

Discovery Voyage: A Key Outreach Program

By

**Professor Mark Coté, PE, Associate Professor Barbara Fleck, PE, and
Assistant Professor Steven Walk, PE
Engineering Department
Maine Maritime Academy**

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ABSTRACT

Maine Maritime Academy (MMA) is located in Castine Maine, a small town on the Maine Coast. The college's remote location presents significant challenges in attracting potential students and in allowing the school to support Maine's youth and industry. To improve the school's interaction with students at Maine High Schools, MMA established the Discovery Voyage (DV) Program in 1995. Since the DV Program was started, MMA has experienced a dramatic increase in the number of applications and Engineering Department enrollment and is currently at full enrollment of approximately 800 students.

In the first ten years, over 7000 students and adults have participated in the DV Program. In its standard form, the program entails a day-long visit to the campus by high school students from around the state. Initially, the students' visit focused on the maritime and small boat aspect of the school, but as these resources became less available for non-curricular activities, Discovery Voyage changed its focus to demonstrating the engineering and technology aspects of MMA. The Engineering Department has worked with the MMA Admissions office to prepare demonstration presentations that highlight various engineering applications and allow the visiting student to interact with MMA faculty and students. These demonstrations have included subject areas such as Ship Buoyancy and Stability, Material Failure Testing, and Hydrogen Fuel Cells.

The DV Program continues to evolve and improve. The impact of the DV Program has not been formally assessed, but MMA is in the process of developing a more formal method of evaluating visiting student reactions and impressions. Additionally, the school is looking to formalize the process of determining the key factors in school selection for currently enrolled students. This will allow MMA to quantify the impact of the DV Program on the MMA student body. The feedback from DV program visitors and currently enrolled students will be used to strengthen and improve this program.

Introduction

Maine Maritime Academy (MMA) has taught Engineering in various forms for over 60 years. The school enrolls over 800 undergraduate students with more than 50% enrolled in one of the Engineering Department's five majors. The college's location, in Castine, a town of 600 people on the Maine coast, has always presented significant challenges in recruiting students to MMA's programs. The town is over forty miles from the nearest city of any size and is at least two hours from Maine's major population centers. While the school's reputation as a school of outstanding, "hands-on" education, has provided a core recruiting base, it has been difficult to expand the potential recruiting pool. Since 1995, MMA has instituted a Discovery Voyage (DV) program to bring Maine high school student to the campus. Since 2000, the Engineering Department has actively used this program to familiarize potential students with the department's programs. This paper describes actions taken to incorporate the DV program in the Engineering Department's recruiting efforts.

Adoption of Discovery Voyage

Program Inception

The Discovery Voyage program began in 1995, when it was created and developed by John Henderson, the High School Relations Coordinator in Admissions. It was intended to serve as an aspirations building educational tool by getting students onto the Maine Maritime Academy campus to experience programs in maritime history, operations, theory, and applied technology. Many elements of the program were developed for teachers to be able to incorporate DV programs into their lesson plans and units. DV programming was launched in 1996 to high school students in Maine and beyond. The MMA Engineering Dept. has, from the onset, been a principle player and leader in DV programming.

General Program Description

Math and science teachers and high school guidance counselors are invited to bring students to the Discovery Voyage program for their choice of activities. They usually arrive between 9 and 10 AM, and start with an introduction to college life. They then move on to sessions on engineering, marine transportation operations, international business and logistics, or marine science. Each session lasts between 45 minutes and one hour; there is a break for lunch at the college cafeteria, and students often finish their visit with a tour of the Training Ship State of Maine. The entire visit lasts between four and six hours for most groups.

The Discovery Voyage Program at Maine Maritime Academy has served high school, middle school, and elementary school students, as well as Cub Scouts, Boy Scouts, Girl Scouts, Sea

Cadets, Sea Scouts, and JROTC groups for several years. It is a flexible program that offers these groups college planning and aspirations support; applied educational demonstrations for mathematics, international business, physics and chemistry, and engineering; and applied training in leadership, communications, and teamwork development. Specific data for the MMA Discovery Voyage program appears below.

Table 1. School Group Attendance of MMA’s Discovery Voyage Program

Academic Year	Number of students	Number of school groups
1996/1997	256	20
1997/1998	1300	37
1998/1999	1251	42
1999/2000	1405	39
2000/2001	1311	45
2003/2004	536	22
2004/2005	664	30

In addition to these school groups, over 350 people have attended the program with Scout Troops or other non-school groups since 2001. Over 7000 people have attended the program since its inception in 1995.

Engineering Discovery Voyage

Development of Modules

For its first few years, a key component of the program was getting out on MMA vessels, notably the Schooner Bowdoin and the Tug Pentagoet. This worked very well and was greatly enjoyed by the students, teachers, and guidance counselors taking advantage of the program. In

academic year 2001-02, the DV program was not offered due to lack of personnel. After some reorganization, the program was re-opened and has been offered consistently since then with Hugh Porter, the new High School Relations Coordinator, directing the program. However, due to increasing MMA enrollments and increased and more efficient use of the Academy's vessels, the programs had to rely significantly less on getting out on vessels simply because they were reserved, understandably, for MMA classes/training. Consequently, Porter revised the program to offer more "land-based" engineering and marine transportation modules of various types. As numbers of visiting students increased, so also did the demands of current faculty and the logistical challenges of arranging the programs.

As a result of this situation, Porter contracted with Prof. Laurie Flood of the Engineering Dept. to develop two educational engineering modules for use in the DV program by any professor in the department. The topics of the modules are "Introduction to Ship Buoyancy and Stability" and "Predicting Material Failure in Ships Due to Brittle Fracture". These modules have been presented by Prof. Flood many times with great success. Another key pillar of the revised DV program is Prof. Barbara Fleck's presentations on structures and strength of materials. Prof. Fleck discusses mechanical properties of materials with the students. After determining that strength and stiffness are important properties, the students participate in a test to measure these properties for two metal samples. These engineering modules provide an educational experience for these groups that they are not able to get in their high schools.

In early 2005, Professors David Skaves and Steven Walk proposed that the Admissions and Engineering Depts. jointly purchase 10 Hydrogen Fuel Cell kits to be used both in MMA classes and in the DV modules. These have been successfully used in both applications.

Another recent addition to the DV program is the use of the West Point Bridge Designer computer program with the high school students (see <http://bridgecontest.usma.edu/>). The students visit the CAD Lab, which has 18 computers with the West Point Bridge Designer software, as well as an instructor's computer with a projector. After a short demonstration of the program, the students modify a bridge design, and attempt to build the least expensive bridge that can carry a specified load. The visiting students learn to use the software very quickly, and enjoy making unusual bridge designs. While they are working on their designs, MMA students and/or instructors circulate to answer questions and provide help. This unit works well with the strength of materials lab that determines the strength of materials in tension. Discussion of tensile and compressive loads, and the advantages of solid bars compared to hollow tubes, introduce the students to some of the design alternatives engineers must consider when designing a structure.

Changes and Improvements

The changes in the engineering department's presentations for the Discovery Voyage program have developed the program from a boat ride to lab and classroom based educational activities. The goal is to have the students participate in a lab activity, and to understand what engineering is about, and consider engineering as a possible career.

Results

Qualitative, Informal Evaluation and Outcomes Assessment

The success of the Discovery Voyage program has been measured by the response of group leaders and participating students. Overwhelmingly positive, the responses cited most often the following key program attributes for praise:

1. The leadership and direction of the MMA DV organizer
2. The 'hands-on' quality of the program events
3. The presence of MMA students to engage and encourage the active participation of the visiting students

Group leaders commented most frequently on what they experienced as a well-organized, smoothly operating day, and very often reported being pleased with the positive response of their students or charges. Students and other participants most often were impressed, with themselves and the Academy, in having had the opportunity to learn something of interest or value to them.

The DV organizers gather this feedback commentary from students throughout the day's events and when students are gathered boarding transportation back to their schools. School or group leaders are encouraged to email or send their personal comments to the DV organizers.

Quantitative, Formal Evaluation and Outcomes Assessment

Detailed feedback to assess and improve specific attributes of the DV program has been difficult to gather from participants. Most often, DV trips have been organized out of the school guidance offices, and guidance counselors traditionally are the primary contacts for the DV organizers at MMA. High school teachers typically are too busy to undertake the tedious tasks of the logistics of transportation, management of parental approval forms, etc., of a DV event, yet typically the teachers are the only high school representatives visiting campus. Two problems in obtaining quality program assessment information result: Guidance counselors, who could provide feedback on the career aspirations building effectiveness of the program, do not attend the campus event to evaluate the program and provide feedback to improve student career awareness and aspirations. Teachers, who can best evaluate the appropriateness and effectiveness of the DV learning and aspirations-building opportunities, are not 'in the loop' with DV organization or design to contribute their feedback to improve learning motivation and effectiveness.

For some high school teachers, DV has been viewed more as a career or guidance event, and not as an enhancement to scholastic experience. More and specific feedback could help improve or customize DV events, or even position DV as an extension of the high school classroom, such as by assisting teachers in the development of in-class modules to prepare for or follow up DV 'real world' learning opportunities, and therefore be that much more effective in enhancing student learning and aspirations.

The Admissions office is planning to develop surveys for teachers and participating students to measure effectiveness, education value, and student aspirations impacts of DV program and its

modules and components. The survey will be designed to provide feedback to make improvements through modification, additions, or deletions of modules and events, and to better integrate the learning modules with scholastic curricula.

The surveys will be designed also to assess the increase in student awareness and positive regard for the Academy and its educational opportunities, so that DV indeed does increase student aspirations toward a technical career, and perhaps at MMA.

Incoming first year students are now surveyed to identify those whose college or career choice was influenced by a Discovery Voyage experience. This information can begin to provide information on the effect of DV on enrollment. Follow up interviews with these students should also provide valuable, actionable feedback for program assessment and improvement.

The Future of DV

Discovery Voyage has been very successful in promoting awareness and importance of a technical educational and its career opportunities to high school students and members of youth organizations. Volunteer comments and responses to informal queries from participating school and organization leaders and students have been overwhelmingly positive with regard to the organization, hands-on learning opportunities, and overall enjoyment by student participants.

New surveys are being developed to better assess the events, learning modules, and other attributes of Discovery Voyage to better identify the qualifying strengths of the program and to obtain feedback to make improvements through modification, additions, or deletions of modules and events. New surveys of incoming students who indicate having participated in DV will begin to quantify the affect of DV on enrollments and provide feedback for continuous improvement of the program.

Recent review of the success of the program has resulted in the following near term directions for the program:

1. The goals of DV remain the same: to effect positively the career aspirations of high school students in Maine and to promote the educational and career opportunities at MMA.
2. Maintain participation at 600-700 students per year.
3. Increase the number of participating faculty in current learning modules and add two new learning modules in the next Academic year.
4. Increase the number and participation level of Academy students in the program.

Conclusion

The Discovery Voyage program has brought thousands of potential students and adults to Maine Maritime Academy. The MMA Engineering Department has worked with the Admissions Office to develop a series of presentations and experiential learning events that expose visitors to many different aspects of Engineering. MMA continues to work to strengthen the DV program

and is establishing assessment tools to evaluate the programs effectiveness and aid in continuously improving the program.

Biographical Information

MARK COTÉ, PE is a Professor of Engineering at Maine Maritime Academy. He joined the faculty at MMA in 1992 after working in the power industry for the General Electric Company, Duke Power Company, and the Carolina Power and Light Company. He is a licensed Stationary and Marine Engineer and is a registered Professional Engineer. He is an Engineering Duty Officer in the Navy Reserve. Contact Information: (207) 326-2365, mcote@mma.edu.

BARBARA FLECK, PE is an Associate Professor in the Engineering Department at Maine Maritime Academy. She began teaching at MMA in 1994 after working with several research and development groups, including Battelle Columbus Laboratories, Brookhaven National Laboratory, Sunpower, Inc. and Stirling Technology, Inc. She can be contacted at bfleck@mma.edu.

STEVEN ROBERT WALK, PE is an Assistant Professor of Engineering at Maine Maritime Academy, a college of engineering, science, and business, where he is head of the Center for Technology Forecasting and Director of the Center for Maritime-Aerospace Liaison and Technology Development. He is owner and founder of Technology Intelligence, a consulting company in Castine, Maine, providing strategic technology management services to industry, government, and institutions. Mr. Walk earned BSEET and MSEE degrees at the University of Pittsburgh, where he was a University Scholar. He can be contacted at swalk@mma.edu.