P1.17 AN EVALUATION OF THE MAURY PROJECT BY ITS PARTICIPANTS

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1. INTRODUCTION

In 1994 the American Meteorological Society (AMS) in conjunction with the United States Naval Academy initiated a teacher enhancement program called the Maury Project. The purpose of this program is to promote the understanding of the physical foundations of oceanography. Each year a two-week summer workshop is held for approximately 25 teachers at the Naval Academy in Annapolis, Maryland. A key component of the workshop is a set of 10 instructional modules on a variety of topics relevant to physical oceanography, which provides resource materials that Maury Project participants use for peer-training sessions. This program establishes a highly successful format to enhance the background of teachers on the physical aspects of the ocean sciences (Smith et al., 1997; Smith et al., 2002).

An important component of any educational program is the assessment of its effectiveness. This paper provides a long-term assessment of the Maury Project. It describes the results of a survey of the participants from the first eight years of the Maury Project (1994-2001). The purpose of the survey was to determine how many Maury Project participants continue to be active with the program, if they use project materials in their classroom and what do they use. The survey was also designed to determine their general impressions of the program after they have completed their requirements, implemented the instruction into their curriculum and conducted in-service training.

2. SURVEY RESULTS

The survey was developed and distributed to all past participants in the Maury Project Summer Workshops for Teachers (1994-2001). The survey can be divided into five parts: demographics, usage and quality of materials, quality of workshops, continued involvement of the participants, and goals attainment and contribution of the participating agencies. The following is a summary of the results of the survey.

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a) Demographic information

Fig. 1 provides a year-by-year breakdown of the number of respondents. A total of 200 participants attended the Maury Project Summer Workshop during the period of interest, but for various reasons the AMS education office lost contact with a number (50) of former participants. Of the 150 participants that were contacted, 129 responded for an 86% rate of return of the total number contacted and 64.5% of the total number of teachers trained (all percentage calculations will be based on the 129 respondents rather than the 150 reached or the 200 total trained). The average number of teachers attending per year was 25, of which 16.1 per year responded, and 6.3 per year were not reachable and did not receive the survey. As expected, the highest number (nine per year) of those not reached were participants during the first five years compared to only two per year during the final three years.

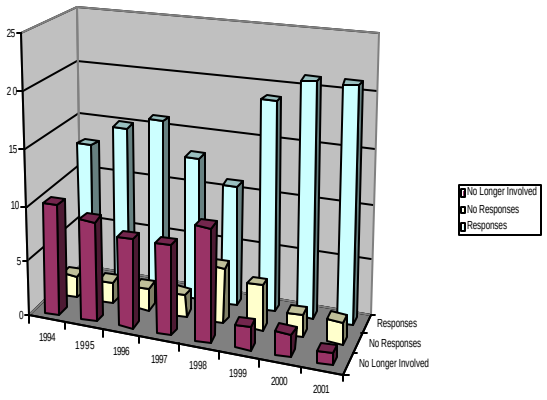

Fig. 1. - This graph depicts the number of participants that responded (by year), those that did not respond and those that were not able to be reached.

Fig. 2 shows that the large majority of the participants teach at the middle and high school levels (90), although several teach at multiple

levels (18). Some teach exclusively at the college level (7). In addition, 19 of the K-12 teachers also hold adjunct positions at colleges, primarily teaching courses to pre-service teachers. (Those 19 positions are not included in Fig. 2, since they are already counted in their primary teaching positions which are part of the 129 total respondents). Two people no longer teach, but responded based on their past experience with the Maury Project.

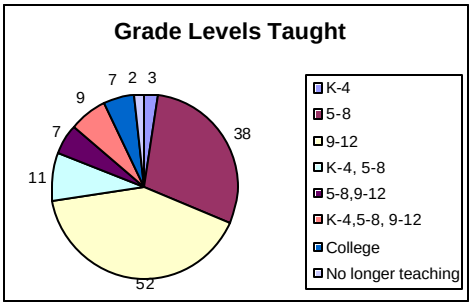

Fig 2. – This graph depicts the grade levels taught by Maury Project participants

b) Usage and quality of materials

Of the 129 participants, 117 (90.7%) indicated that they use Maury modules in their classrooms in a variety of courses. The use of Maury Project materials was diverse, with inclusion in Earth science, geography, physical science, biological science, across the curriculum, and general education (especially at the elementary level). This widespread usage indicates the instructional value of the Maury Project materials throughout the precollege curriculum and the quality of the materials. For those that do not use the Maury materials, they generally no longer teach or do not teach oceanographic topics, rather than due to dissatisfaction with the materials themselves. The variation in usage is primarily due to two reasons. 1) In order to be able to use the modules, the participants must receive training. Some of the early participants were never trained on the modules developed in years after their workshop, so they cannot use the later modules. 2) Some of the modules are fairly sophisticated in terms of the physical processes, so some teachers (often at the lower grade levels) view the materials as inappropriate for use in their classes.

A total of ten modules were developed for the Maury Project over the first six years of the program. Fig. 3 lists the modules and the percentage of the respondents that use each of the modules. The usage varies from 33-91%, with an average usage of approximately 55% per module.

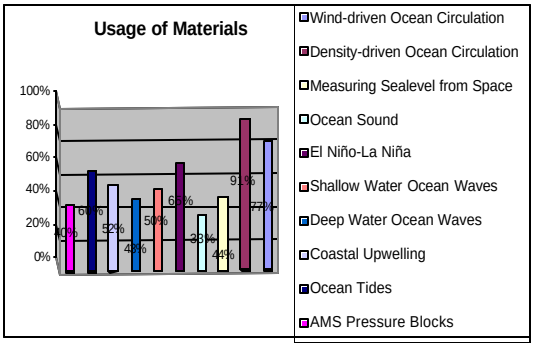

Fig 3. – This graph depicts the usage of the ten Maury modules.

Two questions were asked to determine the quality of the modules.

How do these materials compare to other oceanographic learning materials from other sources? and *Would you recommend these materials to your colleagues?*

Fig 4 shows that over 90% of the respondents rate the Maury modules as the very best (49.6%) or among the very best (41.9%) oceanographic learning materials compared to other sources. Further, 99.2% would recommend them to their colleagues, which is a ringing endorsement that the modules are worthwhile instructional materials for teaching oceanographic topics.

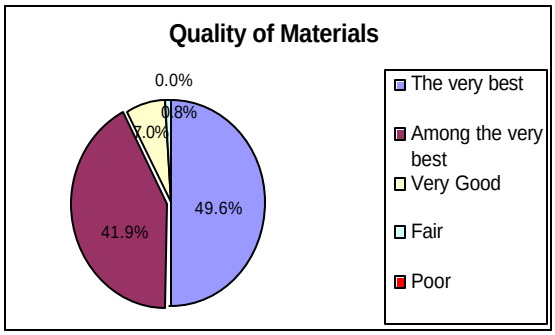

Fig. 4. – This graph depicts the respondents' assessment of the quality of the Maury teaching materials.

c) Quality of the workshops

The next three questions evaluate the participants' impression of the quality, the level, and the appropriateness of the instruction at the workshops.

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How would you rate the quality of the instruction that you received at the Maury Project Summer Workshop compared to other teacher enhancement experiences?

The respondents indicated overwhelming satisfaction with the quality of the Maury workshop. Fig. 5a shows that 73.6% said that it was the very best teacher enhancement workshop they had ever attended, while 24.8% said that it was among the very best.

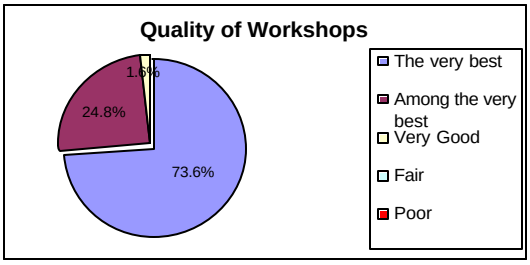

Fig. 5a . – This graph depicts the respondents' assessment of the quality of the Maury workshop.

How would you rate the level of the instruction in the Maury Project Summer Workshop?

Attempting to reach the appropriate level of instruction for teachers ranging from elementary school to college is not an easy task. However, respondents overwhelmingly indicated that the level of the instruction was about right (97.7%).

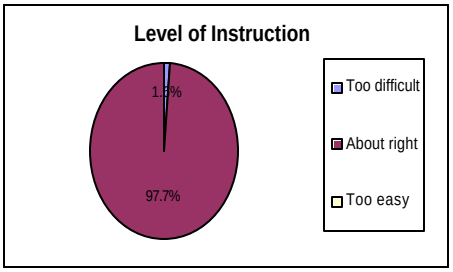

Fig. 5b. – This graph depicts the respondents' assessment of the level of instruction at the Maury workshop.

How would you rate the appropriateness of the instruction in the Maury Project Summer Workshop?

When asked to evaluate the appropriateness of the instruction (for the grade level taught by the teacher), the responses were similar to the previous question - Too difficult (3.1%), About Right (96.1%), and Too Easy (0.7%).

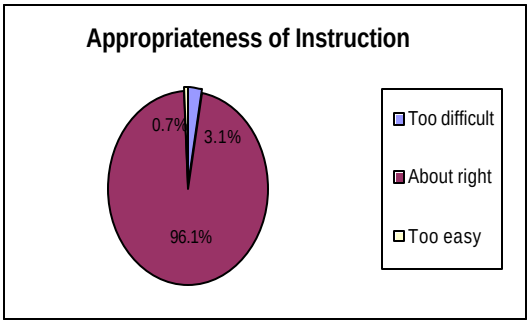

Fig. 5c – This graph depicts the respondents' assessment of the appropriateness of instruction at the Maury workshop.

d) Continued involvement of participants

The next two questions are designed to determine the level of activity of the participants after they completed their summer workshop and if they are still actively involved in the program. Participants are required to conduct two peer-training sessions to successfully complete the program. However, most exceed the requirement and continue to conduct training sessions well beyond the minimum requirement (27.1% have conducted 3-5 training sessions, 20.9% did 6-10%, and 11.6% have presented over 20 workshops) – see Fig 6a.

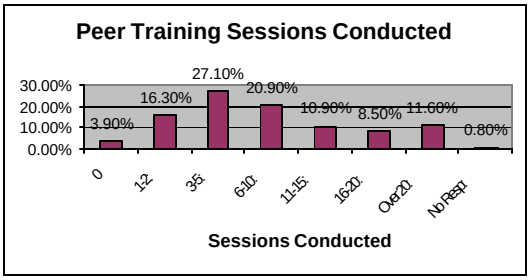

Fig 6a. – This graph depicts the number of peer-training sessions conducted by Maury Project participants.

Are you still active (do you still do at least one workshop per year)?

While the requirement for successful completion of the program is two peer-training sessions during the academic year following the workshop, it is a goal of the program to have the participants

embrace the Maury Project as a long-term commitment. Fig. 6b shows that 68.2% of the respondents indicate that they are still active in the program, as defined by the criteria of continuing to given at least one peer-training session per year. These numbers suggest that participant teachers have clearly bought into the program and are willing to share their experience with their colleagues.

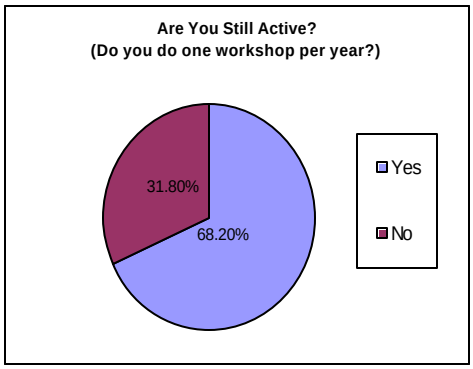

Fig. 6b – This graph depicts the percentage of respondents that remain active by continuing to conduct at least one peer-training session per year after the Maury Project workshop.

e) Goal attainment and contribution of the participating agencies

The remainder of the questions was designed to determine the participants' evaluation of the Maury Project, its goals, and the contributions of the agencies involved in the program. The first goal of the Maury Project is to improve teacher effectiveness in generating interest and understanding in science, mathematics, and technology though the teaching of physical oceanographic topics. Fig. 7a shows that 80.6% respondents rated the Maury Project as excellent and another 17.8% as very good in accomplishing this goal.

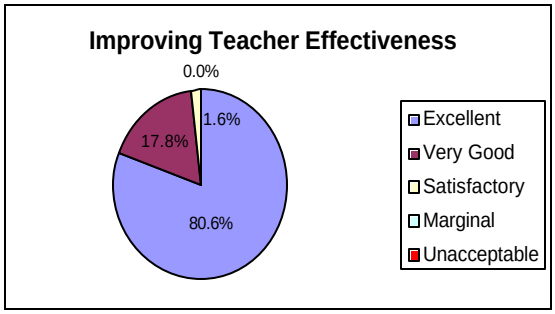

Fig. 7a – This graph depicts the respondents' assessment of how the Maury Project improved teacher effectiveness in generating interest and understanding in science, mathematics, and technology though the teaching of physical oceanographic topics.

The second goal involved the training and support of peer trainers who assist the AMS in training other precollege teachers on oceanographic topics. Continuing support after the workshop ends is important for retaining participants on a long-term basis. Fig. 7b indicates that 76% of the respondents rated the Maury Project as excellent and 20.2% as very good.

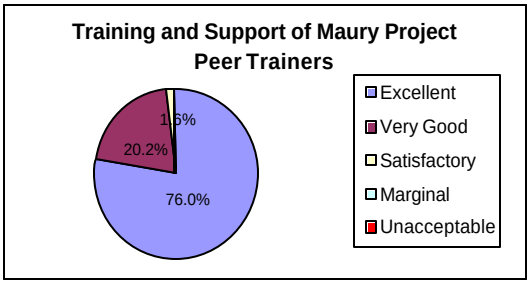

Fig. 7b - This graph depicts the respondents' assessment of the Maury Project training and support of peer trainers who assist the AMS in training other precollege teachers on oceanographic topics.

Regarding the development and implementation of scientifically accurate and pedagogically sound instructional teacher resource materials, the teachers were also laudatory. Fig. 7c indicates that 79.8% of the respondents rated the Maury Project instructional materials as excellent and 18.6% felt they were very good.

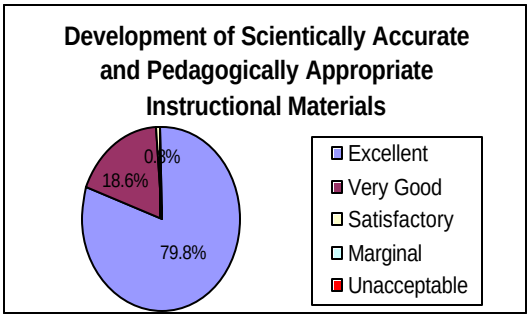

Fig. 7c - This graph depicts the respondents' assessment of the Maury Project instructional materials for scientific accuracy and pedagogical appropriateness.

The National Science Education Standards are regarded as the cornerstone for educational programs in the sciences. Fig. 7d indicates that 68.2% of the respondents rated the Maury Project as excellent in using Oceanography to promote these standards, and 24.8% felt that it was very good.

The responses to these four questions provide an assessment of how the participants perceive the effectiveness of the Maury Project in attaining its goals. Approximately 98% of the respondents rate the program as very good or excellent in terms of three goals (improving teaching effectiveness, training and support of peer-trainers, and materials development). In addition, 93% rate the Maury Project as very good or excellent in terms of using Oceanography as a tool to promote the National Science Education Standards. These figures suggest that the respondents view that the Maury Project is attaining its goals for enhancing science education utilizing the physical foundations of oceanography.

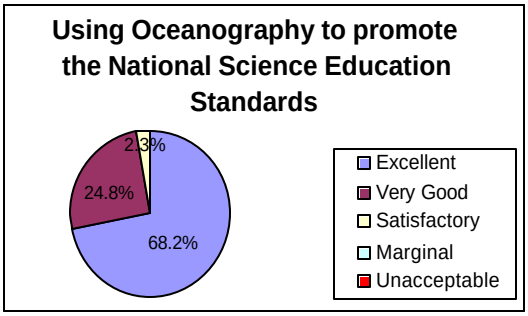

Fig. 7d - This chart depicts the Maury Project for its use of Oceanography as a mechanism to promote the National Science Education Standards.

Two additional questions were posed to determine the respondents' perception of the role played by the primary partners in the Maury Project.

Were you aware that the following organizations were involved in educational outreach activities prior to attending the Maury Project Summer Workshop?

Positive responses were recorded for the following organizations: American Meteorological Society (72.1%), United States Naval Academy (56.6%), United States Navy (CNMOC and ONR) (49.6%) and National Oceanic and Atmospheric Administration (72.9%). It is not surprising that teachers would be aware of the involvement of AMS in NOAA in educational outreach. Further, they would likely be unaware that military organizations would participate in such endeavors, especially at the K-12 level.

The second question was designed to determine if the Maury Project changed those preconceived notions.

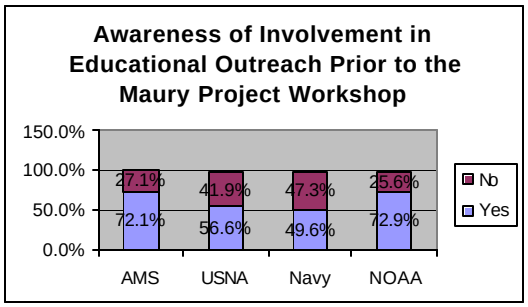

Fig. 8a - This chart depicts the respondents' awareness of the involvement of the Maury Project sponsors in educational outreach activities.

Do you feel that the following organizations made a significant contribution to the instructional component to the Maury Project ?

Fig. 8b shows the following: American Meteorological Society: (97.7%), United States Naval Academy (99.2%), United States Navy (CNMOC and ONR) (86.0%), and National Oceanic and Atmospheric Administration (91.5%)

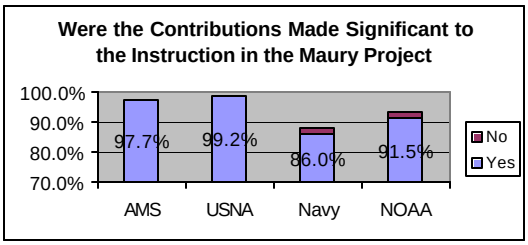

Fig. 8b - This chart depicts the respondents' perception of the contributions made to the instruction in the Maury Project.

The Maury Project represents a unique collection of organizations with an interest in physical oceanography. A professional scientific society (AMS), a college (the Naval Academy) and both military (Navy) and civilian (NOAA) government agencies provide, staffing, instruction, facilities, funding and materials to accomplish its goals. Prior to attending the workshops, participants were reasonably familiar (over 70%) theinvolvement of both AMS and NOAA in educational outreach activities, but significantly less (roughly half) were aware that the Navy also participates in promoting precollege education. However, the second question clearly demonstrates that the participants viewed that the agencies involved in the Maury Project made significant contributions to the this program. The unique backgrounds of these organizations provide diverse perspectives on the physical foundations of oceanography that enrich the experiences of the participants and will undoubtedly enhance their ability to teach the material to their colleagues and their students.

One final question was asked. *If given the opportunity, would you attend another AMS Teacher Workshop?* Perhaps the best indicator of the general satisfaction of the participants regarding the program is whether they would consider other programs for future professional development. An overwhelming percentage (98%) of the respondents indicated that they would attend another AMS Teacher Workshop. In fact, many have already participated in Project ATMOSPHERE or one of the AMS distance-learning courses, indicating their satisfaction with AMS education programs as a mechanism for acquiring professional development.

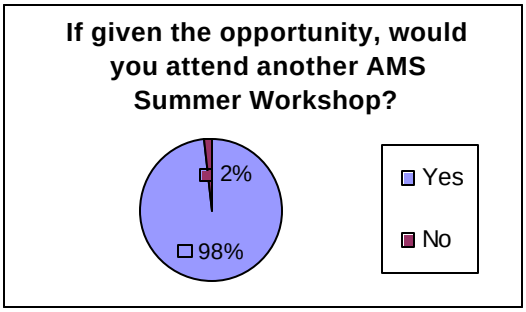

Fig. 9 – This chart depicts the willingness of Maury Project participants to attend another AMS Summer Workshop.

3. CONCLUSIONS

The Maury Project has been involved in teacher enhancement since 1994. During that period it has conducted summer workshops for approximately 25 teachers annually. Those teachers conduct peer-training sessions in their respective schools, school districts, and state or national science education association conferences. To date, over 200 teachers have attended a Maury Project Summer Workshop. In turn, these Maury Project participants have conducted 1200 peer-training sessions for over 20,000 teachers nationwide on a variety of oceanographic topics.

The survey responses from 129 Maury Project participants strongly indicate that they are using Maury Project materials in their classrooms. The assessment of the quality of the materials is uniformly high, with nearly all indicating that the materials are the very best or among the very best that they have used. The assessment of the workshop itself also rates very high marks, again with nearly all indicating that the Maury Project is the very best or among the very best that they have attended in their professional careers. Most of the participants still maintain an active involvement in the Maury Project by continuing to conduct peer-training sessions long after their requirement is satisfied. Some participants have done more than 20 such sessions for their colleagues, indicating their long-term commitment to the program. Undoubtedly, a contributing factor to their association with the Maury Project is the level of support that is provided after they complete their summer workshop. The participants acknowledge the contributions to science education that the various organizations who help support the Maury Project. Finally, the response is nearly unanimous from all participants that they would indeed participate in another program conducted by the American Meteorological Society education program, clearly indicating their satisfaction with the quality of their professional development experience during the Maury Project.

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REFERENCES

Smith, D.R., I.W. Geer, and D.E. McManus (1997). "The Maury Project – An Educational Partnership in Oceanography". *Bulletin of the American Meteorological Society*, **78(7)**, 1497-1502.

Smith, D.R., I.W. Geer and D.E. McManus (2002). "The Maury Project: A Partnership to Promote Educational Outreach on the Physical Foundations of Oceanography", *Preprints of the 11th AMS Symposium on Education*, Amer. Meteor. Soc., Boston, MA, 105-108.