

# PUGET SOUND CONSORTIUM FOR MANUFACTURING EXCELLENCE

## 2004-2005 Evaluation Report – Executive Summary

The Puget Sound Consortium for Manufacturing Excellence (PSCME) is an education-industry partnership working towards building the connection between manufacturing technology education, student career goals, and private sector demand. In its fourth year, the PSCME is working to solidify its legacy in manufacturing technology education by ensuring the sustainability of the programs and processes developed during the funding period. In the following sections, evaluation findings in year four will be described in relation to program objectives. The major evaluation question was: To what extent has the program reached its objectives?

### Objective 1: Curriculum

The PSCME has partnered with the Manufacturing Technology Advisory Group (MTAG) in the revision and implementation of core curriculum modules. Student assessment rubrics were added to each module and were to be used by teachers piloting the curriculum.

Shoreline Community College and PSCME established a relationship with Shorewood High School, a nearby school that could be used as a pathway for students entering manufacturing programs at the community college, in which all modules would be piloted during the academic year and student assessment results would be returned to the program.

At the start of the school year, Shorewood High School students who were enrolled in the course completed a PSCME pre-survey. From the results of the survey, it appears that students have very little background in math and science courses upon entering the class. When asked to report the classes they have completed, students reported first or second year courses, and no advanced or upper-level classes. Students did not seem to be too concerned about class requirements. Instead, they thought the class would be more fun than traditional classes and that it would help them get a job.

PSCME has received only one module assessment rubric from Shorewood High School. From a review of the teacher's comments on the rubric assessment sheets, it seems as if learning outcomes may be closely related to behavior in the classroom, with students who misbehave scoring lower on the instrument. Additional assessment rubrics are needed to monitor this finding.

Interviews were conducted in February 2005 with educators who have either purchased the PSCME/MTAG modules or who have been testing the modules during the current school year. The goal of this process was to document use of the modules in classrooms, and to provide information that will help PSCME and MTAG fine-tune processes. From the interviews it was found that instruction varies from exclusive use of PSCME/MTAG modules to no use. No sites are currently using student assessments and scoring rubrics as written in the modules. Instructors are more focused on meeting the MTAG competencies than on teaching the modules. Teacher suggestions for MTAG and PSCME: PSCME/MTAG must work with local businesses and bring teachers and business leaders together. MTAG Certificate processes need to be in place. Articulation Agreements need to be established.

In Spring 2005, the evaluator visited two schools, Oak Harbor High School and Anacortes High School, to review their use of MTAG/PSCME modules, ascertain if student assessment data was collected, and gather teachers' suggestions for use of the modules in classrooms. Meetings were held with the Directors of Career and Technology Programs and all teachers who work in the programs.

At Oak Harbor, teachers were not using the modules in their classrooms, but felt they were meeting MTAG competencies in other ways. However, they were interested in a final test for competencies. Teachers suggested that PSCME/MTAG work with businesses – when businesses advertise for jobs, the description should say they are looking for someone with MTAG Certification. PSCME/MTAG could also provide support for student internships so that students could see what it is like in the “real world.”

At Anacortes High, two teachers are using the Modules: Val Boyce (owned a manufacturing business for 28 years, has been teaching welding and metals for 3 years); and Mike Beemer (owns a marine technology business and has been teaching for 5 years). PSCME/MTAG Modules are taught in welding, metals, applied math, and marine technology classes. Teachers adapt curriculum as needed in their classrooms and feel that the modules fit their course goals. Teachers seem to appreciate module instructional strategies that encourage hands-on, real world processes. Teachers use a few of the assessments, but not all, and usually adapt/integrate the assessments to fit their needs.

PSCME staff is currently working with MTAG on the design of a final written assessment for students, a requirement to receive the MTAG Certificate. Since teachers are using the modules in various ways – entire module to sections of a module – it is important to have a final written assessment of attainment of skill standards. An inquiry-based activity has also been developed as part of a final assessment. Students work as a team on a Catapult Activity, which is observed by MTAG-trained personnel. An online method for collecting student assessment information and instructor comments for improvement has been developed by PSCME and will be used in the future.

## **Objective 2: Professional Development**

In Fall 2004, PSCME staff presented information about the modules to teachers in school districts North of Seattle. The area is currently organizing a manufacturing consortium through industry-school partnerships.

During the academic year, a PSCME staff person worked with the instructor at Shorewood High School. As a novice teacher, he was experiencing difficulties in the classroom which affected implementation of PSCME/MTAG modules. Classroom organization, instructional objectives, and management strategies were emphasized. The instructor was paid by PSCME for 5 hours per week of planning time. Weekly meetings with the instructor were planned, but sometimes did not occur. As part of the agreement, the instructor was to complete module assessments and share them with PSCME. Some student assessment rubrics were returned to PSCME for analysis and others were not for a variety of reasons (i.e., lost, stolen).

A workshop for teachers is being planned for June 2005. The purpose of the workshop is to help a core group of manufacturing educators develop skills, relationships, and a coherent vision for how they will work with MTAG to support and improve manufacturing education in western Washington. The workshop will involve discussion and reflection upon teachers' experiences working with the MTAG curriculum, sharing other best practices from

their own teaching, evaluating module feedback and learning to make curricular revisions/extensions, assessing capstone activities and instruments, and planning for future training workshops. Five to seven teachers will attend and will form the group of Master Teachers who will interface with MTAG.

### **Objective 3: Articulation and Interaction**

PSCME has provided assistance to three high schools for field trips to local industries and community colleges. The first field trip was held mid-May, with the others soon to follow. Oak Harbor High School staff and teachers planned their field trip so that students could see people working in the “real world” in order to gain an understanding of careers and what further education students will need. Students were able to visit Skagit Valley Community College and see the Marine Technology Program, where the instructor talked to them about the importance of training and preparation for a career. They also visited Nordic Tug and Dakota Creek Industries, local commercial manufacturing businesses. Students observed carpentry and welding work, and were informed of environmental and safety concerns of businesses today. At the end of the field trip, the students were asked to complete a Field Trip Survey. Overall, students liked learning about manufacturing jobs and felt they would do well in a career in manufacturing. Students were not as sure that they could see themselves working in these fields. In responses to the open-ended questions, students stated that they learned about construction processes and how to obtain a career in related fields. They also suggested that future field trips provide opportunities for hands-on activities and more demonstrations. When asked if they liked the field trip, all the students responded that they did.

Other PSCME articulation and interaction activities include: 1) Museum of History and Industry produced a curricular DVD, “The Changing Face of Northwest Manufacturing” and 2) case studies of entrepreneurs in manufacturing fields are being developed.

## **CONCLUSION AND SUGGESTIONS**

To what extent has the program reached its objectives? With good intentions, PSCME staff has made some progress and worked to fulfill program objectives, although there is much more that can be done. For each area, suggestions are included that will support sustainability of program accomplishments.

### **Curriculum**

Curriculum has been developed that should help students meet national skill standards. The modules have undergone a number of pilot tests. Program staff gathered suggestions for improvement, and then provided revised modules to classrooms for implementation. With each pilot, the modules have been improved through the incorporation of teacher feedback.

The evaluation found that teachers are adapting module curriculum to meet their students’ needs. This finding should be no surprise to curriculum developers. Producing teacher-proof curriculum would be unwise, and was opposed in the mid-90’s by educational researchers (i.e., Darling-Hammond, Wise, Friedman, Kohn and others). Even though teachers were included in module curriculum development and review stages, when providing it to others, it is understandable that modifications would be made, thus it is difficult to get teachers to use the modules “as is” and to return student assessment data to the program.

With this in mind, the importance of the final assessments – a written knowledge test and hands-on team exercise – can not be emphasized enough. In order to show they can meet national skill standards, students must have ways to demonstrate their knowledge and skills. Extra effort is needed to make sure this happens. It is suggested that in the remaining months, PSCME staff work closely with MTAG leadership on the design of the final written knowledge test. The hands-on team exercise has been piloted, but needs external observers as part of the assessment team. This may be a burden on schools and should be revisited as a realistic strategy.

## **Professional Development for Educators**

There have been few professional development opportunities for teachers during the past year. Professional development should be clearly linked with student learning. Much is known about designing effective professional development for teachers (works from Sparks, Loucks-Horsley, Guskey and others). Clear goals that are communicated to teachers and a collegial learning environment are key elements of professional development opportunities.

The evaluation found that the level of teacher experience/development can affect module implementation. Novice teachers may find that the modules provide much needed curriculum support, but that classroom management skills/support are also needed. On the other hand, experienced teachers either felt the modules did not add to their current curriculum and instructional strategies, or that only some parts of the modules would integrate easily in their classrooms.

PSCME has a few months remaining in which to place additional, concentrated energy into teacher professional development activities. It is recommended that PSCME: 1) Tap into teachers' experience as a source of knowledge. 2) Help teachers consider the context of their schools and the needs of their students as they integrate the modules. 3) Assist teachers in the collection and analysis of student learning data. 4) Provide opportunities for teachers to collaborate with colleagues.

## **Articulation and Interaction**

The benefits of articulation between secondary and postsecondary programs are obvious. Articulation agreements can reduce duplication of learning, offer desirable options for students, and increase the number of students continuing their education by providing a smooth transition from high school to college. Through articulation agreements, students may become more aware of their choices and take steps toward successful academic planning.

Interactions between schools and businesses are also crucial to facilitate student transitions between school and work. Despite recent economic downturns, the Puget Sound region is beginning to emerge from a national recession. Manufacturing is showing steady growth. Businesses will need knowledgeable, productive workers. Creating student internships may be an ideal way to prepare students for the workforce.

PSCME has supported several activities for this objective, but there is much more that can be done. In the next few months, PSCME staff should work with MTAG to put in place sustainability strategies and develop ways to promote school/industry partnerships. Many opportunities exist, and the program needs to capitalize on them. Additional meetings with MTAG leadership may be needed to make sure this is accomplished.