

SSE PROJECT OCEAN STEWARD 2000 ONLINE
WORKSHOP EVALUATION

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EXECUTIVE SUMMARY

The Sustainable Seas Expeditions (SSE) requested The College of Exploration (TCOE) to assemble a team to conduct an evaluation of the Sustainable Seas Expeditions Project Ocean STEWARD 2000 online workshop. Dr. Kristina Bishop, Mr. Peter Tuddenham and Mrs. Susie Ensign of TCOE, Mr. Howard Walters of the University of Southern Mississippi/Institute of Marine Sciences' J.L. Scott Marine Education Center and Aquarium, and Dr. Leslie Adelman of the Institute for Learning Innovation conducted this evaluation in November and December 2000. This report presents an overview of the project, focus of the evaluation, the methods used, findings, conclusions, and recommendations.

In April 1998, the National Geographic Society (NGS) launched the Sustainable Seas Expeditions (SSE). NGS worked closely with NOAA's National Marine Sanctuary program and NASA to develop education programs based on the results of the SSE missions and also to address the national need for increased marine education for the general public and K-12 students. Project Ocean STEWARD (Students and Teachers Empowered With Access to Real Data) 2000, an interactive teacher workshop, is one of these educational programs and the subject of this report. The online workshop began on October 9, 2000 and lasted four weeks until November 3, 2000. It modeled a face to face workshop and used a conferencing software system to create a private, password protected online environment for the participating educators. During this time, participants were able to access online presentations from experts, participate in asynchronous discussions about marine science topics, and post classroom ideas for information sharing purposes.

The SSE Project Ocean STEWARD 2000 online workshop represented a strong collaborative effort. The design team consisted of a dozen individuals from six organizations. (Francesca Cava of SSE was the project manager.) These organizations included The National Geographic Society's Sustainable Seas Expeditions (SSE), NOAA's National Marine Sanctuary Program, NASA Earth Science Enterprise, University of Southern California Sea Grant, Project WISE at the University California, Berkeley, and The College of Exploration (TCOE). The design team was further bolstered by more than a dozen online facilitators and other supporters from the key organizations, which created a production team of more than 30 individuals. The workshop and evaluation were facilitated by a grant from NASA along with time and resources donated from the partner organizations.

Dr. Sylvia Earle gave a warm welcome to the workshop. Three scientist keynoters, Dr. Gene Feldman from NASA SeaWiFS Mission, Dr. Steve Gittings of the National Marine Sanctuaries Program, and Dr. Steve Webster of the Monterey Bay Aquarium provided excellent online presentations. Their topics included observing ocean color from space, biogeography and the sea, and exploring the Monterey Bay National Marine Sanctuary. Breakout sessions were Human-Ocean Issues, Ocean Technology, Community Service,

Field Studies and Careers, Classroom Activities and an Open Space. A virtual library was also a part of the workshop.

The online workshop attracted 328 registrants. Most of the participants were formal or informal educators of Grades K-12. A small number were from colleges or universities. High school teachers comprised the largest group. Most middle and high school level teachers stated they were science teachers in the fields of Biology, Environmental Science, Earth Science, Marine Science, and Oceanography. There were participants from 37 states and from 19 other countries. The largest number of participants (53) claimed California as their state of residence.

The primary goal for Project Ocean STEWARD 2000 was to introduce and empower teachers to understand the importance of the ocean and marine sanctuaries and to reinforce this through understanding of process (questions) and products (data) of scientific investigation and exploration. Other goals included: to make new technologies, new knowledge and new learning opportunities available to teachers and thus their students through the web; to provide an opportunity for teachers and others to interact with scientists; to offer the chance for educators to interact with each other and share ideas and projects; to help develop educator's knowledge and use of the Web; to assist educators in gaining a multi-disciplinary view of our National Marine Sanctuaries; to assist teachers in using data in classroom activities and to provide them with activities for use in the classroom; to give teachers the tools to develop their own Expedition to link their local environment to the ocean. The purpose of this evaluation is to assess the workshop's effectiveness as a professional development tool, determining the success of this model of online teacher workshops using earth science data as content and sanctuaries as focused examples to create innovative learning opportunities.

To evaluate the implementation of the SSE Project Ocean STEWARD 2000 online workshop, the evaluation team chose a combination of qualitative methods and quantitative methods, including participation statistics, an online survey with selective response and open-ended questions, external evaluators' participant observation, and informal feedback from the team. The evaluation was both summative and formative.

116 individuals responded to the online survey. Based on the comments during the online workshop and those from the final survey, the workshop experience was clearly positive, informative, and inspirational for most participants. The workshop was logistically well run - organized, easy to navigate and download information, and easy to contribute to by participants. An overwhelming 86% of the survey respondents agreed or strongly agreed that they had a positive experience with the workshop. The workshop experience impacted participants' knowledge and teaching, as well as increasing their desire to participate in other online experiences.

The evaluation findings are organized by four overall categories, which represent the guiding questions (based on project goals) for this evaluation: Quality of Content, Learning Opportunities, Participation and Interaction, and Quality of Resources.

Quality of Content: How effective was the workshop for increasing participant awareness of ocean systems, ocean data, scientific exploration, and marine sanctuaries?

The online survey results conveyed a widely expressed perception that the science content presented in the workshop was outstanding and that the presenters were indeed impressive experts in their respective disciplines. Over 80% of respondents either agreed or strongly agreed with the statement that "participation in the workshop greatly increased my awareness of ocean science content." Terms like "accurate, excellent, expert, expertise, and awesome" abound through numerous comments. In addition, most participants reported increased awareness of ocean science after participating in the workshop. Comments provided evidence that participants increased their understanding and appreciation for the ocean. E.g. "I love studying the ocean and this workshop definitely made me want to keep learning." The workshop had an abundance of information, thanks to the wonderful scientists and participants." "This workshop allowed me to expand my ocean unit and gave me strong references for environmental issues, which were previously lacking." "I learned a lot about marine environments that I did not know."

Learning Opportunities: Did the workshop provide a new learning opportunity for teachers that increased: understanding of main topics, ability to link ocean sciences with national standards, and knowledge and use of the Internet and web-based science resources?

One of the main desires of the SSE Project Ocean STEWARD 2000 online workshop was to provide a new learning opportunity that was clear, well organized, and interesting for participants. By creating a logical and informative environment, participants have a higher-quality experience, and finish the program having gained valuable knowledge. Therefore, several of the evaluation questions explored the quality and effectiveness of the workshop format for increasing content understanding and for supporting enhanced Internet skills. Over 90% of evaluation respondents (105 individuals) found the mixed text and multimedia workshop format to be effective. There was a widely expressed perception that the amount of content, the breadth of information, and the number of links provided throughout the workshop were overwhelming, though overwhelmingly positive. For some participants, the proliferation of links was perceived as an obstacle to participation because they felt unable to adequately explore these areas.

19 of 52 respondents to the open-ended question about barriers to participation stated that they experienced some type of technological barrier to their learning experience. Many of these were local technology issues, including school servers that did not always work, inability to maintain connections to the Internet, or difficulty viewing graphics and pictures with antiquated personal computers. Other comments addressed workshop-related technology issues. Those related to navigation problems, as well as difficulties staying current with the volume of content presented, were identified as key barriers. Although there were participants who experienced a significant learning curve in "getting a feel for" the technology skills and Internet sophistication required to readily participate

in an online course, it appeared that they overcame their difficulties and were able to enjoy their experience.

Participation and Interaction: Was the quality and quantity of online interactions among teachers, scientists, and participants satisfactory? Have participants subsequently made connections that create an ongoing community that extends beyond the workshop time frame?

The level and quality of participation in the SSE Project Ocean STEWARD 2000 workshop was very positive. Half of the workshop participants who responded to the survey indicated that they logged in to the workshop 2 to 4 times a week, with nearly 20% signing in five or more times a week. As with many face-to-face discussion groups, most of the contributions to discussions were made by a limited number of people. There was engaging dialogue in each of the breakout sessions and there were thoughtful questions and appreciative comments to the keynoters. Review of the tracking of participation showed that many more people regularly were reading the material even though not writing responses.

It may appear intuitively that the lack of "face to face" encounters among participants, presenters, and facilitators limits the important social aspects of learning. This assumption is not supported by numerous comments from participants. While categorizing responses from several open-ended questions, it became clear that a true sense of community emerged for a majority of individuals in the workshop.

The favorable feeling of community and participation may have been even more widespread if participants had been able to spend more time online. Time constraints, in their many forms, were clearly detriments to participation, with 22 respondents mentioning "time" as a major barrier.

Quality of Resources: Was the SSE Project Ocean 2000 workshop a helpful classroom resource for marine exploration in that it provided tools, lesson plans, web sites, and scientific data that could be easily integrated into a classroom setting?

Of the 88 participant responses describing benefits from the workshop, the single largest pool of responses (i.e., 31 in number) described the practical benefit of resources for classroom use. Many participants reported an increased infusion of ocean sciences in their classrooms. This suggests that the workshop is impacting an audience greater than the direct participants, and the workshop materials were organized and implemented in a way that made connections for participants between content and education.

Three major categories of benefits were emphasized: the new content learned, exposure to new educational resources, and the value and quality of the interaction experienced in the workshop. The majority found the workshop provided them with enhanced content knowledge and practical information to infuse in their classrooms. In light of professional development standards, it could be seen that the workshop offered an excellent opportunity for continuous lifelong learning in its provision of direct interaction with the

scientific community. The content of the workshop presentations was current and relevant to salient ocean issues. It provided a chance for the teachers to keep pace in their science understanding with the continual changes in science content and to build on their knowledge and skills of oceans and ocean data. This was accomplished by giving them access to existing research and experiential knowledge. The workshop also offered the opportunity to interact with peers and colleagues and share ideas and activities for use in classrooms. Three enthusiastic comments are representative of the large number of grateful participants in the Project Ocean STEWARD 2000 online workshop.

This is an exciting way to learn... to have access to this level of expertise in one course is beyond anything I have experienced before.

The online conference created a virtual collegial setting for discovery and discourse.

Thank you so much for presenting this excellent online workshop. It has made a remarkable impact on me professionally and personally.

Recommendations include: continued improvements in online learning communities to engage greater participation, refinements of technology and web design through navigation aids, and additional research to provide even more solid information about online behavior and about the longer-term effects of this online professional development program on teachers and their classrooms.

Participants noted that the online workshop was practical and convenient--a "valuable way to do continuing ed. at your own pace..." The SSE team commented that online workshops are a cost-effective way to bring together a large number of educators for dialogue with scientists. Cost per participant is substantially less than bringing together a similar number of teachers in most face to face workshops.

A final comment represents the desire of many participants to take part in more online workshops.

This workshop exceeded my expectations. It was truly first class. I have a lot that I will use in my classroom. Thanks for the new URLs. Would like more workshops like this, please.

I. INTRODUCTION

The Sustainable Seas Expeditions (SSE) requested The College of Exploration (TCOE) to assemble a team to conduct an evaluation of the Sustainable Seas Expedition's Project Ocean STEWARD 2000 online workshop. This evaluation was conducted in November and December of 2000 by the following individuals: Dr. Kristina Bishop, Mr. Peter Tuddenham, and Mrs. Susie Ensign of TCOE; Mr. Howard Walters of the University of Southern Mississippi/Institute of Marine Sciences; J.L. Scott of the Marine Education Center and Aquarium; and Dr. Leslie Adelman of the Institute for Learning Innovation. (See Appendix A for detailed information about the evaluation team.) This report presents an overview of the project, focus of the evaluation, the methods used, findings, conclusions, and a presentation of recommendations.

THE SUSTAINABLE SEAS EXPEDITIONS

In April 1998, the National Geographic Society (NGS) launched the Sustainable Seas Expeditions (SSE). One of the main aims of the SSE was to carry out public education efforts, using the "drama of path-breaking exploration" and "compelling visual evidence of high-quality photographs and videotapes" to generate interest in the marine sanctuaries. In less than two years, SSE has completed 13 Expeditions to 10 national marine sanctuaries. To achieve this goal, NGS worked closely with NOAA's National Marine Sanctuary program and NASA to develop education programs based on the results of the SSE missions and also to address the national need for increased marine education for the general public and K-12 students.

SSE and its partners have also developed a series of new education programs to bring the excitement of these Expeditions and fascination about the ocean into the classroom. These programs have included interactive Internet events, development of a Teacher Resource Book, online student activities, student field trips, teacher workshops, and, for the general public, books, magazine articles, television programs, and exhibits. Project Ocean STEWARD 2000, an interactive teacher workshop, is one of these educational programs and the subject of this report.

OVERVIEW OF PROJECT OCEAN STEWARD 2000

The title of this conference—Project Ocean STEWARD (Students and Teachers Empowered With Access to Real Data)—had a dual meaning. The purpose was to extend findings and data to teachers and their students and also to instill a sense of stewardship (the careful and responsible management of an entity entrusted to one's care) in the ocean. The impetus motivating this special conference was the effort to combine today's telecommunications technology with this historic series of Expeditions.

The online workshop began 9 October 2000 and lasted four weeks, until 3 November 2000. It modeled a face to face workshop and used a conferencing software system to create a private, password protected online environment for the participating educators.

During this period, participants were able to access online presentations from experts, participate in asynchronous discussions about marine science topics and post classroom ideas for the purpose of sharing information. (A detailed description of the workshop components is found in the Participation and Interaction section.) The online workshop attracted 328 registrants. (Participant demographics may be found in the Participant Background Information.)

The workshop represented a strong collaborative effort; its design team consisted of a dozen individuals from six organizations. Francesca Cava of SSE was the project manager. The workshop and evaluation were facilitated by a grant from NASA along with time and resources donated from the partner organizations. The design team was further bolstered by more than a dozen online facilitators and other staff members from the key organizations, which created a production team of more than 30 individuals. These organizations included The National Geographic Society's Sustainable Seas Expeditions (SSE), NOAA's National Marine Sanctuary Program, NASA Earth Science Enterprise, University of Southern California Sea Grant, Project WISE at the University of California, Berkeley, and The College of Exploration (TCOE). Dr. Sylvia Earle gave a warm welcome to the participants and three scientist keynoters, Dr. Gene Feldman from NASA SeaWiFS Mission, Dr. Steve Gittings of the National Marine Sanctuaries Program, and Dr. Steve Webster of the Monterey Bay Aquarium provided excellent online presentations.

The primary goal for Project Ocean STEWARD 2000 was to introduce teachers to an understanding of the importance of ocean and marine sanctuaries and to reinforce this through an understanding of process (questions) and products (data) of scientific investigation and exploration. Other goals included:

- Making available new technologies, new knowledge and new learning opportunities to teachers (and subsequently their students);
- Providing an opportunity for teacher-scientist interaction;
- Offering an opportunity for educators to interact with each other to share ideas and projects;
- Developing educators' knowledge and use of the Web;
- Assisting educators in gaining a multi-disciplinary view of our National Marine Sanctuaries;
- Demonstrating to teachers how to use data in classroom activities;
- Providing teachers with activities for use in the classroom;
- Giving teachers the tools to develop their own Expedition (i.e., link their local environment to the ocean).

The online workshop was designed to provide a unique and valuable experience by using real NASA and NOAA data sets as a means to introduce protocols for data collection and scientific analyses for teachers and students across the nation. In addition to the value of the scientific content, this workshop was designed to generate greater technological literacy in teachers.

PURPOSE OF EVALUATION

The purpose of this evaluation is to assess the workshop's effectiveness as a professional development tool. Earth science data and sanctuaries were used as content and examples of creative, innovative learning opportunities to determine the success of this model. The evaluation examines how well the project's goals have been met. Another aim was to gather information in order to make recommendations about the process and content of future online workshops.

LIMITATIONS OF THE EVALUATION

A measure of the success of this workshop was the high percentage of feedback from participants. With more resources and time, it would have been possible to gain more background information about participants. This kind of information would help TCOE determine the quantity and quality of what people learned, and how to enhance their experience in the future. Particular questions generated a desire for follow-up information. For instance, while most participants agreed that the lecture format was effective, it would be helpful to categorize their online experiences prior to this workshop so TCOE would have some benchmark data. Similarly, because enhancing technological experience is a goal of this online workshop, it could be beneficial to create matrices for measuring how participants expanded their skills during the workshop and whether it was a motivation for participating. Overall, the response to the evaluation was positive and constructive, and will provide help for developing future online workshops of this breadth.

II. FOCUS OF THE EVALUATION

The evaluation team developed a workshop evaluation design beginning with the stated goal of the workshop experience. The team, along with SSE personnel and workshop designers, identified the overarching goal of the workshop as empowering teachers to understand the importance of ocean and marine sanctuaries by introducing meaningful oceanic process and product information in a technologically advanced and exciting manner.

In order to gauge the level to which the SSE Project Ocean 2000 experience satisfied this goal, the evaluation team created four guiding questions. Each question addresses a unique objective for the workshop experience, and the subsequent evaluation was created based on these questions:

1. Quality of Content: How effective was the workshop for increasing participant awareness of ocean systems, ocean data, scientific exploration, and marine sanctuaries?
2. Learning Opportunities: Did the workshop provide a new learning opportunity for teachers that increased: understanding of main topics, ability to link ocean sciences with national standards, and knowledge and use of Internet and web-based science resources?
3. Participation and Interaction: Was the quality and quantity of online interactions among teachers, scientists, and participants satisfactory? Have participants subsequently made connections that create an ongoing community that extends beyond the workshop time frame?
4. Quality of Resources: Was the SSE Project Ocean STEWARD 2000 workshop a helpful classroom resource for marine exploration in that it provided tools, lesson plans, web sites, and scientific data that can be easily integrated into a classroom setting?

Within each of these areas of interest, the evaluators not only analyzed the findings but additionally explored recommendations to identify improvements that may be made for future workshops.

III. METHODOLOGY

EVALUATION MODEL

To evaluate the implementation of the SSE Project Ocean STEWARD 2000 online workshop, the evaluation team chose a combination of qualitative methods and quantitative presentation and analyses of questionnaire data. The evaluation was summative in its efforts to examine the outcomes of the recently completed workshop, but was also formative by examining this workshop with an eye to enhancing workshops in the future.

OVERVIEW OF EVALUATION INSTRUMENTS

Three evaluation instruments were used for this report. The following paragraphs contain brief descriptions of each instrument.

1. Online Survey: Participants were encouraged to complete an online survey at the end of the course. This evaluation survey consisted of 24 selective response and open-ended questions designed to give evaluators an idea of the participant's demographic, intentions for completing the program, impressions of the program, and criticism. Specifically, the evaluation contained 16 selective questions and 8 open-ended format questions. (Attached as Appendix B)
2. External Evaluation through Participant Observation: The second method of evaluation used the observations of two external evaluators, Dr. Adelman and Mr. Walters, who acted as participant observers and reported their findings. These observers followed the discussions, became familiar with the materials and the web site, and tracked participant reaction to the workshop. Following the course, they each wrote a summary of their observations.
3. Workshop Team Feedback Mechanism: Online space was created to generate feedback from the SSE Workshop team. This area consisted of an open-ended evaluation space where SSE facilitators and the design team could record their written feedback about the workshop. Comments provided there are incorporated in the conclusions and recommendations.

OVERVIEW OF DATA ANALYSIS AND INTERPRETATION

Following the workshop, the 328 registrants were encouraged to complete a voluntary evaluation of their experience. The evaluation survey was completed, entirely or in part, by 116 (35%) of the participants. In addition to the selective response questions, these participants were asked a series of open-ended questions to solicit responses relative to various aspects of the workshop.

Participant responses to open-ended questions were analyzed using a modified content analysis technique, as described by Michael Quinn Patton in *Qualitative Evaluation and Research Methods* (1990), and by Sharan B. Merriam in *Case Study Research in Education: A Qualitative Approach* (1988). Therefore, when evaluating the responses to open ended questions, the responses were read completely by the evaluator, and then highlighted using a multi-color marking technique to code for similar themes or constructs. Numeric counting of the similarities reflects two numerically interesting categories of responses from participants--the credibility of the information presented, and the personal learning experienced.

IV. FINDINGS

The following findings include participant background information from the database and from the survey, review of participation statistics, responses to the forced choice and open-ended questions of the online survey, as well as synthesized comments from the external evaluators and the rest of the team.

PARTICIPANT BACKGROUND INFORMATION

A database was created as part of the registration process. This provided information about each participant's position, level taught, state, country, and how he/she heard about the program.

Of the 328 total registrants in SSE Project Ocean STEWARD 2000, 274 indicated the grade level they teach, although there was some overlap in response. Those who did not record a grade level are assumed to be in a profession other than teachers working directly with students. The majority of participants were either formal or informal educators of Grades K-12. A smaller number were from colleges or universities. High school teachers comprised the largest group. Most middle and high school level teachers stated they were science teachers in the fields of Biology, Environmental Science, Earth Science, Marine Science, and Oceanography/Oceanology. A few Math and Computer/Technology teachers participated as well as several teachers in Gifted and Talented programs. Table 1 shows the numbers from each grade level. Table 2 delineates how they became aware of the workshop.

Table 1: Number of Participants by Teaching Level*

Grade Levels Taught	Number of Participants
Elementary	28
Middle	39
High	79
Elementary & Middle	30
Elementary & High	1
Middle & High	25
All levels	43
College	27
Unrecorded	73

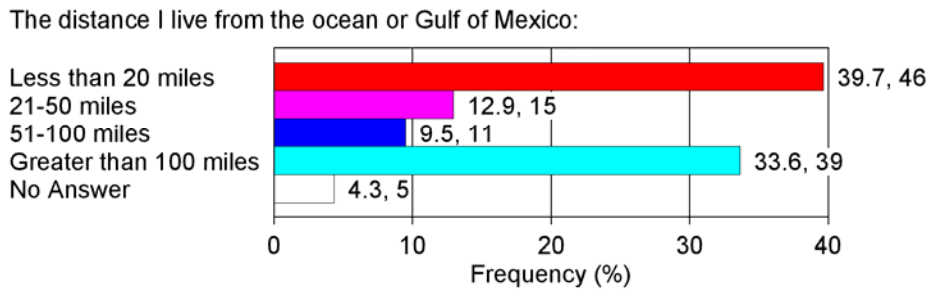
**Some participants taught at more than one level, thus the total is more than 328.*

The largest number of participants (53) claimed California as their state of residence. There were representatives from 36 other states, with the next largest concentrations in Florida (34), Maryland (20), Virginia (15), and Illinois (11). Approximately twelve participants were teachers from the Department of Defense Education Activity school system. Nineteen countries plus the US were represented in the participant group.

In the survey, the respondents demonstrated an interesting dichotomy in their relative proximity to the ocean (see Figure 1). Slightly more than one-third was less than 20 miles from the ocean or Gulf of Mexico, while another one-third were more than 100 miles. This matches other patterns where people who are very close to an environment know it and seek more information about it, while people who are very far from an environment have little chance to 'know it' and try harder to make connections and seek information about such an environment.

For all the figures in this report, the first number on the bar is the percentage and the second number is the actual number of respondents.

Figure 1: Distance from the Ocean



Participants overwhelmingly agreed that they received program information in a timely manner.

Figure 2: Timely Receipt of Information

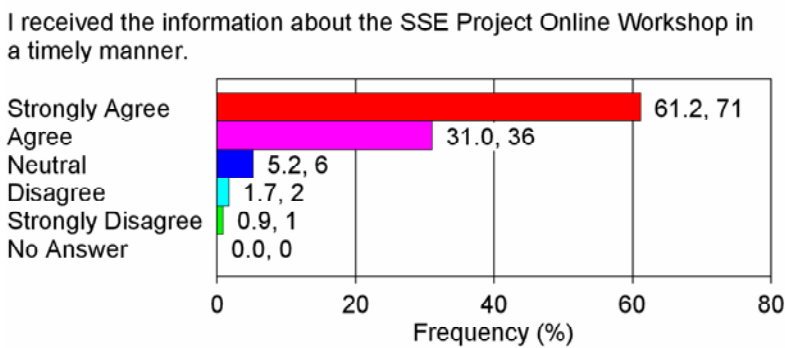


Table 2: How Participants Became Aware of Workshop

Source of Information	Number of Responses
NASA	19
NOAA Marine Sanctuaries	46
NOAA Sea Grant	27
National Geographic	75
The College of Exploration	54
Other	99
Unrecorded	8

The main reasons for participation are found in Table 3. (The numbers add up to greater than 100% because respondents could check as many reasons as they wished.)

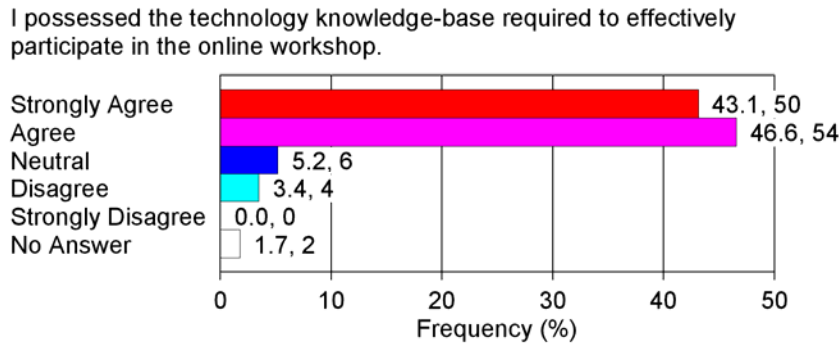
Participants listed a variety of "other" motivating factors for attending the workshop; the most commonly mentioned was to learn how an online workshop is implemented.

Table 3: Reasons for Participation

Reason	Percent Responding to Survey
To enhance my content knowledge	76%
To acquire information for classroom use	70%
Personal environmental concerns	41%
CEU or graduate credit availability	6%

Respondents indicated that nearly 90% agreed or strongly agreed that they possessed the necessary technology skills to participate in the workshop (see Figure 3).

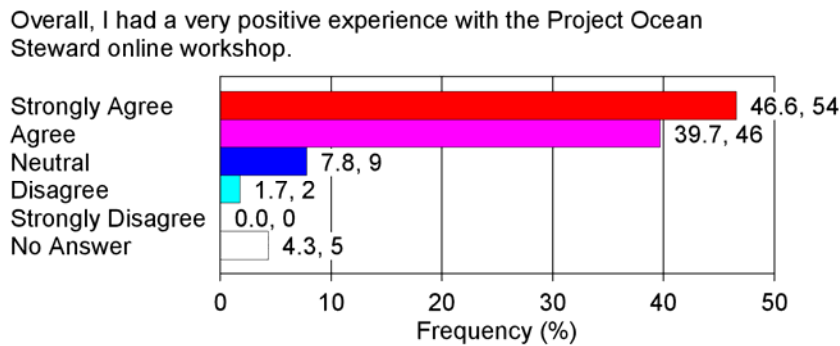
Figure 3: Technology Skills Background



OVERALL EXPERIENCE

Based on comments made both during the online workshop and in the final survey, the workshop experience was clearly positive, informative and inspirational for most participants. The workshop was logistically well run--organized, easy to navigate and download information, and easy to contribute to by participants. As shown in Figure 4, an overwhelming 86.3% of respondents had a positive experience with the workshop.

Figure 4: Overall Workshop Experience



The workshop experience impacted participants' knowledge and teaching, as well as increased participants' desire to participate in other online experiences. The evaluation findings are organized by four overall categories, which represent the guiding questions for this evaluation.

QUALITY OF CONTENT

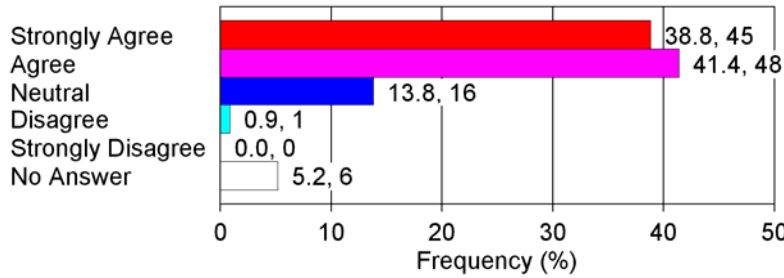
A couple areas of interest fall into the Quality of Content area. First: Was the actual scientific information viewed as expert testimony? Second: Was the presentation of the information effective in communicating education information and generating interest in the ocean sciences? The responses to the online evaluation and from the objective observers found that all criteria for this category were met in the SSE Project Ocean STEWARD 2000 workshop.

The online survey results conveyed a widely expressed perception that the science content presented in the workshop was outstanding and that the presenters were indeed impressive experts in their respective disciplines. Over 80% of respondents either agreed or strongly agreed with the statement that "participation in the workshop greatly increased my awareness of ocean science content." Terms like "accurate", "excellent", "expert", "expertise", and "awesome" abound. In addition, most participants reported increased awareness of ocean science after participating in the workshop. One respondent claimed: "I was very impressed with the knowledge and expertise of the people giving the lectures." Comments provided evidence that participants increased their understanding and appreciation for the ocean. E.g. "I love studying the ocean and this workshop definitely made me want to keep learning." "The workshop had an

abundance of information, thanks to the wonderful scientists and participants." "This workshop allowed me to expand my ocean unit and gave me strong references for environmental issues, which were previously lacking. " "I learned a lot about marine environments that I did not know."

Figure 5: Increased Awareness of Ocean Science Content

I believe that participation in the workshop greatly increased my awareness of ocean science content.



The second largest pool of responses (27 in number) related to enhanced content knowledge among participants. These comments frequently used terms such as "updated", "new", "increased knowledge", "information", "awareness", and "idea".

Overall, the open-ended responses suggest that participants generally had their participation goals met. Such a finding suggests that the workshop was well designed for the targeted population. Further, it provides positive feedback to organizers that this methodology is generally useful to convey both content knowledge and classroom skills/lesson plan ideas—the two constructs at the heart of continuing professional education for in-service teachers in this country.

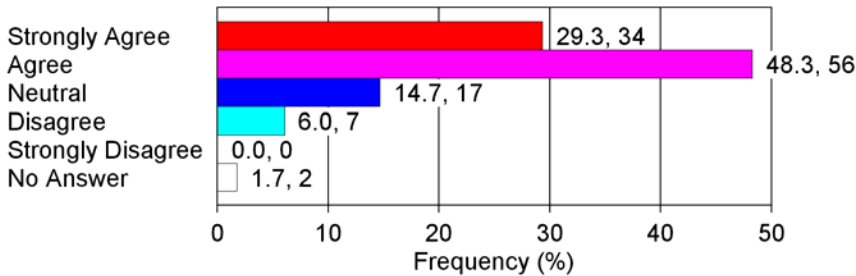
When asked if participants were expecting content they did not find in the workshop, the majority of responses stated the content was either satisfactory or more than they had anticipated. A handful of respondents requested more lessons for use in the classroom. Others cited specific topics for inclusion (e.g., plankton, statistical information, and biology). However, since this open-ended question received the least responses, it is possible to conclude that the quality of content was satisfactory.

LEARNING OPPORTUNITIES

Concurrent with the positive feedback about the quality of information presented in the workshop, most respondents were pleased with the learning opportunities presented in an online workshop format. One of the main desires of the SSE Project Ocean STEWARD 2000 online workshop was to provide clear, well-organized, and interesting information for participants. By creating a logical and informative environment, participants have a higher-quality experience, and finish the program having gained valuable knowledge. Therefore, several of the evaluation questions explored the quality and effectiveness of the workshop format. When asked if the directions for participation in the workshop were clear, over 77% of respondents (90 individuals) either strongly agreed or agreed. (See the following figure).

Figure 6: Clarity of Directions

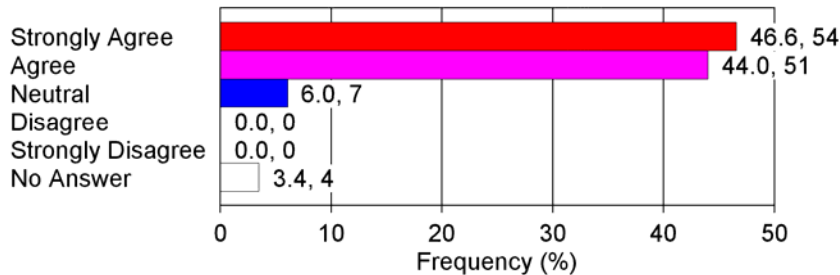
The directions for participation in the workshop were clear.



In order to make the learning process interactive and interesting, the workshop contained both textual presentations and a multi-media format (e.g., video feed and graphics). According to the results shown in Figure 7, over 90% of evaluation respondents (105 individuals) found this workshop format to be effective.

Figure 7: Effectiveness of Lecture Format

The mixed text and multimedia format for the lectures was effective.



Even though participants overwhelmingly rated themselves as possessing the base of technology skills required for the workshop, their comments within the evaluation indicate that they were happily surprised by their exposure to information and technology in the program. For instance, one respondent stated the following:

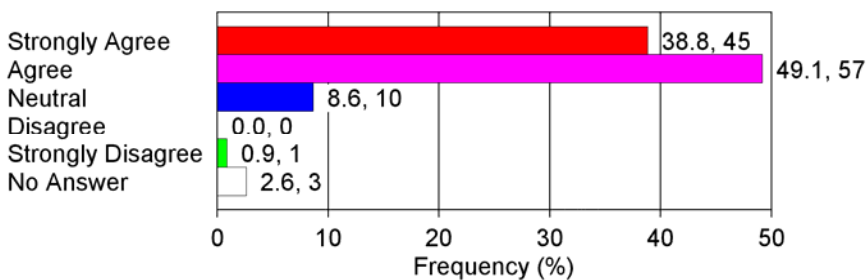
The online conference created a virtual collegial setting for discovery and discourse. ...finding intriguing information about the current state of exploration of the seas, or finding colleagues to 'chat' with. One could get lost in the amazing amount of fascinating topics and links that were available.

There was a widely expressed perception that the amount of content, the breadth of information, and the number of links provided throughout the workshop were overwhelming, though overwhelmingly positive. For some participants, the proliferation of links was perceived as an obstacle to participation because they felt unable to adequately explore these areas. Despite some participants feeling overwhelmed by the amount of content available to them in this workshop, the majority of responses relayed appreciation that the content of the workshop exceeded their expectations.

19 of 52 respondents to the open-ended question about barriers to participation stated that they experienced some type of technological barrier to their learning experience. After reviewing the evaluation responses, it is possible to classify these barriers as either local technology issues, or workshop-related technology issues. Of the local technology issues, the barriers most frequently mentioned include: school servers that did not always work, participants were unable to maintain connections to the Internet, or viewing graphics and pictures with antiquated personal computers was difficult. One respondent found that using an: "...8-year old Powermac and 28 modem on a phone line makes workshop-type Internet activities take way too long."

Figure 8: Overall Organization

The overall organization of the workshop was done well.



Although there were comments that indicated workshop-related technological issues, nearly 88% (shown in Figure 8) stated that the overall organization of the workshop was done well. However, there were some navigational issues. Comments addressing workshop-related technology issues related to navigation problems and difficulties staying current with content. An evaluator on this project, also registered as a participant to the workshop, initially experienced these problems, but quickly learned to navigate by the heading at the top of each section. As shown earlier, approximately 90% of the participants "Strongly Agree" or "Agree" that they possessed the required technological skills. It is possible to view technology-related criticisms as informed consumer responses. Therefore, navigational difficulties in the course, or criticisms regarding the operation and appearance of the web pages, should be strongly considered in future workshop planning.

Although there were participants who experienced a significant learning curve in "getting a feel for" the technology skills and Internet sophistication required to readily participate in an online course, it appeared they overcame their difficulties and were able to enjoy their experience.

PARTICIPATION AND INTERACTION

The level and quality of participation in the SSE Project Ocean STEWARD 2000 workshop was very positive. Half of the workshop participants who responded to the survey indicated they logged in to the workshop 2 to 4 times a week, with nearly 20% signing in five or more times a week. There were 186 responses in the Welcome and Introductions item in the Reception area, which indicates that roughly half of those

registered for the workshop introduced themselves and their work. Five participants completed the requirements for graduate credit from California State University-Fullerton.

As with face-to-face discussion groups, most of the contributions to discussions were made by a limited number of people. One evaluator felt that the contributions to the dialogue were bimodal; that is, one group of participants already had some experience/confidence in content or topic and on the other extreme, those who had little experience/confidence and were commenting how great and invaluable the experience was for them.

The following few paragraphs provide descriptions of the main components of the online workshop and the statistical specifics of the level of interaction during the workshop.

In the "Main Hall--Keynotes" portion of the web site, participants were met with a video greeting by Sylvia Earle, and an introduction to the workshop by Francesca Cava, Jim Slotta, and Laura Francis. Two days later, Phyllis Grifman and Peter Tuddenham welcomed participants with a presentation on "Exploring to Learn and Learning to Explore."

The "Main Hall--Keynotes" area also housed the three keynote presentations by scientists Gene Feldman, Steve Gittings, and Steve Webster. Their topics included observing ocean color from space, biogeography and the sea, and exploring the Monterey Bay National Marine Sanctuary. The software allows tracking of what each participant has seen. Between 128 to 145 participants read the three keynote presentations. There were many more participants who read the keynote presentations but did not directly pose a question or make a written comment. An average of 11% of the people who viewed the keynote presentations gave written responses. Although it is desirable to draw out contributions from more participants, a range of 9 to 23 individual teacher participants responded to each of the introductory presentations or keynote presentations.

Five breakout sessions ran concurrently for the duration of the workshop: Classroom Activities, WISE Ocean STEWARD Online Curriculum, Understanding Human-Ocean Issues, Ocean Technology, and Community Service, Field Studies and Careers. The Classroom Activities session was the most frequently visited of the five. While 86 participants conversed in this session, 85 participants read the K-4 item, 119 read the Grades 5-8, and 109 read the Grades 9-12. Approximately 25% of the people reading the items posted a response.

Combined responses to the various items in each of the other rooms ranged from 46 in Ocean Technology to 69 in Human-Ocean Issues. A review of some of the more popular items in the other breakout sessions showed that the number of people reading the items ranged from 37 in Ocean Technology to a high of 81 in the Project WISE introductions area. Therefore, the pattern of participation was typical in that most of the participants made an introductory statement, read through the keynote presentations, and read through

some of the discussions in the breakout rooms, however, not many actively participated in the discussions.

As stated earlier, over 90% of respondents found that the lecture format was effective. Within the open-ended questions, a number of emotionally-positive terms appear frequently when asked to evaluate the overall impact of this workshop, including: “thought-provoking”, “sharing”, “interacting”, “meeting people”, “lively banter”, “discussion”, “connection”, “community”, “enthusiasm”, “exciting”, “connecting”, and “listening”. These responses indicate that participants established a group identity during the online workshop, which validates the use of this technological approach for conference and workshops in the future.

It may appear that the lack of “face to face” encounters among participants, presenters, and facilitators intuitively a limitation to the important social aspects of learning. This assumption is not supported by numerous comments from participants. While categorizing responses from several open-ended questions, it becomes clear that a true sense of community emerged for a majority of individuals in the workshop. Specific comments include:

I enjoyed the immediacy of the exchange.
I enjoyed 'hearing' scientists speak their heart.

Added bonus is knowing that there is an entire nation of teachers who
have the same interests and concerns for the environment and how it is
brought into the classroom.

The highly favorable response to the feeling of community and participation may have had even more widespread effect if participants had been able to spend more time online.

Time constraints, in their many forms, were clearly a barrier to participation. 22 respondents mentioned ‘time’ as a major barrier. Participants’ comments emphasized several areas where time was an issue. First, business and professional obligations for educators produced a time constraint. This concern is generally outside the control of the workshop staff because it relates to participants’ personal and professional demands. The following represents a typical comment of this type:

Nothing you guys did, just my own schedule.

Second, the sheer volume of information available online within the time frame for the workshop produced a time constraint. Most suggested the workshop be extended from four to six-to-eight weeks in length.

There was a lot of new material... the ability to absorb a huge amount of content was a barrier... I would have liked to have another week or two because there was so much great [sic] information to reflect on.

Third, many respondents requested that the timing of the workshop be more carefully considered in the future. Educators indicated that the fall is an especially busy time as they are juggling active teaching and planning schedules. A spring or summer time frame may allow people to participate more fully.

I would like to have had more time in the course; perhaps eight weeks as opposed to four. During the fall period there are too many other conferences, conventions, and teacher workshops that teachers attend.

These comments make clear some of the issues involved with conducting an online workshop, while giving realistic suggestions for improvement. If time constraint issues can be addressed internally, added to the economic efficiency of an online workshop, the community of educators will enthusiastically embrace this format. It is encouraging to see, through feedback from participants, that the concerns regarding limited social contact in an online workshop are generally unfounded.

The quality of online interactions was clearly satisfactory to most participants. The quantity of participation was reasonable in most areas, though there is room for increasing participation by more people, particularly in the breakout areas.

The evidence for group social development within this set of responses appears to be a fertile area for additional research. Project directors should consider follow-up project impact research to explore more carefully perceptions of this group identity among participants. Nevertheless, it seems clear that participants finished the workshop feeling generally connected with a larger, common community.

QUALITY OF RESOURCES

When attempting to gauge the quality of resources in this online workshop, participants were asked to delineate their reasons for participation by categories or by an open response window. The categorical responses, where participants checked all responses that applied, ranked from enhancement of content knowledge (76%), to acquiring information for classroom use (70%), to personal environmental concerns (41%).

Of the 88 participant responses describing benefits from the workshop, the single largest pool of responses (i.e., 31 in number) described the practical benefit of resources for classroom use. Specific comments include:

I've used them in class already... this [workshop] gave me ideas that can work.

I received lesson plans...oceanography lessons... I also see how well it will work with my students.

I will be able to share this information with the two other sixth grade teachers I work with... I now have web sites to use in my classes.

Over 70% of respondents (82 individuals) (see Figure 9) found that their participation in the workshop has resulted or will result in an increased infusion of the ocean sciences in their classroom. Participants specifically commented on how the workshop will help their classrooms:

It was an incredible experience to have all these scientists participating with real time data, notes, and comments.

Bringing together the scientific and educational communities into an information sharing environment elevates the possibility of ocean science infusion into the nation's classrooms.

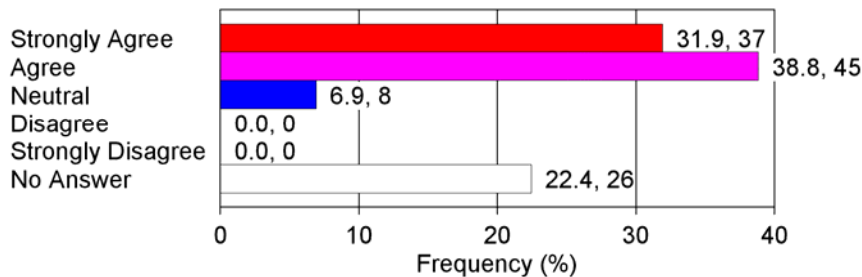
The diversity of participants and various perspectives was astounding!

[This workshop] has turned me on to using the Internet as a tool for learning, both for myself and my students. Prior to this, I was not in the habit of 'surfing the web'. Now that I have more focused sites to go to, I suspect I will be utilizing the Internet more.

These reports of increased infusion of ocean sciences in their classrooms suggest that the workshop is impacting an audience greater than the direct participants, and that the workshop materials were organized and implemented in a way that made connections for participants between content and education.

Figure 9: Increased Infusion of Ocean Sciences in Classroom

My participation has resulted/will result in an increased infusion of the ocean sciences in my classroom.



Some constructive criticism relating to workshop resources was concerned with the format, online experience, and amount of tools provided. First, respondents suggested that in order to keep participant interaction more focused, the workshop may explore ways to better organize the presentation of the copious amounts of information. For

instance, perhaps minimize the topic options a user may choose from, and define clear goals for participants.

Second, participants generally requested more information or instruction about how to navigate effectively, and use the online workshop interface. This issue was also noted in the “Learning Opportunities” section, where participants expressed some technology frustrations.

Third, several participants requested more "ready-to-use" instructional resources and materials that were prepared in a consistent lesson plan format. The "Resources" area of the workshop contained a library of resources prepared in advance by a member of the Sea Grant team. Several Ocean STEWARD 2000 team members supplied additional resources and links throughout the workshop. Other participants made limited contributions. Additional comments in this area encouraged more specific instructions on age and audience appropriateness of content and materials. Overall, participants were very pleased with the lesson plans and links given, and the ability to communicate with other teachers and share lesson plans.

Interestingly, when reviewing the responses to questions relating to educational benefits, participants clearly valued web sites and Internet links more than lesson plans—with 10 responses directly mentioning links, Internet or the web, or online resources, and only 3 mentioning lesson plans per se. This observation is compatible with one of the evaluator’s experience that, currently, lesson plans and curriculum guides are readily available for teachers from numerous sources. However, there is tremendous pressure on teachers to incorporate technology in their classrooms, yet limited assistance in accomplishing this technology infusion. Therefore, teachers frequently seek to “incorporate technology” into the classroom by encouraging students to use the Internet for information gathering, or other purposes. Teachers regularly seek quality web sites for students to use, rather than seeking more lesson plans for a curriculum already crowded with expanding requirements. This theory may explain the limited number of lesson plans and activity ideas that participants posted to the workshop discussion sites, and also explain the highly positive reaction of teachers to the substantive number of web sites provided as resources during the workshop.

The opinions expressed definitely indicated that the workshop was a helpful classroom resource for marine exploration by providing tools, lesson plans, web sites and scientific data that can be easily integrated into the classroom.

THE SUSTAINABLE SEAS PROJECT OCEAN STEWARD 2000 TEAM PROCESS AND COLLABORATION

The Project Ocean STEWARD 2000 online workshop was a strong collaborative effort, with a design team of a dozen individuals from six organizations. The design team was further bolstered by more than a dozen online facilitators and other staff members from the key organizations. An additional three keynoters plus a welcome from Sylvia Earle brought the number of players in the production of the project to more than 30.

Implementing an online event of the scale of Project Ocean STEWARD requires extensive coordination and attention to detail. The collaborative efforts in the project development emerged during 10 months of planning prior to the workshop.

A number of communication methods and collaborative tools were used in the process, including several face-to-face meetings, conference phone calls, and an online planning room and an online presenters green room. These were instrumental in keeping the process moving and were helpful for all team members to keep abreast as things moved forward. The face-to-face meetings were excellent for building a sense of teamwork, particularly in the beginning to flesh out the entire project. The phone meetings, though helpful, may have been too numerous and stretched out over too long a time frame. The online conference spaces, which were private for the team only, were good avenues for sharing and allowing all members to see all comments and ideas.

Having such a big team made the load easier and each person brought his/her individual strengths as well as organizational expertise to the team. However, the down side was the time and level of effort required to address all the respective needs, priorities, and logistical considerations for such a large team.

V. CONCLUSIONS AND RECOMMENDATIONS

CRITERIA FOR EVALUATION

The goals of the SSE Project Ocean STEWARD 2000 were used as criteria to guide this evaluation. Additionally, the four guiding questions listed in the Focus section provided a framework for the evaluation and were used throughout as an organizer for the evaluation model, method, analyses, and report writing.

The evaluation team also reviewed the *Standards for Professional Development for Teachers of Science* (National Academy Press, 1996) to guide its judgments about the quality and effectiveness of the workshop.

CONCLUSIONS

In light of the above mentioned professional development standards it is clear that the workshop offered an excellent opportunity for continuous lifelong learning in its provision of direct interaction with the scientific community. The content of the workshop presentations was current and relevant to salient ocean issues. It provided a chance for the teachers to keep pace in their science understanding with the continual changes in science content and to build on their knowledge and skills of oceans and ocean data. This was accomplished by giving them access to existing research and experiential knowledge. It also offered the opportunity to interact with peers and colleagues and share ideas and activities for use in classrooms. The workshop also supplied the teachers with excellent science resources and introduced them to scientific literature. It afforded a forum for discussing issues related to ocean and human health, career and community service, and field studies, as well as factors affecting marine sanctuaries.

When reviewing and categorizing the evaluation data, it is clear that participants perceived great benefits from their workshop experience. They emphasized three categories of major benefit: new content learned; exposure to new educational resources; and the value and quality of the interaction they experienced in the workshop. A number of emotive comments attested to participants' emotional connections to the content and the workshop experience.

As one respondent stated:

<p>Just knowing this resource exists and that science educators can connect with other educators who have more content, experiential, and research depth encourages my use of the Internet in education and for education. The discovery of a community!</p>
--

Another respondent emphasized the excitement he discovered with the blend of the technology and quality of content in the SSE Project Ocean STEWARD 2000 workshop:

This is an exciting way to learn... to have access to this level of expertise in one course is beyond anything I have experienced before.

Participants also perceived several more specific positive aspects of their SSE Project Ocean STEWARD 2000 online workshop experience. The following categories emphasize several different aspects of the experience:

- Professional/Quality Experience: Impressive variety and diversity of information and participants; engaging and inspirational content and dialogue; good organization and timeliness of content/discussion of issues
- Practical Format: Online format allowed participation ‘anytime/anywhere’; self-paced; interactive; multi-media (particular emphasis on visual documentation in speakers lectures)
- Expert Staff and Presenters: Enthusiastic and passionate presenters; opportunity to interact with experts was appreciated, workshop staff were excellent at trying to facilitate and efficiently guide interaction.
- Expanded Knowledge: Useful information, resources, and materials; great opportunities to share ideas and knowledge with others, ‘accurate’ and ‘real’ content appreciated, visual documentation stimulating
- Interaction/‘Real Time’ Exchange: Opportunity to ask questions and make comments, and having the workshop act as a forum that promoted interaction between diverse participants effectively brought together educators and researchers; the workshop was a ‘setting for discovery’; the interaction was an exciting way to learn
- Enhanced Teaching: The workshop experience would enhance teaching; it stimulated new thoughts and/or focused their thoughts and ideas on specific issues and problems.

Participants noted that the online workshop was practical and convenient--a "valuable way to do continuing ed. at your own pace..." The SSE team commented that online workshops are a cost-effective way to bring together a large number of educators for dialogue with scientists. Cost per participant is substantially less than bringing together a similar number of teachers in most face to face workshops.

RECOMMENDATIONS

The most frequently mentioned barrier to participants was a lack of time to participate. Intuitively, it would seem that individuals motivated to participate as individual learners in an online workshop are generally fully engaged in other professional pursuits as well. Consequently, it may not be possible to satisfy the time issues for this audience, as they

most probably will always have a perception that they are “too busy.” However, workshop planners need to be sensitive to time concerns, since it is in their best interest to create an environment that promotes involvement and discussion. Therefore, in the future, workshop planners may consider their audience more carefully, noting that educators are typically most busy during the early months of a school year.

The barriers to participation and motivation that were mentioned by participants lead to the following considerations for improving and refining the process and content:

1. Continued Improvements in Online Learning Communities: Future workshops should continue to devise new strategies for encouraging participation and interaction of all registrants. This may involve the following suggestions.

- ◆ Greater attention to timing and length of workshop
- ◆ Narrow the amount of content delivered
- ◆ Provide more specific instructions on the age/audience appropriateness of content/materials
- ◆ Invite teams/groups of colleagues to participate, thus providing an opportunity to build inspiration and infrastructure among participants that work together and buoy long-term impact of workshop experience.
- ◆ Promote greater interaction of discussion leaders to continually prompt response and discussion.
- ◆ Encourage more exploration and interaction so that each participant is involved in the community.
- ◆ Review the option, and assess the value, of offering graduate credit realizing that this option is labor- intensive for team members to oversee.

2. Refine Technology and Web Design: It is TCOE's goal to tap into the latest technology that will facilitate online workshops in the future.

- ◆ Facilitate user navigation of and orientation with the online system, have a chart or map of the site, use different colors or icons for each room.
- ◆ Develop an updated, more user-friendly tutorial for new users of the conferencing software system. This would alleviate frustrations for users and allow them to concentrate more fully on the content of the workshop

3. Value-Added Research: Additional research could provide even more solid information about online behavior and about the effects of online professional development program on teachers. Through researching participant's online behavior, TCOE may continually refine workshops to create an optimal learning environment for teacher's professional development and students. This may include determining ways to:

- ◆ Calculate the average session length of participants (difficult to obtain from this conferencing system, but could be obtained from participant interviews or future evaluations).

- ◆ Gather more participant-specific data (e.g., number of comments made, number of different areas visited, number of log-ins to measure interest and participation from week-to-week).
- ◆ Identify creative ways to directly and indirectly facilitate online interaction
- ◆ Determine the reason for attrition by those who either never came in (though registered) or those who discontinued participation midway.

Additional research on the impact of this workshop is suggested to

- ◆ Generate follow-up data by evaluating how participants used the information from this workshop in their classrooms during the rest of the school year.
- ◆ Examine any ongoing professional communication among participants that emerges from the online experience; explore the perceptions of group identity among participants
- ◆ Implement a qualitative analysis of contributions looking at associative, descriptive, classification, interpretive, and analytical content.

Overall, the constructive criticisms must be viewed in context that 95% of respondents concluded that they are likely or very likely to participate in an online workshop again. Clearly, the professionals who were most invested in participation, as evidenced by their completion of the evaluation survey, were substantively pleased with their experience. The majority found the workshop provided them with enhanced content knowledge and practical information to infuse in their classrooms. The workshop left these participants with a general perception they wished they had more time to spend with the workshop. The overall success of the workshop is captured in the following feedback from the evaluation:

This workshop exceeded my expectations. It was truly first class. I have a lot that I will use in my classroom. Thanks for the new URLs. Would like more workshops like this, please.

APPENDIX A

Evaluation Team

Howard Walters

Howard Walters is the Assistant Administrator and Coordinator of Educational Programs at the University of Southern Mississippi/Institute of Marine Sciences' J.L. Scott Marine Education Center and Aquarium in Biloxi, MS. He has previously taught elementary school (for 4 years) and community college (for 5 years) students, and has also taught for 3 years in informal marine science education at the Center. While serving as an instructor at Mississippi Gulf Coast Community College, he wrote or co-wrote and implemented five courses utilizing computer-mediated instructional laboratories with a \$1.2 million dollar appropriation from the State of Mississippi. His contributions to science education include serving as PI or co-PI on eleven different federal grant projects over the last six years including publications, informal teacher training efforts, and programs targeting female middle-school students. Mr. Walters brings his research expertise in the area of educational program evaluation. He has 40+ hours of doctoral level coursework in advanced statistical analysis, and 10 years of experience serving as the program analyst/evaluator. As a program analyst and evaluator, Mr. Walters has worked with numerous national educational programs, including the following: Operation Pathfinder; COAST; the NSF funded Global Environmental Education Project; the 1999-2000 National Ocean Science Bowl; teacher training programs funded by Mississippi-Alabama Sea Grant College Program and/or the U.S. Department of Education's Dwight D. Eisenhower Program.

The J.L. Scott Marine Education Center and Aquarium

The J.L. Scott Marine Education Center and Aquarium is part of The University of Southern Mississippi's Institute of Marine Sciences. The Center is the public education and outreach facility and offers formal and informal educational opportunities to students from 3 years of age through 12th grade, pre-service and inservice classroom teachers, and the general public. Programs range from half-day field trip activities, full day "minicamp" programs, and a summer camp program. Seminars, evening presentations with visiting scientists and educators, and a web presence round out our educational offering. The Center also offer a series of graduate and undergraduate courses, has published a number of education curriculum guides and pamphlets on marine organisms and systems, and offers numerous "customized" educational programs upon request. It also co-coordinates the regional Science and Engineering Fair in Mississippi, serves as a JASON primary downlink site, and houses the national office of the National Marine Educators Association. The Center's educational programs directly impact or enroll approximately 30,000 students annually, and the public aquarium component registers approximately 80,000 people annually.

Leslie McKelvey Adelman

Leslie McKelvey Adelman is a Senior Associate at the Institute for Learning Innovation. She has extensive background in research and evaluation, and has undertaken front-end, formative, and summative evaluations in a number of institutional settings, including science centers and art museums, as well as community programs and professional organizations. Research interests include public understanding of science, gender issues in science learning, and learning in community-based organizations. In addition to research and evaluation, she has experience in the development and implementation of community science-education programs. Dr. Adelman has a doctorate in Zoology from Duke University, with a focus in aquatic systems and invertebrate zoology.

The Institute for Learning Innovation

Established in 1986 as a non-profit educational research and development organization, the Institute for Learning Innovation is a group of evaluators, researchers and educational materials developers committed to promoting and facilitating innovative approaches to learning. The Institute's staff use their years of experience in researching and promoting innovative learning to design and assess user-effective exhibits, materials and programs in the areas of art, history and science.

Kristina Bishop

Kristina Bishop, EdD and MA in Educational Measurement and Statistics head of Academic Programs at TCOE, has 25 years of educational experience in the K-12 arena, as well as in higher education. Her work has included:

- Development of Web-based distance learning programs, especially teacher professional development online workshops and graduate courses;
- Curriculum development of Web-based environmental science materials;
- Evaluation of technology-based educational programs;
- Online Teacher Workshops: Design, development and delivery of online professional development workshops for teachers. Workshops included:
 - ◆ NSF BBSR Using Ocean Data in the Classroom Online Workshop (5-00) 50 teachers, including a core group from Miami-Dade Public Schools;
 - ◆ NASA-JPL Water and the Solar System Online Workshop (11-99)-200 teachers worldwide participated;
 - ◆ NOAA USC Sea Grant (11-99) Harmful Algal Blooms Workshop for Scientists, Educators and General Public -100 participants;
 - ◆ NOAA USC Sea Grant (3-98) El Niño Workshop-75 participants.
- Online Graduate Courses: Served as adjunct faculty for University of Maryland for online graduate courses for teachers. Topics included: Internet for Educators, Project-Based Learning, Classroom Assessment, and Exploring Global Communities.
- Evaluation of Technology-Based programs:

- ◆ National Wildlife Federation---evaluation of Animal Tracks environmental programs and materials, including online workshops, web-based educational packets for teachers, and face-to face workshops.
- ◆ Department of Defense Dependents Schools--evaluation of DoDDS JASON Project, the Lester Electronic School, and the Learning Logic program, programs that focused on technology, science and math.
- ◆ Evaluation of PBS MATHLINE programs for middle and high school mathematics teachers, as well as for pre-service, teachers.

Peter Tuddenham

Mr. Peter Tuddenham, President of TCOE has more than 25 years of training, education, and information systems design and management experience with schools, colleges, companies, and government in the US and Europe. He has specific knowledge in the design and implementation of distance learning technology systems; training analysis, design, development and delivery for worldwide audiences; computer-based instruction; information and communications systems design and management; technology assessment; technology implementation; and systems and cybernetic approaches to learning, organization, and technology. He has developed knowledge management systems for Coors Brewing Company and Arizona Public Service and technology-based learning programs for the U.S Army War College, U.S. Air Force, Department of Defense Dependents Schools, IBM Global Sales, NASA-JPL, NOAA Sea Grant, and the Bermuda Biological Station for Research.

Susie Ensign

Susie Ensign, technical writer for TCOE, graduated from Mary Washington College in 1996 and has gained valuable writing experience in the past four years. As a writer and researcher for Science Applications International Corporation, Mrs. Ensign drafted technical background documents for the EPA's Office of Solid Waste. Subsequently, as a Manager for Performance Improvement Programs, Mrs. Ensign converted a paper-based manual into an interactive CD-ROM employee-training program. Mrs. Ensign currently assists TCOE in many capacities, and has been involved in several high-profile projects, including the evaluation of PBS MATHLINE programs for middle and high school mathematics and pre-service teachers.

The College of Exploration

The College of Exploration (TCOE) (<http://www.coexploration.org>) is a not-for-profit educational organization with 501c3 status, located in Virginia. TCOE designs, develops, and delivers courses for learners of all ages, with a particular emphasis on prospective and practicing teachers. TCOE was incorporated in 1991. Educational program design and course development, delivery, and evaluation have been accomplished in collaboration with Public Broadcasting System for its Teacher MATHLINE Program and with the Department of Defense Dependents Schools for its distance learning programs for teachers and high school students. TCOE also has provided support to the University of Maryland System for the design, development, delivery, and evaluation of courses for

teachers at international schools. Employees of TCOE have served as adjunct faculty for University of Maryland -University College.

Since organizing its first course for the DoDDS schools, TCOE has served several thousand prospective and practicing teachers in distance learning and on-site/distance learning courses and workshops. Courses offered included *New Approaches to Assessment, Integrating Technology into the Curriculum, Project-Based Learning*, and the *Exploring Global Communities Series*. Topics and clients for online teacher workshops have included *Water and the Solar System* (NASA-JPL), *Harmful Algal Blooms* (NOAA Sea Grant), *Project Ocean STEWARD* (Sustainable Sea Expeditions of National Geographic), *El Niño* (NOAA Sea Grant), and Tech21 for Department of Defense Dependents Schools.

Most courses are offered on TCOE's virtual campus. The design of the campus focuses on learner-centered activities that occur via conversations within a computer conferencing environment. The virtual campus is completely web-based, and connected to the Internet via a T1 line, running on a network of Sun, Linux and NT servers. The system supports web-computer conferencing with Caucus software, chat, web page hosting and development, Lotus Notes Domino, FTP, and database connectivity. The virtual campus also uses a TCOE NT server for audio and video streaming using Real Networks technology. Multimedia presentations are also made using a variety of collaborative software products.

APPENDIX B PROJECT OCEAN STEWARD ONLINE WORKSHOP EVALUATION QUESTIONNAIRE

Project Ocean Steward Online Workshop Evaluation November 2000

I received the information about the SSE Project Ocean Steward Online Workshop in a timely manner.

- Strongly Agree Neutral Strongly Disagree
 Agree Disagree NA

I decided to participate in this workshop (check as many as apply)

- To enhance my content knowledge To acquire information for classroom use Personal environmental concerns CEU or graduate credit availability
 Other:

I logged in to the workshop

- 0-1 time a week 2-4 times a week 5 or greater times a week NA

The directions for participation in the workshop were clear.

- Strongly Agree Neutral Strongly Disagree
 Agree Disagree NA

The overall organization of the workshop was done well.

- Strongly Agree Neutral Strongly Disagree
 Agree Disagree NA

The mixed text and multimedia format for the lectures was effective

- Strongly Agree Neutral Strongly Disagree
 Agree Disagree NA

I possessed the technology knowledge-base required to effectively participate in this online workshop.

- Strongly Agree Neutral Strongly Disagree
 Agree Disagree NA

I believe that participation in the workshop greatly increased my awareness of ocean science content.

- Strongly Agree Neutral Strongly Disagree
 Agree Disagree NA

My participation has resulted/will result in an increased infusion of the ocean sciences in my classroom.

- Strongly Agree Neutral Strongly Disagree
 Agree Disagree NA

Overall, I had a very positive experience with the Project Ocean Steward online workshop.

- Strongly Agree Neutral Strongly Disagree
 Agree Disagree NA

Please indicate whether the following were barriers to participation in the workshop:

Lack of information about the event was a barrier.

Yes No NA

Lack of time to keep up with workshop was a barrier.

Yes No NA

Insufficient technology skills were barriers.

Yes No NA

Workshop did not meet expectations

Yes No NA

Any other barriers to your participation?

--

We are interested in evaluating the overall impact of this online workshop. In that vein, please provide us your most positive comment.

--

What was the greatest benefit you received from participating in this workshop?

--

We would also like you to provide your most constructive criticism about the workshop.

--

Did you find the "buttons" functional and easy to use, or were specific components difficult to manage?

--

In view of the technological aspect of this workshop, how could we improve the visual or graphic organization or layout of the web page for the workshop?

--

If there was any content that you were expecting in this workshop but did not see, please tell us.

--

It is likely that I will participate in other online workshops if offered the opportunity.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree
- NA

The distance I live from the ocean or Gulf of Mexico is:

- Less than 20 miles
- 21-50 miles
- 51-100 miles
- Greater than 100 miles
- NA

This evaluation survey may not have provided you a space to address any comments you wish the program organizers to hear. Please provide any additional comments here.

**THANK YOU FOR YOUR COOPERATION AND PARTICIPATION!
WE ANTICIPATE USING YOUR COMMENTS TO IMPROVE
FUTURE PROGRAMMING OPPORTUNITIES, AND INVITE YOUR
FUTURE PARTICIPATION WITH US.**

Send Answers