MarineTech

STEM Preparation through Marine Engineering, Science and Technology Experiences

Project Funded by NSF under ITEST

Dr. Alok K. Verma P.E., CMfgE
Project Director & Ray Ferrari Professor
Dr. Manorama Talaiver
Dr. Sueanne Mckinney
Dr. Daniel Dickerson
Dr. Nina Brown
Prof. Deborah Chen
Co Project Directors
Old Dominion University
Norfolk, Virginia

Located in historic Norfolk.

- Founded in 1930 as a division of the College of William and Mary.
- Old Dominion is now one of only 101 public universities with a Carnegie/Doctoral Research-Extensive distinction.
- Approx. 20,000 students
- Proximity to NASA Langley Research Center
- 200 miles south of Washington DC
Lean Institute at ODU is Your Host

Focus on Research, Education & Short Courses, Conferences and Implementation

* Implementation is done with the help of Virginia Applied Technology and Professional Development Center
MarineTech Project Goals

- Increase student awareness about careers in the STEM workforce, specifically in marine engineering and technology.
- To attract students towards marine engineering and technology careers to meet the critical shortage of workforce in this area.
- To train students in the use of information and communications technology tools to work collaboratively on group projects.
- To incorporate project-based pedagogy using Maine kits 1-4, Sea Perch robotics and ship building for students to connect physical science concepts to marine engineering and technology.
MarineTech covers 3 geographical areas: Hampton Roads, Central Virginia, South Virginia

- 40 Teachers and 80 students from middle and high school will participate in this 3 year program.

- Marine Tech also features carefully constructed evaluation component that will examine the impact of this project based learning approach on student knowledge, instructional practices and student career interests.
For Teachers

- Two day professional development summer workshops.
- Online training (10 hrs every semester), classroom visits and support from ITTIP.
- Each participating teacher will receive:
  - 1 Sea Perch Robot Kit
  - 4 Marine Kits and
  - Associated curriculum
  - $1800 stipend for 3 years
  - 6 Graduate Credits
For Students

- Saturday Academies
  (64 hrs during school year, 4 Saturdays/Semester)
- Summer Academies (80hrs/summer)
- Counseling Services.
- Field Trips to Shipyards and Marine Museums
- $1200 stipend for 3 years.
Expectations from Students

- Saturday Academy (4 Saturdays / Semester for 3 years)
- Summer Academy (2 week long Workshop each Summer)
- Active Participation in Classroom Implementation of Marine Kits and Sea Perch
- Active Participation in Field Trips
- Active Participation in Sea Perch and Human Powered Container Ship Competition
<table>
<thead>
<tr>
<th>March 14</th>
<th>March 21</th>
<th>April 18</th>
<th>April 25</th>
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</thead>
<tbody>
<tr>
<td>Shipyards &amp; Marine Industry</td>
<td>Shipbuilding Production</td>
<td>Field Trips to Marine Museum</td>
<td>Career Counseling</td>
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<tr>
<td>Terminology I</td>
<td>Processes (Hands-on)</td>
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<td>By Dr. Nina Brown</td>
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<tr>
<td>• Speakers from Marine Industry (NGNN, Colonna’s, BAE, Apprentice School) (4 hrs)</td>
<td>• Peninsula Higher Education Center</td>
<td>Group-1: Hampton Roads - HR</td>
<td>9:00 AM - 12:PM (3 hrs)</td>
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<tr>
<td>LUNCH</td>
<td>LUNCH</td>
<td>Group-2: Central Virginia - CV</td>
<td>• 3 graduate student in SS &amp; CV</td>
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<tr>
<td>Use of IT in Marine Industry</td>
<td>Counseling Sessions by Dr. Nina Brown</td>
<td>Group-3: South Side Virginia –SS</td>
<td>• Career Exploration</td>
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<tr>
<td>by Prof Deborah Chen</td>
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<td>• Games, Competition, raffles</td>
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<td>(3 hrs)</td>
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<tr>
<td>• 21st century skills</td>
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<td>• CS basics-Activities using</td>
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<td>Computer Science Unplugged</td>
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<tr>
<td>• Discussion of Assignment</td>
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<td>before Fall</td>
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<tr>
<td>LUNCH</td>
<td></td>
<td>Math &amp; Science Exploration by Dr. Sueanne Mckinney Dr. Daniel Dickerson</td>
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<tr>
<td></td>
<td></td>
<td>1:00PM - 4:00PM (3 hrs)</td>
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## MarineTech

<table>
<thead>
<tr>
<th>YEAR 1-Spring</th>
<th>YEAR 1- Fall</th>
<th>YEAR 2-Spring</th>
<th>YEAR 2-Fall</th>
<th>YEAR 3-Spring</th>
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<tbody>
<tr>
<td>4 Saturdays</td>
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- **YEAR 1-Spring**
  - Shipyards and marine industry terminology I
  - Shipbuilding production processes (hands-on)
  - Field trip to Marine Science Museum
  - Use of IT in shipping related and other careers I

- **YEAR 1-Fall**
  - Shipyards and marine industry terminology II
  - Shipyards operations / shipyard IT/Advanced Concepts
  - Field trip to Marine Science Museum
  - Use of IT in shipping related and other careers II/Career exploration

- **YEAR 2-Spring**
  - Introduction to Sea Perch /ROV
  - Shipbuilding production process (hands-on)
  - Field trip to Marine Museum
  - Web page design I / Career exploration

- **YEAR 2-Fall**
  - Introduction to ROV/ROV operation and applications
  - Web page design II
  - Field trip to Marine Science Museum
  - Web page design III/Career Exploration

- **YEAR 3-Spring**
  - Introduction to ship design/CAD/simulation
  - Activity shipbuilding production process (hands-on)
  - Field trip to Marine Science Museum
  - Web page design project / Career Exploration
Two-week Summer Academies for Students

- **Marine Kits** – Project based learning related to marine science and technology. Activities tied to Standards of Learning and relate to shipyard operations, ship construction, ship stability and ship disaster investigation.

- **Sea Perch Robot** – Design and build underwater robot and participate in a competition. Learn about engineering and science behind underwater robots.

- **Human Powered Container Ship** – Explore the effect of various hull shapes on ship performance, various structural shapes on strength of a ship and use these concepts in the final human – powered container ship competition.

Other Activities: Fieldtrips to shipyards and Museums.
Student Summer Academy – Two Weeks

Hampton Roads - June 22 – June 26
   June 29 – July 3

Central Virginia - June 22 – June 26
   June 29 – July 3

Southside Virginia - July 13 – July 17
   July 20 – July 24
Field Trips

• Chaperons – Teachers? / Parents? (3 to 4)

Lunch will be provided on the field trips

Field Trip to Peninsula Workforce Development Center: March 21

Hampton Roads  Central Virginia  Southside Virginia

• Start Time 8:00 AM  • Start Time 8:00 AM  • Start Time 9:00 AM
• Return by 2:00 PM  • Return by 2:00 PM  • Return by 6:00 PM
# NSF Marine Tech Project

**Spring - 2009 Summer Academy, March 21, 2009**

<table>
<thead>
<tr>
<th>TIMINGS</th>
<th>HANDS-ON ACTIVITY</th>
<th>COUNSELING</th>
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<tbody>
<tr>
<td>10:00-11:00</td>
<td>HR - 1</td>
<td>CV - 2</td>
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<tr>
<td>11:00-12:00</td>
<td>CV - 2</td>
<td>HR - 1</td>
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<td>30</td>
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## Lunch

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<tr>
<th>TIMINGS</th>
<th>HANDS-ON ACTIVITY</th>
<th>COUNSELING</th>
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<tbody>
<tr>
<td>12:30-1:30</td>
<td>SS - 3</td>
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<td>15</td>
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<tr>
<td>1:30-2:30</td>
<td>SS - 3</td>
<td>SS - 3</td>
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MarineTech Project – Main Components

1. Training in Inquiry based Learning Kits
2. Training in 21st Century Skills
3. Marine Career Awareness
Teacher Workshop

Students will also build Sea Perch robot and compete with other teams
Sea Perch Testing - Norfolk, Virginia
Paper Work Needed

- Student Application form
- Emergency Contact form
- Student contract
- Media Release Form
- Waiver Form for Minors

Forms can be downloaded from this site:
http://www.lions.odu.edu/~averma/nsf/marine.html
MarineTech Website

Program Summary:

1. 60 Math, Science and Technology Education teachers and 60 students
2. One week long professional development workshop during the Summer.
3. Classroom Implementation of instructional resources, building marine kits and Sea Perch underwater robot and human powered container ship for competition
Science Education

Dr. Daniel Dickerson
Assistant Professor of Science Education
What I’ll Do

• Teachers
  – Increase content understanding
  – Enhance pedagogy

• Students
  – Increase content understanding
    • Help with SOL science content
  – Increase relevance
    • Tie learning to careers and real world application
Sample Science Topics

- Density
- Buoyancy
- Gravity
- Force and Motion
- Nature of Science
- And many, many more…

All are directly SOL related.
Mathematics Education

Sueanne E. McKinney, Ph.D.
Assistant Professor of Educational Curriculum and Instruction
Goals

• Build new mathematical knowledge through problem solving.
• Develop and evaluate mathematical arguments.
• Build a conceptual understanding of algebraic concepts through hands-on manipulative.
Future Activities

• Participate in many hands-on and virtual activities.

• Participate in problem-solving situations.

• Work with Hands-on Equations and Algebra Tiles.
Information Technology Component

Prof. Deborah Chen
Norfolk State University
Norfolk, VA
Year One

- 21st Century Skills
- IT/CS Basics through Computer Science Unplugged
  Activities:
  » Working with raw data
  » Color by Numbers – Image Representation
  » Binary numbers
- Careers Exploration
  » Understanding your learning/working style
  » Facts findings on field trips
• Year Two
  – IT/CS Basics
    » Introductions to HTML and web pages
  – Problem Solving and Solution Design
    » Web page design standards and guidelines
    » Web site development - MarineTech project participant journal
    » Mapping ideas to actual design
  – Careers Exploration
    » Report - Findings from field trips
    » Mapping college majors and careers
Year Three

- IT/CS Basics through Computer Science Unplugged Activities
  » Putting Computers to Work
  » Battleships – Searching Games
- Problem Solving and Solution Implementation
  » Web site development (continued to completion)
    - Project Participants Journal
- Careers Exploration
  » Mapping college majors with careers
Career Exploration

NINA W. BROWN, Ed.D, LPC, NCC, FAGPA
PROFESSOR AND EMINENT SCHOLAR OF COUNSELING
OLD DOMINION UNIVERSITY
nbrown@odu.edu
Goals

• Help clarify personal career choices
• Match personal preferences to Marine Technology
Objectives

- Learn career and work values
- Identify personal abilities, competencies and skills
- Understand how to apply career preferences, categories to Oneself
- Become acquainted with opportunities and possibilities for Post-Secondary education and Training
Strategies

1. Group focused - Small groups of students with experienced leaders
2. Creative activities – Ex. Collages, Board Games that teach concepts
3. Media – Example: Career Exploration DVD
4. Presentations - Experts
Future Activities

- Summer Workshops
- E-Mentoring - With parental permission, students will be contacted for updates on school performance via texting, e-mail, and/or chat room
Program Evaluation

David Reider
Education Design, INC
Boston, MA
Evaluation WHY:

- Help the Project Team learn how the project is working:
  - Workshop quality, length, activities, content
  - Communication with teachers
  - Communication with students
  - Expectations being met
Evaluation WHY:

- Help teachers give feedback to project team:
  - Anonymously
  - Outside the context of workshops, in comfort of classroom
- Help team reflect on the activities
Evaluation WHY:

- Help make suggestions toward improvement:
  - 12 years of science education evaluation
  - Participation in 6 NSF projects
  - Bring perspective of the field at large
Evaluation How:

- Workshop Observations
- School site visits: classroom observations
- Surveys for teachers and students
- Interviews for teachers and students
  - Individual and groups, samples
Data Safety:

• All data confidential from team and schools
  – Remains with Education Design
  – Reported anonymously

• Adheres to IRB protocols
  – Student permission required
  – No names ever made public
Evaluation is for…

• Learning about MarineTech
• Learning about new innovations in science and mathematics education
• Helping the project continuously improve
• NSF (funder) to learn how the project evolves from an independent perspective
NSF MarineTech Program Evaluation

- Is NOT about teacher quality or to evaluate a teacher’s ability to teach
- Is NOT about student performance in the classroom
- Will NOT affect a teacher’s performance review
- Will NOT impact a student’s grades in any way
- Will NOT impact a school’s performance
Contact Information

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South Virginia
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Thank You

http://www.lions.odu.edu/~averma/nsf/marine.HTML

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