and to include appropriate assessment tools. Evaluation strategies include documentation of the curriculum design process and analysis of student course evaluation questionnaires from pilot classrooms.

Progress on Objective 2: Professional Development

Toward the achievement of objective 2, two Tri-Institute Summer Conferences were held, one in Bellevue and one in Spokane, to provide learning opportunities for K-12 teachers and community and technical college instructors. Thirty-one participants were enrolled and participated in 1 of 2 Tracks: Virtual Manufacturing or Web Design. Participants were exceptionally positive in their evaluation of the Tri-Institutes (see Table 1). These data will assist in improving future Institutes and providing professional development activities.

Table 1. Tri-Institute Evaluation Results.

	Strongly Disagree	Disagree	Unsure	Agree	Strongly Agree	
	1	2	3	4	5	Mean
The Tri-Institute was well organized.	0.0%	3.3%	6.7%	30.0%	60.0%	4.47
The presenters were well prepared.	0.0%	0.0%	6.7%	20.0%	73.3%	4.67
I felt technical knowledge of the presenters was excellent.	0.0%	3.3%	3.3%	3.3%	90.0%	4.80
The assistance of the Tri-Institute staff was first-rate.	0.0%	3.4%	3.4%	17.2%	75.9%	4.66
The content presented was valuable for me.	0.0%	3.3%	6.7%	23.3%	66.7%	4.53
The content of the Tri-Institute met my expectations based on published descriptions.	0.0%	3.3%	23.3%	33.3%	40.0%	4.10
I would recommend the Tri-Institute to others.	0.0%	3.3%	3.3%	26.7%	66.7%	4.57

Additional plans include a one-day conference for teachers which addresses implementation of CME curriculum modules in their classrooms. The CME evaluation team will ask teachers to complete a questionnaire regarding their understanding of the redesigned curriculum, satisfaction with the conference, and plans for implementation of what they learned. Additionally, a summer workshop for high school students to evaluate the experience of learning the MTAG curriculum is planned.

Progress on Objective 3: Articulation

Student Field Trip

Toward the achievement of Objective 3, the CME, the Mathematics, Engineering, and Science Achievement (MESA) program, and Renton Technical College co-sponsored a student field trip to Renton Technical College to build interaction between middle schools, high schools, community and technical colleges, and industry while promoting manufacturing career opportunities to students. During the one-day field trip, thirty-four middle school and high school students selected two of four workshops to attend. The workshop options were: machining, surveying, electronics, and drafting. An end-of-field-trip survey was administered to gather information for planning and improving future field trips. The questions inquired about demographic characteristics (e.g., grade, ethnicity), which workshops were attended, students' interest in the workshop area, and students' intent to pursue a career in that area. Other questions asked about students' liking of the field trip, their desire to attend another similar field trip, what they learned from the field trip, what were the two best things about the field trip, and what would make the field trip better.

Students from the African American Academy and Ranier Beach High School liked the field trip to Renton Technical College. The students gained knowledge about each of the manufacturing technology areas that they were exposed to during the workshops. In addition to content area knowledge, students gained knowledge about computing, as well as general information about manufacturing careers and planning for the future. Drafting received the highest average ratings for students' current interests as well as their future interest in a career. An overwhelming majority of students indicated that they would like to attend future field trips about manufacturing technology.

When planning future field trips, it was recommended that planners consider what students thought was best about the event. In particular, students enjoyed learning about things of interest to them (e.g., drafting), hands-on learning, and having the opportunity to interact with, and learn from, college students. It was further recommended that students' suggestions for improvement be incorporated into future field trip plans. The most frequent suggestions included more hands-on learning activities, more/better food, and more time in the workshop sessions.

Focus Groups

The CME commissioned three focus groups to gather information for diverse student recruitment and retention program development. Focus groups were conducted with women re-entering the workforce, a community group comprised of parents involved with the MESA program, and a group of manufacturing industry leaders. The women's and parents' groups explored participants' perceptions of careers in manufacturing (e.g., stereotypes and areas of interest), barriers to pursuing these careers, and training opportunities. The industry leaders group explored participants' expectations for the future of manufacturing and their attitudes, values, and ideas regarding the recruitment of women and diverse populations.

Participants in the women's and parents' groups reported that there is value in a career that goes beyond procuring money for survival. Careers, unlike jobs, can provide self-definition and personal fulfillment. When discussing manufacturing careers in particular, they were viewed both positively as a desirable career, and negatively as a "go nowhere" job. Both participant groups had little knowledge of, or experience with, the manufacturing industry, and consequently, many responses were based on negative stereotypes from North American culture as well as from exploitative labor practices in other countries. Participants identified many barriers to pursuing manufacturing careers such as a lack of knowledge about manufacturing industries, negative perceptions (e.g., stereotypes, frequent layoffs), and a lack of financial resources for training. If a manufacturing career were to be pursued, there was a preference for upper-level positions and positions with many opportunities for advancement. On-the-job training and internships were considered very attractive training options. According to these participants, the cost and duration of training should be commensurate with income potential. Moreover, training facilities should be easily accessible (i.e., close to bus routes, provided online).

The industry representative focus group explored participants' thoughts on the future of manufacturing in Washington and qualities needed in future employees. First, there was some concern that lower level production may be at risk in this state, but technology skills required in assembly and manufacturing will be in demand. It was anticipated that manufacturing careers of the future will require individuals who are highly skilled, knowledgeable and experienced with computer technologies, good communicators/team builders, flexible, and life-long learners with competitive attitudes capable of big-picture thinking and

problem solving. The industry representatives reported that there are many career paths available in manufacturing industries. Participants felt there is no bias against women or people of diverse ethnic backgrounds in manufacturing industries. However, several other potential barriers to pursuing manufacturing careers were acknowledged including negative stereotypes, variable economic cycles, lack of public knowledge about the benefits of manufacturing careers, and poor marketing by the industry and educational institutions.

Based on the findings of the three focus groups, several recommendations were made. It was suggested that the manufacturing industry partner with educational institutions to provide financially feasible training opportunities such as internship programs. Marketing strategies need to be revised to dispel negative stereotypes and increase public knowledge of the benefits of manufacturing careers. Moreover, it was suggested that all recruitment and retention efforts should make a concerted effort to reach out to women and people of diverse ethnic backgrounds.

CONCLUSIONS

During 2002-2003, the CME leadership team drafted a strategic plan, developed with the National Visiting Committee's advice, which has guided program activities and accomplishments. The restructured Advisory Board and Leadership Team have streamlined leadership processes and have provided more focus toward developing activities to reach CME objectives. As a result, the CME has made great progress toward the achievement of year 2 objectives as stated in the strategic plan. The complete year 2 evaluation plan, which also acts as a check on outcomes, is included on the next page.

For Objectives 1 and 2 (curriculum design and professional development) the CME is offering a conference for instructors to learn how to teach the redesigned Manufacturing Technology Advisory Group (MTAG) curriculum, and will host a summer workshop for high school students to experience learning the MTAG curriculum.

For Objective 3 (articulation), the student field trip to Renton Technical College exposed diverse students to manufacturing training and career opportunities and promoted interaction between a middle school, high school, and technical college. The findings from the focus group studies have influenced the development of an internship program for college level manufacturing career training, which should aid the recruitment and retention of diverse students.

CME Evaluation Plan – Year 2

Program Areas	Program Activities	PROGRAM OUTCOMES	EVALUATION ACTIVITIES
Curriculum	Continue curriculum research Industry validation of curriculum Hire MTAG curriculum consultant Form Curriculum Design Teams Review and revise existing curricular materials for consistency with standards and modern instructional techniques Develop curriculum materials for gaps (manufacturing processes, internships, technical English as a second language) Trial teaching of curricular materials Pilot Certification Project – OSPI collaboration, MTAG & Industry validation	Curriculum Design Team membership is diverse (high school teachers, community/technical college instructors, industry trainers or personnel) All existing MTAG modules (18) are revised Three new modules are designed and pilot tested in classrooms Curriculum is interesting and exciting to diverse students (women, racial diversity), therefore all students rate their satisfaction above average on course evaluation questionnaire Certification plan drafted and reviewed by SBCTC	Document progress and outcomes of the Curriculum Design Teams Student course evaluation questionnaire given to all students in pilot classrooms
Professional Development	Recruit teachers for design teams Pilot teach modules at 5-day summer workshop for high school students Deliver August Conference for teachers	Orientation for teachers at a one-day conference helps teachers plan implementation of modules All modules are piloted at the student workshop	Survey summer institute teachers regarding understanding, satisfaction with conference, and plans for implementation Survey students at the workshop for understanding of concepts and evaluation of teaching strategies
Articulation	Using focus group information, incorporate student recruitment and retention emphasis in activities Tri-Institute --Year 1 Follow-up Develop career map For appropriate activities, work through partners (MS/HS/CC/TC/MESA/WWU/CWU) Draft articulation model (MTAG/MESA) MTAG/CME partnership	From focus group conclusions; a plan for recruitment and retention of underrepresented students is developed Career map reviewed and validated by industry partners and advisory board MESA field trips receive positive ratings from students and staff	Create Executive Summary of results from focus groups Evaluate existing internship models (Lake Washington, shoreline) and interview industry sponsors concerning internship outcomes MESA field trip evaluation Interview critical partners (MacGowan/MESA, Brown/MTAG)
CME Program	Utilize NVC feedback Create dynamic advisory team	All NVC suggestions are addressed Advisory team provides critical input on decisions	Documentation of how each NVC suggestion is addressed Interview chair of Advisory Board regarding role, responsibilities, and suggestions for the CME