

**PLANNING FOR THE FUTURE OF IOOS EDUCATION
A SUMMER '05 EARTH WORKSHOP @ MBARI**

FRONT-END EVALUATION SURVEY RESULTS

Introduction

Ocean scientists are transforming the way we experience and understand the ocean through the Integrated Ocean Observing Systems (IOOS). For the first time there will be continuous, sustained, near-real-time, multi-dimensional information / data available on the oceans. These data are and will be meaningful, exciting and challenging for a full range of audiences, including educators and their students.

In the summer of 2005 the Monterey Bay Aquarium Research Institute (MBARI), Monterey Bay Aquarium, COSEE Mid-Atlantic and Ocean.US will host a workshop to begin discussing a national IOOS-based education "product." The workshop, *Planning for the Future of IOOS Education: Development of national instructional materials using ocean observing systems data*, will be held at MBARI on July 7 & 8, 2005. During the workshop, participants will discuss the need for national ocean observing systems (NOOS, pronounced news) instructional materials that take advantage of the IOOS network of datastreams and meet national science standards.

The goals of the workshop are to:

- 1) gain consensus on the need / desire for a coordinated effort to develop NOOS materials / lessons / curriculum
- 2) develop a plan on how such a coordinated effort should happen (next steps)
- 3) and, if there's time and it's appropriate, begin brainstorming content focus and template format for such materials.

The planners have organized this workshop because they believe that it will help avoid the regional reinventing-of-the-wheel syndrome and, since the development of materials are time consuming and challenging, a national product generated from/by the IOOS regions will save money and time. Finally, this effort could potentially allow marine educators involved in observing systems education to collectively and collaboratively develop and market a high-quality, national product with high visibility.

To help the planners prepare for the workshop, they conducted a front-end evaluation using an online survey. On May 5, 2005 an email with the survey URL went to the 27 people who (at that date) had agreed to attend the workshop. Twenty-two people responded before the closing of the survey on May 20.

This document reports the results. The survey used a mix of questions (items) to collect quantitative and qualitative data. Quantitative responses (to yes / no, rating-scale, restricted-choice questions) are reported as frequencies and percentages. Qualitative responses to open-ended questions have been categorized, then tallied and the top responses, generally those offered by greater than 20% of respondents are reported here. In some cases the complete verbatim responses are also included in the appendices.

1. Given what you know about this workshop, how does it relate to what you do and why have you agreed to attend? *n* = 22

Responses	Frequency	%
relates closely to primary job and institution/agency role	12	54%
interested in developing better education & outreach (classroom lessons/professional development/other activities) for teachers	11	50%
interested in integration/coordination of similar efforts	5	23%
want to know more about what's happening with OOS and/or what works (best practices) for lessons/curricula	5	23%

Note: This was an open-ended question and some respondents offered more than one response. As a result the total equals more than 100%. The verbatim responses are not offered in this report to ensure anonymity of respondents.

2. Do you think we (the community of educators involved with ocean observing systems) can develop an ocean observing systems curriculum that would be useful nationally? (check one) *n* = 22

Response Choices	Frequency	%
yes	10	45%
yes with reservations	8	36%
not sure	3	14%
no	1	4%

3. Do you think it's possible to develop a curriculum/set of lessons for national reach that can also serve the needs of local educators and teachers? (check one) *n* = 22

Response Choices	Frequency	%
yes	11	50%
yes with reservations	7	32%
not sure	4	18%
no	0	0%

4. Do you think that we (the same community of educators) should be developing a national ocean observing systems curriculum? (check one) *n* = 22

Response Choices	Frequency	%
yes	13	59%
not sure	5	23%
yes with reservations	4	18%
no	0	0%

5 & 6. What are your concerns (if any) about the development of a national ocean observing systems curriculum? *n* = 21

Responses	Frequency	%
issues related to local efforts/interests/relevance	8	38%
meeting teachers' needs	6	29%
easy-to-use, accessible, reliable data streams	5	24%
flexibility (with teacher/student needs, regional issues, changing technology)	4	19%
other— <i>See Appendix 1 for all of the responses</i>	—	—

Note: This was an open-ended question and some respondents offered more than one response. As a result the total equals more than 100%. Also, the one response to question 6 (which was the same as question 5 but for those who answered no to the previous questions) is not included because the response was gibberish.

These are the main concerns of those who expressed the most reservations
(responding “yes with reservations” or “not sure” at least twice to questions #2, 3 & 4)
n = 11

Responses	Frequency	%
issues related to local efforts/interests/relevance	4	36%
meeting teachers' needs	4	36%
flexibility (teacher/student needs and regional issues)	3	27%
easy-to-use, accessible, reliable data streams	3	27%

7. Given what you know about this workshop, which of these outcomes would indicate success to you? (check all that apply) *n* = 22

Response Choices	Frequency	%
a plan for how to work together to develop a national ocean observing systems curriculum	19	86%
decision on the content focus (datastreams) for a national ocean observing systems curriculum	13	59%
decision on who will lead and who will participate in this effort	11	50%
consensus on the need for a national ocean observatory systems curriculum/set of lessons	9	41%
decision on the format of curriculum lessons	5	23%
other <i>Possibility of integrating into existing textbooks</i> <i>A timeline for completion of each section</i> <i>These are all important, but given the time frame we have for this first meeting I think the outcomes I've checked are reasonable for a day and a half</i> <i>[note: indicated a plan for working together and decision on leaders/participants]</i> <i>A plan for how to work with data providers to let them know about needs of outreach providers. [Wasn't sure whether to measure success based on given workshop goals or personal interest.]</i> <i>Overview of ocean observing systems and the type of data they are collecting and how that data is being used by those coordinating and managing the systems</i>	5	23%

Note: Because respondents were encouraged to check more than one response to this multiple-choice question, the total equals more than 100%.

8. For such a curriculum, who should be our target audience(s)? (check all that apply)

n = 22

Response Choices	Frequency	%
high school teachers & students	11	50%
middle school teachers & students	9	41%
all of the above [of the choices]	8	36%
pre-service teachers	8	36%
science-savvy teachers	8	36%
nonformal/informal educators	8	36%
teachers of at-risk/underserved students	7	32%
people living near ocean observing systems	7	32%
people living nowhere near ocean observing systems	7	32%
community college teachers & students	6	27%
non-science-savvy teachers	6	27%
college/university teachers	5	23%
college/university students	4	18%
general public/adults	3	14%
elementary school teachers & students	2	9%
others <i>I'm not yet sure.</i> <i>General public and adults for starters, then curriculum that is general enough that it can be infused into science, technology, policy, government, etc. classes at all levels.</i> <i>I would like to say all of the above, but if we're talking about lessons/activities in a prescribed format, it might be better to start with formal edu. teachers/students starting with middle school</i> <i>Governmental officials</i> <i>Need a strong ocean workforce to support IOOS (so people who may have some interest in marine technology careers)</i> <i>[Wasn't sure if you were looking for audiences I am working with now, or those of more general interest.]</i>	6	27%

Note: Because respondents were encouraged to check more than one response to this multiple-choice question, the total equals more than 100%.

9. Which of these ocean observatory systems datastreams should be included as topics for such a curriculum? (check all that you think should be included) *n* = 21

Response Choices	Frequency	%
currents	18	86%
water temperature	18	86%
nutrients	16	76%
salinity	16	76%
sea level	15	71%
fish species & abundance	14	67%
river discharge	14	67%
waves	14	67%
bathymetry / topography	13	62%
wind vector	13	62%
air temperature	12	57%
water contaminants	12	57%
ocean color	10	48%
zooplankton species	10	48%
seafood contaminants	9	43%
ice concentration	8	38%
vector currents	8	38%
directional wave spectra	7	33%
optical properties	7	33%
other (please specify) <i>Depends on decisions about audiences. Response based on priorities. Might add atmospheric pressure, primary productivity All of this is valuable, but make sure whatever is selected is put into the bigger picture of its practical applications and implications. In other words, why is this data important? All</i>	4	19%
skipped / na	1	—

Note: Because respondents were encouraged to check more than one response to this multiple-choice question, the total equals more than 100%.

10. Any other comments, suggestions and/or questions for the planners regarding this workshop? *n* = 11

Responses	Frequency	%
looking forward to the workshop	3	27%
given short time, need to prioritize and focus the workshop	3	27%
need to think about the future—funding, dissemination of curriculum, updating curriculum, dealing with technology & data changes	3	27%
other—See Appendix 2 for all of the responses	—	—

11. If you would like a reply to your comments or questions, please provide your email address below. *Note: For anonymity these responses are not included in this report.*

Appendices

Appendix 1

5. What are your concerns (if any) about the development of a national ocean observing systems curriculum? *n* = 21

Note: The one response to question 6 (which was the same as question 5 but for those who answered no to the previous questions) is not included because the response was gibberish.

All Responses

none [no concerns]

I'd prefer to wait to answer this until after the workshop.

1. That it be flexible enough to make close connections to regional issues such as specific weather conditions, and environmental or social issues. 2. That it be flexible enough to meet state as well as national standards requirements. 3. That it be flexible enough to allow outreach developers and providers to maximize the opportunities here with other opportunities and innovations.

At this point, I am open in my thinking about the development of a national ocean observing systems curriculum. Of course, any curriculum should be driven by the needs of the classroom educator and topics that are not relevant or useful should not be pushed. We need to really think about how a NOOS curriculum would be useful in meeting educational needs at all levels.

Each region has very different issues and application of the oos. I can see that it would be very challenging to come up with something that will meet the needs of each region. Also there needs to be flexibility with in each region to address the needs of educators

How to get the most out of what we share in terms of national educational commonality and potential, while allowing for adoption, in whole or part, by regions and districts with varied curriculum needs and guidelines.

I am NOT concerned with using the National Standards, but I am concerned that teachers who do not have a broad vision of the goal become mired down with their own classroom needs and regional needs.

I do not know the systems well enough to be able to develop curriculum. I want to learn more.

I have been involved in some of these activities already and have only a few concerns. The first is convincing those in charge of the data streams to provide an easy and engaging tool for access. My impression to date is that everyone is quite open to do this. The second concern involves the most effective way to facilitate teacher training. My experience indicates that, if you provide effective training, the teachers will use observing systems in the classroom.

I think that ocean observing system coordinators and creators first need to better define what they are and what they will do before we as educators can come in and effectively develop a national curriculum that would be of real value and use to other educators.

*I would like to ensure that the development of national curriculum inspires local groups to create site specific curriculum that *compliments* national curriculum, rather than depending on only the national curriculum.*

I'd like to see that any materials development be as closely aligned as possible with the formal education community to ensure they would meet the needs of teachers and the constraints/challenges they face. Any efforts would need to be closely aligned with ongoing national efforts to define and promote ocean literacy, including the eventual development of ocean science standards that will hopefully be recognized and incorporated into the formal education community

If we choose to co-locate the education efforts with the science instrumentation (i.e., along the coasts) and -- as many advocate -- view NOAA Sea Grant as 'the' players in NOOS education, then we risk reaching only those communities located in coastal areas. Ocean education -- e.g., its relationship to larger systems such as climate -- needs to be appreciated by everyone, regardless of their proximity to coasts (or oceanographers).

In a recent meeting with some local highschool and middle school science educators, there was concern expressed that the data most relevant to the students would probably be local data rather than national data. Further reservations were expressed concerning the use of data without students getting into the field to understand the process of data collection. Finally, I would say there was tentative support to look further into development of the curriculum, but we all felt that the development of meaningful questions or inquiry would be at the heart of the usefulness of the data.

It's always challenging to get people from different areas with different backgrounds to agree on anything. However, if everyone can see the value in developing one unified set of curricula or resources, I think it will go a little more smoothly. I think the idea is great, and will avoid a lot of time-wasting duplicative activities.

Merging of the science culture with the education culture. May need some ground rules for collaboration.

My concerns are more about how the operational end of the OOS develop. The DMAC will be key. If the 'national' curriculum and tools we develop are to be useful for teacher wishing to teach using local/regional examples, then we need common data sets coming in from each COOS. If we do it right, regional comparison could provide a very valuable basis for great learning activities, rich in content and excellent for developing student investigative skills.

My key concerns in this process is that we establish some clear standards and protocols to follow when writing the curriculum which will help give the curriculum and ourselves, a common structure that meets all the necessary components needed in schools today. Another concern is that the curriculum be dynamic, which means it demonstrates a variety of types of methods of teaching and learning. While utilizing new and real-time data, computers, and other technology tools, it is also important to incorporate an equal amount of 'hands on', non-computer based activities that allow students to create, construct, build, get dirty, muddy and the rest, while learning to work effectively in groups. It is also important that we find a balance between getting bogged down and moving forward efficiently through the process.

Only that 1) it undoubtedly will be necessary to 'tweak' any one-size-fits-all curriculum to match local needs and 2) that it will be necessary to conduct many workshops for educators in which they learn to use the curriculum themselves so that they will be willing to disseminate it.

The ease of obtaining data in usable format that teachers on a national scale can use. The concern that this may only be used by the most technologically savvy schools and their teachers. How will training in the use of this curriculum occur? How much money will training cost? Worried about the rapidly changing technological tools and formats that are currently used and how will the curriculum keep up with these foreseeable changes.

There may be more value in attempting to integrate oceans and ocean observing systems into existing curriculum through textbook manufacturers.

Appendix 2

10. Any other comments, suggestions and/or questions for the planners regarding this workshop? $n = 11$

All Responses

Considering it's not much time, let's make the goals/outcomes of this first meeting reasonable and stay focused, avoid trying answer/solve all the details and everything at once

Developing a national ocean observing system curriculum is ambitious. I think there should be some thought about working more closely with textbook manufacturers to integrate ocean topics into every textbook. Ocean observing systems and the data collected provide a great connection to how the oceans affect everyone's life, similar to how people now recognize how important information about weather is to them with advance storm warnings, etc.

I answered many of these questions given an ideal funding scenario and years to get it going. We will need to prioritize, but I did not in my responses to the multiple choice questions.

I can't wait to see what develops! I am so glad the group has organized this meeting and this initiative, this really is an excellent step!

I know that some skepticism has been expressed by the teachers that I spoke with, however, I do think that if we can come up with some models and examples of how the data is useful, we will have some support provided there is adequate funding to assist with implementation, training, and potentially equipment. The schools in my area are extremely tight on funding, cutting school days, and teachers. Without some form of assistance to implement, I am doubtful that these teachers will be very receptive. However, we are currently working with an NSF GK-12 grant for the MARE program implementation and the schools are very pleased to have the graduate student teacher assistance. Overall the implementation of that project appears to be going well and in large measure, I would say the appropriate scale of resources to implement is a key factor. Assistance in the classroom and through training is essential. Particularly at the start.

I would like to see the workshop include information on the bigger picture - the goals of IOOS - why develop a national curriculum - how is this going to engage learners of all ages - how do the information and activities translate into knowledge and skills that will make them a better informed public and/or successful in the workplace?

Looking forward to the workshop!

One suggestion is to consider how quickly changes may occur in technology and data and how the versions of the curriculum will need to be modified over time. Also, if this is a national effort, how will dissemination and training of this curriculum occur?

Thank you for all of your efforts! I am looking forward to the progress we are going to make.

Under 'target audience' I checked 'all of the above' which is true generally, but in our short workshop our focus must be much more narrow - in that case I'd pick K-12 formal and informal educators/students as the target.

Just to let you know that I have not received my travel voucher yet in the mail.