HMS Challenger Online Workshop Evaluation

The *HMS Challenger Online Workshop* was cooperatively implemented by the National Oceanic and Atmospheric Administration's Office of Ocean Exploration, and the College of Exploration (COE)—a not-for-profit Educational Research, Technology, and Programming Institution in Potomac Falls, Virginia. Five hundred and two registered educators or scientists participated in the workshop series over a three week period from April into May, 2004, with an additional approximately two dozen project team members, facilitators, speakers, evaluators, or other personnel also participating. This number included nine registered teams and numerous individual participants, and was comprised of individuals from twenty-eight countries or U.S. territories and the United States. These countries were broadly distributed from across the globe—including Canada and Great Britain, Germany, numerous Middle Eastern and Asian countries, Australia, numerous Pacific Island countries and territories, and Central and South America. Approximately 361 of the participants were from the United States—representing 42 states, and were high school and middle school teachers, with representation from informal educators, university faculty and students, scientists, aquarium and museum staff, and government agency personnel.

Of the 502 participants, sixty-two individuals (12%) completed a comprehensive evaluation survey during the final week of the workshop to provide data regarding their participation, benefits and specific content and activities they obtained through participation, and other demographic and open-ended response information required to monitor the effectiveness of this project.

Demographic items were used to ascertain the comparability of *Challenger* workshop participants to participants in previous online workshops, and to characterize the type and distribution of educators who participated in *Challenger*. Figure one as follows provides the grade level distribution of K-16 teachers who participated. These participants were from slightly older grade levels than participants in previous workshops.

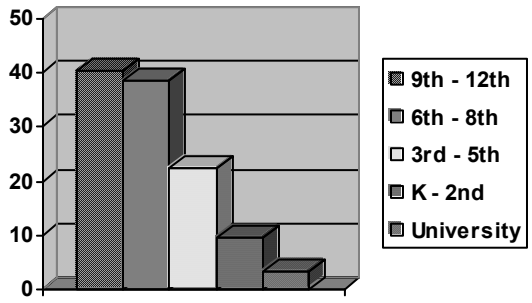

Figure 1. Grade level distribution of HMS Challenger participants.

Figure two indicates that the average number of years teaching experience of the participants who completed the survey was 23.4 years. This figure seems counter-intuitive in that one would have expected online voluntary workshops to have been comprised of, on average, younger and less experienced teachers. This finding suggests the online structure used in *Challenger* supports mid-career teachers who most certainly did not receive academic coursework in technology when they undertook initial licensure training. Further analyses of the narrative data suggests that teachers who had previously participated in online workshops offered by COE had a comfort level with the technology and the software platform that facilitated their learning and navigation in the site.

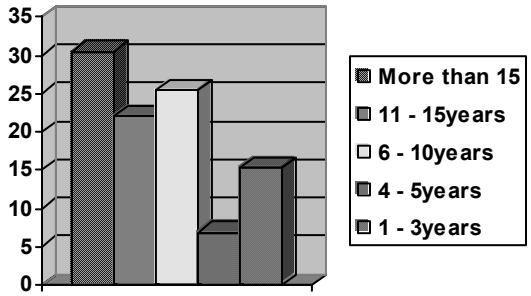

Figure 2. Years of teaching experience of survey respondents with the percentage of responses in each category of experience level.

Figure three provides the distribution of survey respondents based on distance the individuals lived from the Atlantic Ocean, Pacific Ocean, or Gulf of Mexico. The construct beneath this item is an assumption that the further one lives from an ocean, the less likely one is as a teacher to receive curricular support for infusing the oceans and ocean content into classroom instruction. Inland teachers remain an important and relatively underrepresented group in ocean sciences professional development programs.

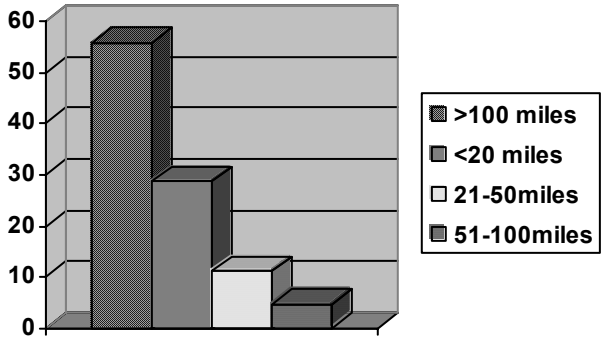

Figure 3. Distance respondent lives from an ocean or the Gulf of Mexico with percentages of responses in each category.

The survey items ascertained previous experiences with online workshops implemented through the College of Exploration—and what, if any, specific content and activities were being infused in classrooms based on participation in those earlier workshops. An important finding in the evaluation report is that over 55% of the survey respondents indicated they had previously participated in more than two and as many as twelve prior online workshops. The survey next asked the respondents to provide specific examples of materials, content, or activities they were using in their classroom instruction from prior workshops. Of the thirty-three respondents who provided specific narrative—twenty-six of the narratives (79%) were specific enough to identify the exact workshop from which the content was being drawn.

One of the survey items asked respondents to indicate the manner in which they were recruited to participate in the *HMS Challenger* workshop. Respondents indicated nearly 70% obtained information for the workshop directly from the College of Exploration via email, or through participation in a prior online workshop. There does appear to be some overlap in these responses—as the College of Exploration email list must include most of the prior workshop participants. However, this proportion indicates the primary communication channel is the learning community facilitated by the College of Exploration from the prior workshops it has implemented. Interestingly—and perhaps of special note—the item on content infusion in classrooms contains information dating back to a NASA-related workshop approximately 5 years ago, yet the teachers still report they are using the materials from that workshop. This observation highlights a critically important need in professional training workshops for teachers, i.e. identifying successful professional development models that result in durable change over time in linking

content knowledge to the classroom practice of teachers. Data for the *HMS Challenger* workshop, as it reveals longitudinal impacts of previous workshops, provide empirical support for the effectiveness over time of online workshops linking scientists and classroom teachers to change the classroom practice of those teachers.

Figure four delineates the motivations for workshop participation of the survey respondents. The item format allowed multiple responses from a participant and should be interpreted in that context. The rank order of the response categories does reflect, however, clusters of responses that were highly focused. The top four responses are included in figure four.

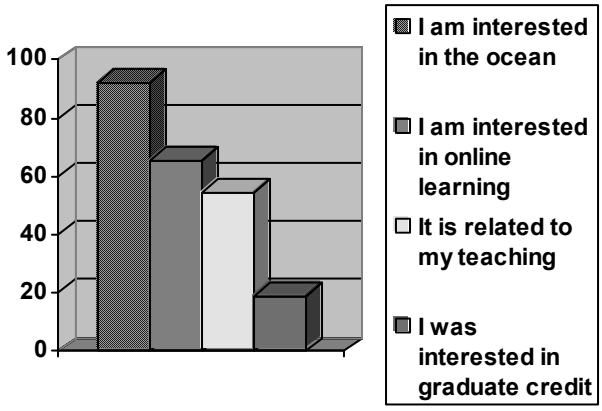

Figure 4. Respondents indicate their motivation for participating in the HMS Challenger Workshop.

Respondents were asked to indicate how many times each week they logged into the *HMS Challenger* workshop. The responses appear to be similarly distributed as in previous workshops—with most people logging in from 2-4 times weekly, and with fewer individuals logging in more frequently or less frequently. This participation level seems to remain fairly constant regardless of the time pressures reported by participants or when during the year the workshop is offered—although the participation level seems

moderately higher in the short-duration workshops than in workshops spread out over time—but additional research is necessary to answer this question. Figure five provides a delineation of the login frequencies.

Survey items related to the perceived quality of the workshop indicated strongly positive perceptions of the program among respondents. For overall perception, 100% of responses were in the Strongly Agree or Agree categories that the workshop was a positive experience. Slightly more than 89% of respondents perceived the directions for participation as being clear. Approximately 98% of respondents perceived the overall

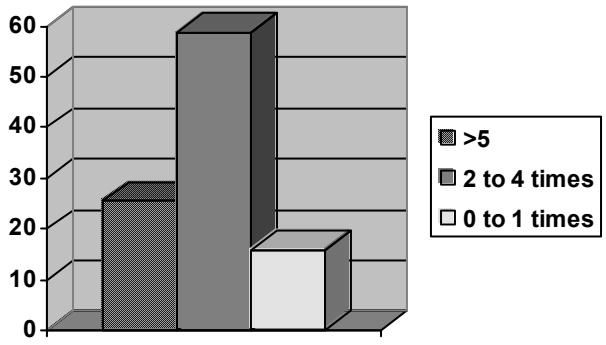

Figure 5. Most respondents logged in to the workshop from two to four times weekly, with a lesser number greater than five, and the fewest number only once.

organization of the workshop was well done, and 90% of the respondents perceived the mixed text and multimedia format as highly effective. Nearly 91% of respondents rated the navigability of the workshop as easy or very easy; slightly more than 99% rated the overall visual look and feel of the workshop as appealing or very appealing. Finally, 95% of respondents agreed or strongly agreed that the various areas of the workshop provided the knowledge, resources, and interaction they expected—a response rate which

is very high and perhaps somewhat related to the accurate *anticipations* of the participants who had, in many cases, prior experience with workshops offered by the College of Exploration and so knew what to expect and how to plan their learning accordingly.

With respect to their capability to use the content from the workshop in their professional activities, 96% of respondents indicated they agreed or strongly agreed that the content was engaging, enriching and helpful to their work. Additionally, 94% of the respondents indicated the workshop greatly increased their awareness of ocean science and exploration technology. Based on narrative data containing specific examples of content, materials, or activities from previous online workshops that respondents have already used in their classrooms—this high response rate in these above two items would be important in ascertaining the potential of the *HMS Challenger* workshop to result in changes to classroom practices and content by the current respondents. Slightly more than 72% of the respondents indicate they have already increased integration of ocean content in their classroom instruction as a result of the *HMS Challenger* workshop—and in many cases were able to provide very specific descriptions of lessons and lesson content they included, and in which classes, grade levels, and sequences, suggesting the responses were very credible.

Interestingly, three items yielded lower overall responses from those who completed the survey than those items summarized above. Item 21 asked whether individuals felt comfortable with the amount of time required for participation (81% agreed or strongly agreed); item 22 asked if individuals had time to read and comprehend all of the keynote addresses (61% agreed or strongly agreed); and item 23 asked if

respondents were able to interact with other workshop participants in the discussion areas (61% agreed or strongly agreed). These items reflect the difficulty in managing personal learning time when the amount of material, i.e. content, activities, web links, and resources, is nearly limitless. Consistently, respondents indicate they do not have enough time to adequately address all of the material they are interested in. This observation seems fairly typical of online workshops and most probably reflects the nature of the www, and not the design environment of the workshop. It certainly doesn't impact in a negative manner the perceived quality of the workshop on the part of the participants/respondents.

The specificity of the responses, and their similarity to responses observed in other online workshops, enhances the credibility of a conclusion that these online workshops are highly effective in bridging the gap between professional training programs based on science and social studies content and the classroom practices of the participants. Inferring these levels to the 502 registrants in the workshop suggests the online workshops implemented by College of Exploration are effectively changing the classroom practices of many teachers nationally and internationally by connecting these educators to scientists in an online community. Further, the large proportion of respondents (55%) who have participated in multiple workshops supports a conclusion that COE has facilitated the development of a community of learners who rely on these online workshops as a primary mechanism for enhancing their own content knowledge, and for obtaining current and scientifically accurate lesson plans to incorporate in their teaching.

It should be noted that the trend of larger numbers of returning participants in the emergent online community has been reported in a prior research study (Walters et al., 2004). The trend data observed in the *HMS Challenger* evaluation is consistent with the prior research, and demonstrates that the growth and continuity of this online community is strengthening. While the number of responses to the *HMS Challenger* survey is modest in terms of continuing to monitor the trend of return participants—prior workshop data reported in the above cited publication is based on a larger pool of survey respondents and substantiates the current observation.

An additional observation among the survey data is that time for participation remains the most significant concern of participants given the quantity of material and the potential of the www to provide links to an almost inexhaustible quantity of reading materials and resources for educators. Further, the dates selected for this workshop overlapped with traditional "end of the year" activities for many teachers, compounding the time pressure. However, it should be noted that similar workshops implemented in fall, spring, and mid-summer have produced the same concerns about time from similar groups of educators. Busy professionals truly do not have "down time," and interested individuals seem to make the time, even as they complain about the time limitations. Nevertheless, as also observed in previous online workshop evaluation and research studies, given the time pressures—the nature of the www, i.e. high individual control over which web links one pursues, which keynotes one reads, and which discussion groups one participates in, appears to significantly overcome the time constraints as the individual participants structure their own learning experience to meet their own content and teaching needs. This suggests again the advantages of online professional

development as teachers become more proficient at participating in the online environment.

The *HMS Challenger* workshop was designed to address historical issues and related social sciences curricular concerns beyond the ocean science content and curricular issues. An analysis of the narrative responses for infusion plans and for participant benefits provides support to conclude that the historical information was carried effectively by the presentations and materials included in the workshop. Numerous responses stated the history of ocean exploration, the changes in technology over time, the changes in research interests and emphases over time, and the sense of discovery were all important elements in the participants' learning through the workshop. Access to the primary documents of the Challenger expedition was seen as an important component that added a rich source for understanding, as well as atmosphere to the workshop. There is a sense that emerges, however, that the history will be infused into science classes—and not the science into history classes. This is most certainly due to the much larger number of science teachers represented among the participants. There is a clear perception that the history adds a valuable, and relatively untapped, level of meaning to the science classroom, and the primary documents from such an important expedition certainly lend historical authority.

An additional set of data has been maintained by Classroom Exploration of the Ocean to cross-check the findings in the survey. Complete transcripts from all of the discussions following each of the keynote presentations have been maintained. These represent verbatim records of the comments, questions, and follow-up dialog between and among the scientists/researchers who presented at the workshop and the participants.

Initial inspection of these narrative data for the science content, concepts, and activities identified in the survey narrative (Item: What content and materials are you incorporating in your classroom instruction?) is useful in determining the consistency and focus of the workshop series. These narratives are highly focused on specific content questions and reflect an enhanced understanding of the science concepts presented in the keynotes. There is also a visible attempt on the part of the participants to obtain clarification of difficult concepts, suggesting they are engaged in authentic learning, and attempting to construct meaning for the individual science areas, as well as linkages across the knowledge domains of the social, biological, and physical sciences represented in the workshops.

Clearly, these individuals are not passively observing and reading—they are in fact engaged with an intentional process, and exhibit communication behaviors indicating they are part of a social community. Numerous references mention "meeting" scientists and peer/colleagues using vocabulary more typically associated with face-to-face meetings and workshops. It seems the participants are transcending the obstacles to non-verbal communications imposed by the web. This suggests an area for follow-up research in understanding how teachers learn in online environments. Specifically, given that non-verbal communication is an important component of face-to-face communications among adult learners, what mechanisms supplant or replace the non-verbal support structures in the online environment?

Beyond this possibility for further research in the theoretical dimensions of online learning, the project evaluator would suggest the following action steps for the College of Exploration personnel based on the survey data:

1. Clearly, the data emerging in this program evaluation are critical support for the effectiveness of many of the prior workshops implemented through the College of Exploration and funding by numerous state and federal agencies—as the *Challenger* participants are providing highly specific references to these earlier projects. These data would be important follow-up information for those individuals who were associated with and/or responsible for those prior workshops. It is recommended that those individuals be provided this additional data—even though the reporting needs for those other projects may be completed. This should allow those organizations to make future programming and funding decisions with greater insight into the effectiveness of prior ones. These data also document leveraging among all of these projects through the development of the online community and the emerging catalog of shared content and experiences by these participants.
2. Select comments from a few participants queried the possibility of incorporating scheduled discussion times in future workshops to facilitate larger groups of participants online simultaneously. While this was only an incidental suggestion in the data—it could perhaps be piloted, as it seems to possess merit, depending on the cost-to-benefit ratio of trying this approach.
3. The strengthening of the trend data for multiple workshop participation—coupled with the specific evidence for classroom infusion—is strong support for the existence and effectiveness of this online learning community as a vehicle to link scientists and researchers to classroom teachers and informal educators. This linkage is resulting in changed classroom practice, wherein the activities taught

and the science content introduced is based on current and relevant research "as it occurs." This suggests a leveraging of this online community to infuse other science research would also be effective. It seems timely—based on the evidence from the *HMS Challenger* and the earlier online workshops—to consider formalizing this online community as a delivery mechanism for broader and different earth, space, ocean, and social science research.

4. The history of human exploration on this planet provides a rich, colorful context to better understand the changes in society and in science research today. The responses from participants reflect a need for the history of science to be interpreted by current historical researchers and science historians in a way that facilitates classroom infusion in the context of current, standards-based curriculum—and a deep appreciation for the content of this specific workshop, as well as highly specific plans for infusion of the HMS Challenger content and activities into their classrooms. The *HMS Challenger*—based on participant survey responses—has filled a valuable niche in a very unique way.