

Ocean Science Education Institute

Lessons learned:

The first sessions of the NE-COSEE Ocean Science Education Institute (OSEI) was held in July 2003, at the UMass Boston Campus. The intense week blended short research talks, field experiences in Boston Harbor, a coastal salt marsh and the intertidal zone. In addition, teachers and researchers experienced inquiry-based ocean science lesson plans and activities led by educational consultant, Kathy Brown. The team of organizers and facilitators led by Rick Atkins (of the UMass Center for Teaching and Learning) and Bob Chen (UMassBoston) included Bill Andrade (Swampscott Public Schools), Cheryl Belknap (New Bedford Oceanarium), Jack Crowley (Mass Marine Educators), Debbie Fillis (UMassBoston), Sukey Padawer (New England Aquarium), and Andrea Thorrold (Woods Hole Oceanographic Institution). At the end of the week, teachers and researchers collaborated to develop a research-based ocean science lesson plan to be implemented during the fall in the classroom of the teachers.

To promote program sustainability and effectiveness, NE-COSEE evaluated all aspects of the Ocean Science Education Institute. Carol Baldassari, Senior Research Associate and Jodi Sandler, Research Associate, from the Program Evaluation and Research Group at Lesley University in Cambridge, MA, conducted interviews and administered surveys to all OSEI scientists, teachers, and facilitators. Evaluations about program design, content, and recommendations for the future were provided. A summary follows.

Reflections on OSEI-1's Design

The overall focus of the July OSEI was for teachers to find examples from current ocean science research to integrate with their existing curriculum. Initial feedback from teachers identified successes and limitations. Participants felt the institute was highly organized and motivating. They were excited about possible resources: contacts with presenters, scientists, and facilitators. Many were fascinated by WHOI researcher, David Gallo and his video footage of vents. Teachers identified their needs for ocean science content knowledge, useable activities, and affordable supplies. Several teachers were looking for a researcher with a specific expertise. Participants identified some challenges that teachers need to consider in developing ocean science curriculum. These include proximately to ocean/estuary areas, funding for materials and transportation, scheduling, class sizes, storage space for supplies, and time within the curriculum.

At the end of the OSEI, the evaluator shared her observations and recommended the following changes.

Excerpts: Baldasari, Carol. "Evaluators' Reflections on the NE-COSEE Ocean Science Education Institute." LESLEY UNIVERSITY CENTERS AND INSTITUTES Program Evaluation and Research Group. Cambridge, MA. Oct., 2003.

"Participants needed more time to digest content, question scientists, interact for in-

depth explorations, and reflect. Scientists needed more feedback about how or whether the teachers were interpreting their presentations.”

“**Hands-on activities** needed connections to the research presented, and to be relevant for teachers’ classrooms in terms of access to equipment or environment needed. Scientists would have benefited from viewing the presentation on ‘best practices’ in an inquiry-centered middle school science classroom. “

“**Institute’s design** needed to incorporate what is known about best practices in professional development for science teachers by employing those with in-depth knowledge of and experience designing inquiry-based professional development for middle school teachers.”

Teacher-Scientists Collaboration to Design and Implement Research-based Ocean Science lessons:

OSEI researchers and educators gathered at the New England Aquarium (NEAQ) in November and December to share implementation experiences along with their ocean science research-based lesson plans. During presentations, it became apparent that factors such as participants’ understanding of inquiry-based science, mandated curricular constraints, and other classroom challenges impacted the quality of work produced. Components of successful models were identified by the evaluator. The teacher and researcher collaborations producing high-quality ocean-science lesson plans had the following characteristics:

Excerpts: Sandler, Jodi. “NE COSEE: OSEI-1 Follow-Up Day Memo.” LESLEY UNIVERSITY CENTERS AND INSTITUTES Program Evaluation and Research Group. Cambridge, MA. Feb., 2004.

“**Collaborations** involved face to face planning meetings and on going communication among teachers and scientists. Researchers’ expertise was used to design the lesson, and they visited the classroom to present research and/or participate in lesson implementation.

“**Lessons** developed were individual lessons that fit into the required curriculum. They were inquiry-based and/or hands-on, and required the students to authentically engage in the scientific process through design of research questions, collecting and analyzing data, and learning how to use scientific tools.”

“**Students** were engaged and excited by the lessons, and enjoyed the researcher presentations. Some indicators of student engagement were a decrease in behavioral problems, or increase in the amount and quality of student work.”

”**Presentation** hand-outs during the follow-up session included the standards that the lessons met. The researchers appeared engaged in the presentations during the 2nd follow-up day and provided energetic and detailed comments about their role in the

lessons.”

“Facilitators also played a key role in the teacher/researcher collaborations. They observed scientist presentations in classrooms, provided resources, education, and content expertise.”

The Future/Recommendations for OSEI-2

Another of OSEI’s goals is to promote program sustainability and to increase capacity. Working closely with district science coordinators will be key in integrating ocean science within existing curriculum. District efforts could be enhanced by the presence and participation of OSEI researcher and funding support. The evaluator offered suggestions for designing OSEI-2 in order to improve upon the first institute and to promote program sustainability.

Excerpts: Baldasari, Carol. “Summary, Interview with OSEI Teachers.” LESLEY UNIVERSITY CENTERS AND INSTITUTES Program Evaluation and Research Group. Cambridge, MA. May, 2003.

“Align the curriculum and consider the constraints. Lesson implementation should coincide with what strands teachers are teaching -- life science vs. earth science. In addition the time of year affected the availability of the creatures to be studied, the ability to gather data outside, and the placement of the OSEI lessons in the mandated curriculum.”

“Clearly articulate goals and identify intended outcomes for OSEI participants and the strategies you will use to achieve them. Plan meetings with presenters and facilitators to clearly communicate program goals, intended outcomes, logistics, etc.”

“Identify leaders and invite individuals with educational experience and professional development expertise to work with you as a team member or advise the team in the following areas: middle school science content and pedagogy, and designing and facilitating effective professional development programs for science teachers.”

“Address the cultural barrier among scientists and educators. “While researchers and teachers planned together, most researchers took on the role of consultant rather than collaborator during the implementation and presentations of OSEI units and expected teachers to initiate the relationship.”

Developing Program Sustainability

OSEI-I has begun to build a community of ocean science researchers and educators. All participants acknowledged plans to remain in contact with each other. The evaluator noted positive interactions between participants during the July institute and follow-up

days. After the second follow-up day, more signs of program sustainability were apparent.

Excerpts: Sandler, Jodi. "NE COSEE: OSEI-1 Follow-Up Day Memo." LESLEY UNIVERSITY CENTERS AND INSTITUTES Program Evaluation and Research Group. Cambridge, MA. Feb., 2004.

"Ten (10) teachers said that they would use the lessons created by other OSEI participants. Ten (10) teachers had shared their OSEI experiences with other teachers in their school who did not participate in OSEI. Five (5) teachers planned ways to integrate ocean science into the curriculum with colleagues who did not participate in OSEI. Three (3) teachers reported that their OSEI lesson plans were used by other teachers who did not participate in the institute."

OSEI participants are now a significant part of the NE-COSEE network and will be informed of many other ocean science educational opportunities. Lessons learned from OSEI-1, as identified by the outside evaluator, are already being implemented in the early planning stages for OSEI-2. Refinements based on the evaluators' feedback will build upon the initial successes of OSEI-1 and ultimately provide for high quality ocean science lessons, increased capacity, and program sustainability.