

COSEE NETWORK EVALUATION

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Ongoing evaluation of COSEE activities has been taking place at each of the 10 Centers. Evaluation efforts to date have played a dual role: documenting the effectiveness of these activities and providing COSEE planners with insights that help refine ongoing efforts. In addition to local evaluation efforts, the COSEE Network is interested in understanding the collective impact of the local Centers on ocean sciences education nationally.

In the early stages of Network evolution, the work focused on creating a vision and an infrastructure to support the Centers' collective advancement. To this end, operational guidelines and planning documents, such as the COSEE Strategic Business Plan, were adopted in May 2004. This plan systematically outlined a set of Network-level goals (see Spitzer and Ganter, this issue). These goals have guided Network-level evaluation efforts focused on both ascertaining progress towards meeting these goals and identifying gaps between goals and COSEE activities.

Many COSEE activities take place at the individual Centers, with the richest data concerning Center activities collected by local Center evaluators (see sidebars on pages 21, 22, and 23 for three brief examples). The collective evaluation expertise across Centers is impressive. Currently, there are over 70 evaluation instruments and 30 reports, which are shared across COSEE Centers. Evaluation instruments include surveys, questionnaires, journal prompts, and cognitive tests, while reports range from annual reviews of Centers to reports of specific activities.

Although document sharing is one way that evaluators leverage expertise and share ideas, more powerful examples include discussions and collaborations among Center evaluators. For example, COSEE has focused on enhancing ocean literacy within various target audiences and institutions. Evaluating this diverse program has necessitated wide-ranging evaluation expertise that is also useful in refining the role of the COSEE Network and its Centers, as well as evaluating related programs such as COSIA (Communicating Ocean Science to Informal Audiences) and the use of real-time data with the National Oceanic and Atmospheric Administration's Natural Estuarine Research Reserve System. Evaluators with greater familiarity or access to K-16 schools or informal science centers have shared their expertise when other Centers expanded their programming efforts to these arenas. Centers have developed their own unique areas of expertise and share this knowledge with other Centers. COSEE California shared its success with the Communicating Ocean Sciences undergraduate college course and several COSEE Centers now offer similar courses; COSEE Mid-Atlantic has conducted several focus groups on the use of real-time data (see Parsons, Stewart, Fortner, Lichtenwalner,

COSEE WEST is dedicated to three general goals:

- 1) greater awareness of ocean sciences in the general public,
- 2) use of ocean sciences as a strategy to increase general science literacy, and
- 3) attracting more students to science and ocean sciences careers.

The COSEE West evaluation uses a combination of surveys targeted towards different types of program activities and audiences, key informant interviews, and field observations of program activities to create an overall picture. This is particularly valuable for program staff and partners, who get immediate feedback on how participants view the program overall and the effectiveness of specific program activities. Such feedback allows for midstream corrections. Annual reports provide an assessment of progress toward general goals and program initiatives for the Center and Network. COSEE West collaborates with evaluators from other Centers in refining its own programming and in assisting other Centers with related evaluation efforts.

this issue). Evaluators have met to discuss Network evaluation and the contributions of individual Centers toward COSEE program goals.

Data collection forms the backbone of any evaluation and the types of data and methods of collection vary widely across the Network and even within individual COSEE Centers. Given the breadth and depth of COSEE Center initiatives, each initiative often requires its own data collection methodology, with additional efforts to evaluate overall Center efforts and impact. Given the limited availability of evaluation funding, data collection efforts need to be strategic and cost effective.

In addition to local data collection, Network-level data are collected as individual Centers submit information about their activities into an online searchable activity database linked to the COSEE website and available to the public. The elements of the database include descriptions of activities, target audiences, intended outcomes, numbers of scientist and educator

participants, participant diversity, and evaluation methods. Local Center reports, the activities database, the survey of Center principal investigators, and individual Center websites create a composite picture of the Network that provides insight about overall COSEE effectiveness.

These data are analyzed to investigate the key COSEE Network evaluation question: "What is the impact of COSEE on ocean sciences education excellence?" Although each Center has its own goals and activities, data analysis reveals common themes across the Network. COSEE participant feedback is overwhelmingly positive. Scientists report increasing involvement with educators, and educators report an increase in the teaching of ocean sciences. Centers have documented multiple collaborations among educators and scientists in both formal and informal education settings. Center efforts include the following foci:

Partnerships and Network Building. Every Center seeks to create regional networks of partnerships among organizations with a vested interest in the ocean sciences. Centers frequently collaborate with aquariums, museums, educational foundations, professional societies, resource and science centers, school districts and schools, and universities. In the Network, collaboration among Centers is common. This is an important outcome of Network building, especially given that the initial funding process was competitive and pitted future partners against one another for limited funds. COSEE

COSEE MID-ATLANTIC (COSEE MA) is thematically focused on ocean observing systems and bringing together scientists and educators to increase the use of real-time data, particularly in K-12 classrooms. Evaluation efforts strategically target three key audiences: middle school teachers, ocean observatory scientists, and science graduate students assisting with COSEE MA education outreach activities. Evaluation tools include web-based surveys and individual and group interviews. On-going online surveys and focus groups with teachers participating in workshops enable continuous improvements and track the use of real-time-data materials and activities over time. An annual online scientist survey tracks ocean observatory scientists' involvement in K-12 education outreach and awareness of COSEE. Interviews with graduate students and mentors provide insights on how to involve new scientists in COSEE education outreach. COSEE MA collaborates with COSEE West, COSEE California, and COSEE New England on evaluation of activities to engage scientists and educators collaboratively.

has grown from a collection of Centers into a thriving Network with a Council, Executive Director, National Advisory Board, and web presence.

Funding and Sustainability. All Centers engage in efforts to promote the Network as a strong force for ocean sciences education excellence. Several Centers used initial funding to leverage additional funds from government agencies, and one Center has successfully acquired corporate funding. This work is intended to anchor COSEE as a sustainable Network that will continue to promote the ocean sciences.

Professional Development. Every Center conducts professional development workshops for educators that draw on scientist expertise, thus creating links between scientists and educators. Some Centers also conduct workshops for scientists. The common purpose is to increase the extent and quality of teaching in the ocean sciences.

Public Outreach. Six Centers conduct activities to disseminate ocean sciences information to the public. These include presentations and lectures, seminars and workshops, and special-interest activities, such as fish tagging with real-time data.

K-12 Curriculum Development. Four Centers have promoted K-12 curriculum development by teams that include educators and scientists. These curricula integrate the study of ocean sciences into the general science curriculum using an inquiry-based approach.

Mentorship and Internship Programs. Three COSEE Centers are offering or developing mentorship/internship programs. In one program, scientists mentor teachers in the ocean sciences. In another, K-12 students in a gifted and talented program are mentored by college science majors. In a third, minority students receive course credit for assisting with summer institute courses.

University Course Development. Two COSEE Centers collaborate with universities to offer undergraduate and graduate courses in teaching ocean sciences. These courses are inquiry-based and require both lesson construction and outreach to K-16 schools.

Centers also conduct activities that focus on the inclusion of traditionally under-represented and under-served groups, including targeted recruitment mailings, partnerships with agencies that serve diverse populations, translation of materials for non-English speakers, and consultations with experts to ascertain the needs of diverse populations. Finally, Centers place significant emphasis on dissemination—the Network product list is long and includes journal articles, conference presentations, newsletters, websites, and curricular materials.

The next phase of the Network evaluation will focus more on Network-level activities. Members of the Network are reviewing a "Blueprint" that will serve as a planning document and guide

With the goal of enhancing the public's understanding and appreciation of the ocean, COSEE CALIFORNIA (COSEE CA) partners have launched a combination of efforts to integrate ocean education and research. In addition to Center-wide and national activities dedicated to this goal, COSEE CA focuses on four initiatives:

- (1) engaging ocean scientists,
- (2) designing and disseminating a college course,
- (3) developing an ocean careers website, and
- (4) ocean immersion in K-12 schools.

Evaluation efforts focus on assessing the quality and impact of these four initiatives individually as well as their synergistic and Center-wide contributions. Numerous data collection efforts investigate COSEE CA efforts and impact, including: interviews and surveys with scientists, educators, program participants, parents, and Center leaders; observations of programs and meetings; initiative participant data; website tracking data; and document review. Data analysis to date has revealed significant accomplishments, some challenges, and several opportunities for future impact both within each initiative and Center-wide. Whenever possible, COSEE CA evaluators collaborate with other Center evaluators on data collection tools and instruments.

for Network evaluation for the next five years (see Spitzer and Ganter, this issue). This augmentation of the evaluation to include both local Center evaluation and Network-level activities is a significant shift, indicating that the COSEE Network has become a functional organization beyond a collection of individual Centers. The success in reaching Blueprint targets will be measured with metrics such as student assessments, numbers of quality educator-scientist collaborations, changes in the numbers of individuals recruited into ocean sciences careers, and longitudinal statistics showing the change in diversity of participants in ocean sciences activities. The instruments and evaluation strategies will continue to build on previous evaluation efforts, refining the ability to assess the impact of a growing and dynamic COSEE on ocean sciences education.

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