Marine Advanced Technology Education Center
Summer Institute in Professional and Curriculum Development
Introduction to Submersible Technology: Teaching this Course at Your Institution

Report for 2001
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I. Introduction:

July 22, 2001 began the third annual NSF-sponsored Marine Advanced Technology Education (MATE) Center faculty development workshop, "*Introduction to Submersible Technology: Teaching this Course at Your Institution*." The two week course, which took place at the MATE Center in Monterey, California, brought together faculty members from across the country who teach high school, college, and university students. The Summer Institute was designed to introduce faculty to careers in marine science and technology; present the knowledge and skills needed to be able to offer the MATE Submersible Technology course at their home institution; and lastly to help faculty develop ways to insert the MATE Submersible Technology course into their curriculum. The MATE Center achieved these goals by inviting experts from the submersible technology industry to present topics relevant to what the faculty needed to successfully teach a submersible technology course. In order to gain the necessary hands-on skills, participants were responsible for working in groups to design, fabricate, and fly a remotely operated vehicle (ROV)- one they could eventually build with their students.

II. Overview:

A. General summary:

Twenty-five people were selected to act as participants in the Summer Institute, and over thirty people were invited to contribute to the presentations for the Institute. On Monday July 23, 2001, participants embarked upon a two-week journey that included technical presentations with such topics as:

- History of Submersible Technology
- ROV in a Bag
- Subsea Physics
- Basic Electricity
- Propulsion
- Structure & Ballast
- Sensors & Payload
- Navigation
- Power Systems & Supply
- Control Systems
- ROV Piloting
- Pneumatics & Hydraulics
- Support Systems
- Pressure Hulls & Canisters
- Operations, Seamanship, & Safety
- Future of Submersible Technology

These topics were presented by experts from MATE partner institutions. The experts were invited to spend anywhere from a few hours, to several days presenting and helping faculty to understand the materials presented. The institutions that supported this year's Institute are listed below.

- Deep Ocean Engineering (DOE)
- Los Angeles Unified School District
- Monterey Bay Aquarium (MBA)
- Monterey Bay Aquarium Research Institute (MBARI)
- Monterey Peninsula College (MPC)
- Moss Landing Marine Laboratories (MLML)
- Oceaneering International
- Roper Resources
- Santa Clara University
- SCRIPPS Institute of Oceanography
- TSC Holdings Group/ MTS ROV Committee

Participants had a tough job ahead of them. Not only were they required to take an active part in the industry presentations, but they were also asked to build a fully-functional Remotely Operated Vehicle (ROV). The ROV had to be strong and fast enough to be the first team to retrieve an unknown object, weighing approximately 300 grams in water, off of the bottom of the Monterey Bay (a.k.a. the MPC swimming pool). At first, this seemed like a daunting task, but as participants were taught the skills they needed to build the ROV and were given the equipment and materials, they flourished.

B. Accomplishments:

The MATE Summer Institute was a success by all measures available; all participants designed and built a functional ROV, and of the twenty-two people who responded to the evaluation, nineteen indicated that the Institute clearly addressed the topic of Submersible Technology. The ultimate goal of this Institute though, was for participants to walk away feeling confident that they could teach the MATE Submersible Technology course at their home institution- seventeen respondents believed that they could and would.

When examining the goals for the Institute, it must also be noted that there are general goals that the MATE Center was also trying to achieve through this faculty development workshop. These goals include: introducing faculty to and helping them to understand who marine technicians are and what they do, what career opportunities are available for students in the marine technical field, and how faculty can train students to work in the marine technical field. Faculty were introduced to marine technicians and the careers available by both the interaction with the thirty guest speakers from the marine industry and by materials handed out at the Institute. With the face-to face interactions, faculty had the opportunity to listen to what marine technicians do on a daily basis and they were able to ask such questions as, "What skills do my students need to know to succeed in this business?" Because the Department of Labor does not classify most careers in the marine technology field, it was extremely important that faculty were able to understand that there are and will be in the future, many career opportunities for their graduates in marine technology!

C. Institute Evaluation:

According to the summary of participant evaluations, the summer institute was a great success! Participants were able to "gather valuable information and network with people from across the nation" to get new ideas for their classrooms. Several faculty commented that they "gained a great deal of insight into strategies for teaching in the classroom." In fact, twenty participants strongly agreed or agreed that the Institute had provided them the opportunity to gain valuable ideas they can use in their courses.

One common suggestion for future Institutes was to have multiple sessions on the same topic, that address the different teaching levels. For instance, one comment was made that, "Four-year colleges with engineering need more details in math and theory. The ideas that I saw and learned were great, but now I need to build upon them so that they apply at the engineering level." This idea should be explored for future Institutes.

III. Organization:

A. Introduction:

Saundra Butcher lead the organization and planning before and during the 2001 MATE Center Summer Institute with support, organization, and participation from all the MATE staff. Frank Barrows, MATE Submersible Technology instructor at MPC, lead the ROV building sessions in his automotive technology laboratory. He also acted as technical support for the Institute speakers.

B. Participant Selection Process:

The MATE Center received over fifty applications for the 2001 Summer Institute. Therefore, the application screening process involved several criterion, which had not been used in previous years. These criteria included the following:

1. applicant had to have the support of the administration at their institution.
2. preference was given to faculty at community colleges.
3. applicant had to have facilities required to offer a submersible technology course (laboratory space, proper equipment, pool or some way of testing ROV).
4. applicant had to be planning or considering to offer the MATE Submersible Technology Course within the next year.
5. applicant had to have some of the basic skills necessary to teach the MATE Submersible Technology Course.

Using this selection process, the MATE staff identified thirty people that would be appropriate to attend the Institute. The invited faculty were sent letters of acceptance in early May, 2001.

C. Participant Information Packet:

Once the participants had been identified, they were sent an information packet containing the following items:

MATE Information

- Cover letter
- Brief description of the MATE Center with contact information
- Marine science and technology careers pamphlet
- MATE Newsletter

Logistics

- Draft agenda
- List of participants
- Evening reception sponsors

ROV Competition

- Competition description
- Competition sponsors

Curriculum Materials

- An example of how MBARI uses one of their ROVs

- Useful web site list for further information about ROVs
- Information about how the University of Delaware has used ROVs
- An example of how a high school instructor built an ROV in the classroom

Monterey Bay Area

- Maps and background information about the Monterey Bay area and accommodations at CSUMB