

A Report on:

US-IODP Education Workshop

For the:

United States Component of the
Integrated Ocean Drilling Program

Sponsored by:

U.S. Science Support Program
Joint Oceanographic Institutions

And convened by:

U.S. Science Advisory Committee

At:

The University of Rhode Island
Graduate School of Oceanography
Narragansett Bay Campus

May 6-7, 2003

Executive Summary

A workshop, focused on the U.S. educational component of the future Integrated Ocean Drilling Program (IODP), was held May 6-7, 2003 at the Narragansett Bay Campus of the University of Rhode Island. The U.S. Science Support Program (USSSP), managed by Joint Oceanographic Institutions (JOI) and funded by the National Science Foundation's Division of Ocean Sciences (NSF/OCE), sponsored this effort. Its purpose was to open a dialog among experts in marine/science education and ocean drilling science in order to develop an effective U.S.-focused educational strategy for the IODP. The three primary workshop goals were to:

1. Establish a U.S. vision and goals for education and outreach activities for IODP.
2. Identify U.S. educational products, activities, and opportunities appropriate for IODP.
3. Identify strategies to implement the recommended educational activities for IODP.

The workshop was attended by 75 participants, representing the scientific drilling community, geoscience/marine educators, agency representatives, science communicators, formal educators, and foundation/corporate representatives. The workshop structure featured plenary sessions and four breakout groups defined by targeted audiences (K-8th grade students, 9-12th grade students, undergraduate-graduate students, and informal/public education) and led by two facilitators, one from the scientific ocean drilling community and the other from the education and outreach community. Each breakout group was asked to address eight questions over the two days:

1. How can each educational group benefit from IODP? How should we engage specific audiences within each group to maximize the educational benefit?
2. How can IODP benefit from greater involvement with the educational community?
3. What are the educational products/activities/opportunities needed by educators (e.g., to meet standards) to which IODP can contribute?
4. How do these products/activities/opportunities mesh with the goals of the U.S. educational component of IODP?
5. How may the previously identified products/activities/opportunities be created?
6. What partners are available, and how might we collaborate to create these products/activities/opportunities?
7. What infrastructure for the USSSP successor program would allow the products/activities/opportunities to be implemented?
8. How will we assess the effectiveness of the recommended products/activities/opportunities?

Clear consensus emerged from the workshop regarding the major priorities for the education elements in the future IODP and USSSP-successor science program. Two key points were:

1. The IODP and USSSP-successor programs must show a commitment to education.
2. Education should be an integral component from the beginning of both new programs.

In order for the USSSP-successor program to have a clear commitment to education and outreach, the JOI-successor office should have sufficient staff to accomplish the following for

the educational portions of the science program: make ocean drilling research findings accessible, create avenues for professional development, expand opportunities for student experiences, identify/foster educational partners and networks, develop and maintain an effective website, assess the education activities, and identify/seek additional funds to support the endeavors. Each of these points is expanded upon below and discussed in greater detail within the report:

1) Staffing at JOI-successor office

Many fulltime positions dedicated to education and outreach are required. The consensus was that 3.5 FTE's would be the minimum effective staff for doing full justice to IODP's educational and outreach potential, however, an educational program must first be defined before specifically assigning staff. These persons will need a background in both education and science in order to effectively interface between the education community and the science of ocean drilling. Included among these positions should be a web support person dedicated to the education and outreach portions of the web presence. Some of these positions or duties could potentially be subcontracted. One of the primary responsibilities of these staff positions would be to seek additional partnership and funding opportunities to support educational endeavors.

2) Materials/Content

There is a need to develop educational content and produce hands-on and interactive materials that can be circulated to a much wider audience than is currently being reached by ODP. A few examples of these materials include: displays – traveling and permanent; classroom kits – of samples, material (photos, thin sections), and data; curricula to accompany the kits as well as to be used independently; media and educational resources (videos, ship-to-shore links); and thematic syntheses of scientific ocean drilling results.

3) Professional Development/Teacher Preparation (formal/informal)

It is vital to provide opportunities for teachers and educational professionals to learn more about the science of ocean drilling and the materials available to them. This can be done through professional development and teacher preparation workshops, courses, and summer institutes. Such activities could be developed by the USSSP-successor program or be accomplished through partnerships with existing programs such as the Teacher Armada project. In particular, developing opportunities for research experiences at sea and shore will offer fewer opportunities but higher impact exposure.

4) K-20 Student Experiences

Offering opportunities for students of a wide range of ages to participate in hands-on activities and research is essential to create an informed and science literate society. ODP and USSSP have provided many such opportunities for undergraduate and graduate students, through such programs as the Distinguished Lecture Series and the Schlanger Fellowship. These programs should be continued and expanded. New student opportunities should also be created to broaden the audience that is impacted (REU experiences, summer institutes, and internships).

5) Partnerships

Partnerships are vital to the success of the educational endeavors of the USSSP-successor program. Teachers, scientists, students, and science education professionals and researchers will need to work side-by-side throughout the program. Many existing organizations can partner with the USSSP-successor program and these partners will be able to play varied and complementary roles in different efforts. There are many opportunities for collaboration with existing programs as well as opportunities to identify new and innovative partnerships.

6) Web site

A USSSP staff position that is dedicated to the educational component of the web presence for IODP is needed. This person's responsibility would be to develop and maintain an easily accessible web site that provides data in usable format to a variety of different audiences: teachers (formal and informal), students, scientists, and the public. It is very important that the past data as well as the new IODP data be accessed and/or managed in a way similar to other scientific data sets (e.g., the seismic data on the IRIS website) that are available for educational purposes.

7) Assessment

Assessment of the educational products, activities and/or opportunities of the program is essential and must be integrated into the program from its beginning. The assessment must be developed and implemented by professional evaluators and must consider the program internally and externally. The success of the educational efforts will be evaluated in terms of whether or not they meet program goals.

In summary, the workshop participants urge those planning the future of scientific ocean drilling in the U.S. to fully develop the tremendous educational resources that will be an inherent part of IODP. Unique and valuable educational opportunities exist for mutual benefit among IODP, the USSSP-successor program, scientists, educators, and the public. To accomplish these opportunities, the USSSP-successor program should include an educational component that has been significantly expanded from the minimal activities associated with the current ODP and USSSP programs. An expanded educational component should include better assessment practices, clearly defined goals, and better leveraging strategies for using limited funds.

Introduction

The Integrated Ocean Drilling Program (IODP)

IODP is an international scientific venture that will use multiple research platforms to collect samples of sediment, rocks, biota, and fluids from seafloor environments at depths never before attempted, and to deploy state-of-the-art downhole measurement devices and long-term seafloor observatories. This new drilling program, which builds upon the 35-year legacy of accomplishments by the Deep Sea Drilling Project (DSDP) and the Ocean Drilling Program (ODP), is slated to begin on October 1, 2003. The initial phase of IODP is proposed to extend 10 years, to September 30, 2013. When fully operational in 2008 (i.e., when all anticipated vessels

are in use), IODP will be a significantly larger program than DSDP and ODP combined. More information can be found at www.iodp.org/brochure/planning_article.html.

The birth of this new, major international scientific endeavor comes at a time of increased interest and concern about the state of science education not only in the U.S., but in other IODP member nations as well. As a result, it is anticipated that IODP will develop and promote international education and outreach through scientific ocean drilling. This report summarizes the U.S. workshop on IODP education and its recommendations for viable educational activity within the successor program to the U.S. Science Support Program (USSSP). A primary goal of USSSP has been to enhance the scientific contribution of ocean drilling and to maintain its vitality, and the USSSP-successor program is expected to have similar goals. In addition to encouraging education and outreach, USSSP has supported U.S. scientists in pre-drilling planning, participation on board the drillship, and post-drilling research efforts. Although it is focused on U.S. educational needs and opportunities, this report may also contribute to the development of an IODP-wide, multi-national education and outreach program.

Existing USSSP Education Activities

At its initiation in 1984, there were no funds in the USSSP budget for educational activities. However, given advice from the scientific drilling community over time, approximately 2.5% of the USSSP program budget is now dedicated to educational activity. This activity consists of two basic components:

1. Programs
 - a. Schlanger Ocean Drilling Fellowships
 - b. Distinguished Lecture Series
 - c. Internships at JOI
 - d. U.S. participation in the JOIDES Undergraduate Student Trainee Program
2. Curriculum Enrichment, Publications and Other Resources
 - a. Cenozoic Glaciation: A Curriculum Supplement
 - b. "Blast from the Past" educational poster
 - c. "ODP: Mountains to Monsoons," an interactive educational CD-ROM
 - d. "Gateways to Glaciation," an interactive educational CD-ROM

A more detailed explanation of these components can be found at:
<http://www.joiscience.org/USSSP/education.html>

Workshop Mandate: Conference on U.S. Participation in IODP (CUSP)

The Conference on U.S. Participation in IODP (CUSP), funded by JOI/USSSP and convened in Washington DC from June 11-14, 2002 by the U.S. Science Advisory Committee (USSAC), provided 19 specific recommendations to help define the role of U.S. scientists in the forthcoming Integrated Ocean Drilling Program. The CUSP report is available on line at:
<http://www.joiscience.org/USSSP/iodp/cusp.html>

Of the 19 recommendations, three directly addressed education and outreach issues. They are:

CUSP Recommendation 17: “USSAC/USSSP should increase its efforts to initiate and foster educational activities and should partner with educational agencies and researchers to conduct the detailed development and production of education materials.”

CUSP Recommendation 18: “USSSP should continue support for the Schlanger fellowships during the ODP/IODP transition and should, in the IODP, at least double the number of fellowships currently awarded by USSSP for the ODP.”

CUSP Recommendation 19: “USSSP should continue support for the U.S. Distinguished Lecturer Series during the ODP/IODP transition and in the IODP.”

Summary explanations of these recommendations included in the CUSP report have been appended to this document (See Appendix #1).

At the USSAC meeting immediately following CUSP, held in San Francisco in July, 2002, USSAC recommended that an education steering committee be established to design a full workshop to address and evaluate the three CUSP recommendations as well as to determine the nature, size, and scope of the education and outreach program that should be provided by the USSSP-successor program. USSAC members Albert C. Hine and Ellen Thomas along with Andrea Johnson of JOI agreed to recruit steering committee members and to convene a meeting to design a full workshop that would include attendees from a broad range of constituencies of the science education community including members of under-represented groups.

Planning the Future

The USSAC Education Steering Committee Workshop

The following individuals constituted the USSAC Education Steering Committee which met November 12, 2002 in Washington, DC at the JOI office to plan the full workshop:

Susan Haynes, Virginia Institute of Marine Science
Sara Hickox, University of Rhode Island
Albert C. Hine, University of South Florida, Co-Chair
Susan Humphris, Woods Hole Oceanographic Institution
Ellen Prager, StormCenter Communications
Sarah Schoedinger, Consortium for Oceanographic Research and Education
* Ellen Thomas, Wesleyan University, Co-Chair
Sharon Walker, University of Southern Mississippi

*Due to her participation on ODP Leg 208, Ellen Thomas was replaced in February, 2003 by Jill Whitman, Pacific Lutheran University, who is a USSAC member.

The framework for the full workshop was developed by the steering committee. Sara Hickox, Director, Office of Marine Programs, volunteered to host the workshop at her conference facility on the campus of the Graduate School of Oceanography at the University of Rhode Island.

At its February 2003 meeting in St. Petersburg, FL, USSAC approved final workshop plans to hold the workshop in early May 2003. Shortly thereafter, individuals representing the scientific ocean drilling community, federal agencies, and various targeted audiences in education and outreach were invited to apply. Members of the U.S. scientific community at large were also invited to apply via the JOI/USSSP listserver. Final invitations were extended to individuals based upon their background, experience, and diversity.

The Workshop

Workshop and Program Goals

Based upon the Steering Committee's recommendation and USSAC's input, the following goals for the full workshop were generated:

1. To establish a U.S. vision and goals for education and outreach activities for IODP.
2. To identify U.S. educational products, activities, and opportunities appropriate for IODP.
3. To identify strategies to implement the recommended educational activities for IODP.

Additionally, the following goals for a future education program were suggested:

1. To promote ocean drilling science to: the public, K-12 students, higher education students, educators, and the scientific community.
2. To communicate both the scientific process and sense of discovery.
3. To make science accessible. (e.g., as a career track, for an informed populace)
4. To promote access to ocean drilling scientific data for use in education.
5. To encourage science education as a vehicle for improved stewardship of Earth (by fostering knowledge of earth history/processes and global change).

Workshop Participants

The 75 invited participants represented the following groups:

Scientific drilling community: 31%
Geoscience/marine educators: 33%
Agency representatives: 3%
Science communicators: 9%
Formal educators: 9%
Informal educators: 4%
Foundation/corporate representatives: 11%

It was widely recognized and accepted that numerous individuals attending had experience in more than one group. In addition, representatives from minority groups came from a wide variety of education and outreach backgrounds as well. The names and contact information of the attendees may be found in Appendix #2.

Workshop Structure, and Agenda

The workshop was structured around plenary sessions and four breakout groups each defined by targeted audiences and led by two facilitators, one from the scientific ocean drilling community and the other from the education and outreach community. The breakout groups and their facilitators were as follows:

K-8th grades: Susan Haynes, Gabe Filippelli
9-12th grades: Susan Humphris, Sharon Walker
Undergraduate-graduate: Peggy Delaney, Sarah Schoedinger
Informal/public education: Don Reed, Ellen Prager

After an initial plenary session during which presentations were made to acquaint the workshop participants with background material on the present Ocean Drilling Program, the ODP/IODP transition, existing USSSP education programs, and the goals of the workshop, each breakout group was asked to address eight questions over the two days and to report back to present their responses to these questions during ensuing plenary sessions. The full agenda of the workshop can be found as Appendix #3.

The eight questions addressed were:

1. How can each educational group benefit from IODP? How should we engage specific audiences within each group to maximize the educational benefit?
2. How can IODP benefit from greater involvement with the educational community?
3. What are the educational products/activities/opportunities needed by educators (e.g., to meet standards) to which IODP can contribute?
4. How do these products/activities/opportunities mesh with the goals of the US educational component of IODP?
5. How may the previously identified products/activities/opportunities be created?
6. What partners are available, and how might we collaborate to create these products/activities/opportunities?
7. What infrastructure for the USSSP successor program would allow the products/activities/opportunities to be implemented?
8. How will we assess the effectiveness of the recommended products/activities/opportunities?

Workshop Results

Consensus Issues

Early in the workshop, participants agreed that a fundamental theme influencing their discussions should be the unique aspects of scientific ocean drilling as compared to other major scientific endeavors. The following elements, which were viewed as unique to the Ocean Drilling Program, should be emphasized in crafting an education and outreach program for IODP:

1. ODP studies Earth's history as well as its dynamic present, addressing processes that operate on a broad range of times scales.
2. ODP requires unique technologies to accomplish its mission.
3. ODP provides a unique human element in that scientists, technicians and ship's crew, who know little about each other at first, have to work together extremely well under stressful conditions.
4. ODP is an international program that works extremely well. ODP scientists travel extensively and work closely with scientists from many nations.
5. ODP is not geographically biased, but conducts operations in all but a few hostile parts of the global ocean.
6. ODP has a huge archived data set that is accessible.

Other important issues that provided a baseline for discussion were:

1. ODP science involves exploration and discovery.
2. The scientific content is tangible and can readily be made relevant to most members of society.
3. The scientific operations are compelling enough to interest many in a real-time mode on the internet.
4. There is a need to understand the culture of scientific ocean drilling research and the culture of science education and how to mesh these two together using incentives and rewards.
5. It is important to emphasize facilitation in creating, funding, managing programs and helping scientists and educators understand opportunities at all levels of education.

Finally, a clear consensus emerged from the discussion of some major priorities for the education elements in the science program. They are:

1. The US-IODP program has the opportunity to become a leader in all of science education in the U.S. The nature of scientific ocean drilling is a great attractor to interest diverse groups in science.
2. The U.S.-IODP program must show a strong commitment to education and outreach.
3. Education and outreach should be integral from the beginning of the new program.
4. The program should promote a climate of mutual respect between scientists and educators.

5. There are many partnerships and examples of educational activities using scientific data that can serve as models for the new education program of IODP.

Vision and Mission Statements

The workshop produced the following vision and mission statements.

Vision Statement

As an integral part of a future U.S. scientific support program for IODP, education will increase awareness and understanding of ocean drilling science and technology and make a positive sustainable impact on science education and society.

Mission Statement

Education is integral to the new U.S. scientific support program for IODP. It will foster scientific investigation and understanding through provision of high-quality materials and experiential opportunities that share ocean drilling science—discoveries, ideas, data, and concepts on earth history and process as seen through ocean drilling—in ways that promote inquiry-based learning at all levels.

Overarching Themes

The results of the full workshop are presented as overarching themes that emerged from the breakout groups and plenary sessions. The breakout groups' responses to the eight questions are embedded within these themes.

Staffing at JOI-successor office

Joint Oceanographic Institutions is currently the prime contractor for the international Ocean Drilling Program and the manager for the U.S. Science Support Program (USSSP) through a cooperative agreement with NSF. As this report was being written, JOI was responding to NSF RFPs to be the Systems Integration Contractor for the U.S. non-riser drilling vessel and to manage the USSSP successor program. The current USSSP educational activities require approximately 2 FTEs, however, this staffing support is distributed among 8 different USSSP staff in the JOI office, with no one staff person being dedicated to education. Consensus among the workshop participants was that education and outreach should be a very important focus of the JOI-successor office and there should be dedicated staff positions to carry out these functions. A straw model, requiring 3.5 FTEs, was presented to the workshop participants for the purpose of stimulating discussion. The workshop consensus was that 3.5 FTEs would be the minimum number of staff for this work. One breakout group suggested six, full-time dedicated positions, which included:

1. Director for education and outreach
2. Web site developer
3. Informal education expert

4. News media expert and science writer
5. Partnership coordinator
6. Science educator

Most of these individuals would need a background in both education and science in order to effectively interface between the education community and the science of ocean drilling. In practice, several of the six functions outlined above could be combined into fewer positions and with other functions in the JOI-successor office. Two issues were paramount in the responses of all the breakout groups:

1. A web support person is essential.
2. Identifying partnerships to seek additional funding opportunities to support the educational endeavors should be a primary mission of this staff.

Other suggestions included: contracting an educator to work at a Center for Ocean Science Education and Excellence (COSEE) for IODP projects or to explore funding opportunities for a new COSEE center all together with a primary focus on IODP science.

Materials/Content

There is a need to develop content and produce hands-on and interactive materials that can be circulated to a much wider audience than is currently being reached by ODP. First and foremost is the need for IODP to organize and synthesize its findings by scientific theme. This is an imperative first step in translating scientific results into understandable and useful education and outreach products. Once the science is made understandable, relevant, and appealing to broad educational audiences, then a large number of activities can be generated. Suggested products and activities (in no order of priority) are:

1. Create displays both traveling and permanently installed. Such displays can be set up in public areas such as airports, cruise ports, and malls.
2. Develop kits with core samples, photos, thin sections, etc. and exercises with accompanying curricula. Provide training for use of kits and curricula. Provide more interactive software.
3. Develop curricula, in collaboration between teachers and scientists, science education researchers.
4. Partner to develop new undergraduate/graduate textbook on Marine Geology based heavily upon ODP/IODP discoveries. For advanced teachers and students, focus on content, problem solving, developing quantitative skills, and overall career development. Develop an upper level course based on the real-life process of drilling-based science from initial hypothesis definition, proposal writing, filling pre-drilling requirements (site survey and site selection, shipboard party selection, special requirements), going to sea (exposure to real-life drilling problems), and all post-cruise activities—a virtual experience from beginning to end.
5. Establish more of an ocean drilling presence in introductory oceanography and geoscience textbooks.
6. Create IODP Careers book.

7. Produce videos - for classroom use, workshops, conferences
8. Develop products for vocational use and application, i.e., health safety, and environmental issues, engineering/technology to make science happen, information technology and data management, and maritime training.
9. Media outreach that would include:
 - a. Ship-to-shore links. High-quality, near real time videos made on drilling platforms—“meet the scientists” venue.
 - b. Port-call platform tours
 - c. Leg-specific promotions
10. Promote science fairs.
11. Coordinate outreach to policymakers.
12. Coordinate outreach to entertainment industry.
13. Work to integrate IODP results and applications into other disciplines – biology, chemistry, geography, policy, environmental studies, etc.

Professional Development/Teacher Preparation (formal/informal)

It is vital to provide opportunities for teachers and professionals to learn more about the science of ocean drilling and the materials available to them. Scientific ocean drilling can be used generically as an effective vehicle to demonstrate the scientific process and how science works. Awareness of scientific ocean drilling can be achieved through professional development, teacher preparation workshops, courses, shipboard experiences, and summer institutes and camps. Such activities could be developed by the USSSP-successor program or be accomplished through partnerships with existing programs such as the Teacher Armada project at the University of Rhode Island. IODP benefits as this provides a key investment in future scientists, teachers, politicians, and fundraisers. In addition, an initial investment in professional development will help teachers educate future teachers thus increasing the sustainability effort. Key points made by workshop participants include:

1. Professional development should be part of the U.S.-IODP education program from the beginning.
2. Workshops should be held to teach graduate students and young professionals in science how to write proposals, with an emphasis on ocean drilling proposals.
3. Scientists and educators should each make more of an effort to attend one another's professional meetings/conferences. This would help in meshing these two often disparate groups.
4. IODP needs to be aware of teacher time limitations.
5. There should be an effort to concentrate on pre-service teachers.
6. The inquiry-based skills of teachers at all levels should be increased.
7. Content sharing between scientists and teachers should be emphasized.
8. IODP can help teachers focus on awareness for younger students and scientific inquiry (hypothesis testing, data analysis) for older students.
9. Graduate students involved in IODP science should be exposed to the option of becoming teachers.
10. Develop relationships with COSEE and REU centers.

11. An IODP presence should be established at meetings of the National Science Teachers Association (NSTA) and other teacher conferences.

K-20 Students Experiences

Offering opportunities for students of a wide range of ages to participate in hands-on activities and research is essential to create an informed and science literate society. There is a very broad range of audiences to address. These include: K-12, undergraduate, and graduate students. In the undergraduate area, there are science majors and non-science majors, pre-service and in-service teachers, technical schools, 2-year colleges, 4-year colleges, and universities.

ODP has provided many such opportunities for undergraduate and graduate students, through such programs as the Schlanger fellowship and the Distinguished Lecture Series. These programs should be continued and expanded. New ones should be created to broaden the audience that is impacted. Some suggestions are:

1. Create/support REU experiences, summer institutes, and internships
2. Continue and expand the Schlanger Fellowship
3. Continue and expand the Distinguished Lecture Series
4. Promote workshops and training to use IODP materials and resources
5. Summer camps (like Camp SEA Lab)

Partnerships

Partnerships are vital to the success of the educational endeavors of the program as they can increase diversity and broaden participation. As a practical matter, the new U.S.-IODP education program cannot be entirely self sufficient, but will require resources from partnerships in order to be effective. This matter is so important that the workshop recommended that staffing of a new education and outreach program specifically include someone who deals with developing partnerships even on the international level. As a first step, such an individual should examine other educational partnerships as potential models such as the JASON Project, Lawrence Hall of Science, Alexandria Digital Library, and the American Geological Institute. Efforts should also be made at all levels in IODP and the USSSP successor program to facilitate long-term relationships between institutions with researchers conducting IODP research and those with limited exposure to IODP research. On the individual level, teachers, scientists, students, and science education professionals and researchers will need to work side-by-side throughout the program to make it successful. Finally, workshop participants pointed out that honest and respectful feedback is essential to any healthy partner relationship.

There are many opportunities for collaboration with existing partnerships as well as opportunities to identify new and innovative partnerships. The workshop identified the following potential partners:

1. Other programs with NSF including but not limited to COSEE, RIDGE, MARGINS
2. Government agencies; National Aeronautic and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), U.S. Geological Survey (USGS)
3. Professional societies; International Society of Technology Education (ISTE), International Research Institutes for Seismology (IRIS), National Association of Geology Teachers (NAGT), American Geophysical Institute (AGU), Geological Society of America (GSA), IEEE, OES, Marine Technology Society (MTS), American Chemical Society (ACS), Society for Advancement of Chicanos and Native Americans in Science (SACNAS), National Earth Science Teachers Association (NESTA).
4. Public entities; Public Broadcasting System (PBS), National Public Radio (NPR), National Oceanographic Partnership Program (NOPP), Digital Library for Earth System Education (DLESE), National Science Digital Library (NSDL), and The Bridge: Ocean Science Resource Center for Teachers.
5. Corporate partners, either direct financial or in-kind support
6. Private donors/foundations
7. Individual educators/researchers and academic institutions (e.g., URI Teacher Armada project).

Web site

As mentioned previously, a staff position should be dedicated to the educational component of the web presence for IODP. This person's responsibility will be to develop and maintain an easily accessible web site that provides data in usable format to a variety of different audiences. Some key points were:

1. Make data and results easily available to all audiences – scientists and non-scientists.
2. Possibly as different tracks accessed from the same initial web page: teachers (formal and informal), students, scientists, and the public.
3. It is very important that the research findings of DSDP and ODP, as well as the new IODP data, be accessed and/or managed in a way similar to other scientific data sets that are available to the similar audiences (e.g., IRIS seismic data).

Assessment

Assessment of the educational products, activities and/or opportunities of the program is essential and must be integral to the program from the beginning. The assessment must be done by professional evaluators and must consider the program internally and externally. The success of the program will be evaluated in terms of whether the efforts meet the goals of program.

Workshop Assessment

In keeping with the importance of assessment, workshop participants were asked to complete a workshop evaluation form (Appendix #4). Fifteen different categories were presented

for review as well as six questions requiring written responses. We received 45 completed forms from the 75 participants (60% response rate). The results are presented in Appendix #5.

Conclusions and Summary Recommendations

The workshop participants urge all those involved in planning the future of scientific ocean drilling in the U.S. to fully develop the tremendous educational resources that will be an inherent part of IODP. Unique and valuable educational opportunities exist for mutual benefit among IODP, the USSSP-successor program, scientists, educators, and the public. To develop these opportunities, the USSSP-successor program should include an educational component that has been significantly expanded from minimal activities associated with the current ODP and USSSP programs. It is important that education be an integral component from the beginning of both new programs. Subsequently, both programs must be prepared to seek and allocate funds to accomplish this goal. However, if “significantly expanded” funds are not available in the future, it will be necessary for the educational components within both IODP and USSSP to be both targeted in accordance with their respective program goals and to be guided by solid assessment practices. Limited funding also means that leveraging strategies and partnerships will be even more critical to fulfilling the educational potential of the IODP both internationally and in the U.S.

Recommendations

A successful program will include the following components:

1. Adequate staffing at the JOI-successor office to support the education program.
2. The capability to develop materials and content to disseminate to the educational community and the public.
3. Opportunities for professional development and teacher preparation to learn more about ocean drilling.
4. Opportunities for K-20 students.
5. Partnerships with existing organizations.
6. Accessible web site of user-friendly ODP data.
8. Assessment of all activities from the outset.

Appendices

Appendix 1: CUSP Report Education Recommendations

Appendix 2: Workshop Participants and Contact Information

Appendix 3: Workshop Agenda

Appendix 4: Workshop Evaluation Form

Appendix 5: Workshop Evaluation Form Responses