

# **FINAL REPORT**

**July 31, 2008**

**Section I**  
**Technical Status Report**  
**Technology Investment Agreement 2007-375**  
**between**  
**the Advanced Technology Institute (ATI)**  
**and**  
**Old Dominion University**  
**for**  
**Ship Building and Repair Career Day Events (SBRCD)**

## **Project Overview**

The Ship Building and Repair Career Day Events (SBRCD) Project was presented as a comprehensive solution to the workforce problems faced today by the United States shipbuilding and repair industries. It looked at the root cause of the workforce problems and addressed them to improve the pool of students interested in shipbuilding careers by increasing their awareness about shipbuilding and ship repair operations utilizing simulation based learning. It also ensured that students get accurate guidance and counseling from teachers and counselors about careers in this industry. This was accomplished by training teachers and counselors about career paths and job opportunities in this industry. In addition, the project created four project based simulation kits to engage students in shipbuilding related classroom activities. SBRCD also created a common platform for the industry to market itself, producing cost savings for the entire industry. Finally, SBRCD attempted to create a positive image of the industry by providing information about the Career Day Events through press releases to local media in Gulf Coast and Hampton Roads.

Old Dominion University (ODU), Northrop Grumman Shipbuilding (formerly NGNN and NGSS) and Colonna's Shipyard Inc. (Colonna's) partnered with other regional shipbuilding and repair companies in the Hampton Roads and Gulf Coast regions to host a Shipbuilding and Repair Career Day Event in each of the two regions.

The learning objectives of the four simulation kits developed under this project are aligned with SOL objectives to ensure that teachers will use these tools to educate their students about shipbuilding and repair fundamentals.

## **Technical Progress**

This is the final Technical report for the subject agreement. Technical efforts for the period January 2007 through July 2008 include six major tasks and workshops for teachers and counselors.

All six major tasks have been completed successfully as shown in figure 1 below. SBRCD website development and deployment has been completed and now the website is constantly being updated and maintained. Career days were planned and implemented according to the schedule. The original proposal included development of two simulation kits. Instead, the project team developed 4 kits. Teachers, math and science coordinators and shipyard professionals were involved during the development of these kits. Each participating teacher and counselor in the Gulf Coast and Hampton Roads received a set of four marine kits during the workshop.

		Q1			Q2			Q3			Q4			Q1			Q2			Status			
No.	Major Task\Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7			
1	Career Day Planning																					Complete	
2	Web Site Development & Deployment																				Complete		
3	Career Day Implementation																			Complete			
4	Design & Development of Simulation Kits																				Complete		
5	Fabricate Simulation Kits																					Complete	
6	Development of Training Program																						Complete

**Figure 1:** Current Status for the Major SBRCD Activities

## 1. Gulf Coast Career Day Event

The first Shipbuilding and Repair Career Day Event was held in Mississippi Gulf Coast Community College (MGCCC), Gautier, Mississippi on January 17, 2008. It offered an educational and fun-filled environment for middle and high school students to learn about various career options in shipbuilding and repair. It also provided school counselors and teachers a realistic picture of shipbuilding and repair industry. The event was held from 8.00am till 3.00pm. About 400 students and 35 teachers from different schools in Mississippi and Alabama participated in this daylong event. The list of schools that participated in the event is attached in Appendix A.

The career day event was divided into three major activities: 1) Industry Expo 2) Hands on Activity and 3) Shipyard Tours.

#### **a. Industry Expo:**



The purpose of this expo was to give students a chance to interact with the shipbuilding and repair industry professionals. This event was held in the lecture hall of Warner Peterson Building at MGCCC. Shipbuilding and repair companies, educational institutes and Government organizations displayed information about their products and services and

offered advice about career paths, salaries, and educational programs in this field. Among the industry participants were Northrop Grumman Shipbuilding (formerly NGSS), Alabama Fluid Systems, Bollinger Shipyard Inc., Hiller Systems, Atlantic Marine, Bender Shipbuilding and Repair Company, Trinity Yachts, VT Halter Marine; while Bishop Community College and Mississippi Gulf Coast Community College represented educational institutes. Two government agencies, Maritime Administration (MARAD) and Occupational Safety and Health Administration (OSHA) also participated in this event.

Students talked to Industry professionals about their products, services and career opportunities and got their event passport stamped.

The layout for Industry Expo is attached in Appendix B.

#### **b. Hands-on Activities:**

This activity was designed to give students first-hand experience about various processes used in the shipbuilding and repair industry. This event was held in the Health Physical and Aquatic Education Building (Gym) at MGCCC.

The list of hands – on activities and the company that conducted it is as follows:



- |                         |                                  |
|-------------------------|----------------------------------|
| 1. Bollinger Shipyards  | Welder Inspection Station        |
| 2. Trinity Yacht        | Pipe Fitter Station              |
| 3. Atlantic Marine Inc. | Ship Fitter / Fabricator Station |
| 4. Atlantic Marine Inc. | Rigging Station                  |

- |     |                      |                                      |
|-----|----------------------|--------------------------------------|
| 5.  | Signal International | Machinist Station                    |
| 6.  | Signal International | Dimension Control Technician Station |
| 7.  | NGSS                 | Electrical Station                   |
| 8.  | NGSS                 | Hull / Ship Fitter Station           |
| 9.  | NGSS                 | Sheet Metal Station                  |
| 10. | NGSS                 | Composites Station                   |
| 11. | Hiller Systems       | Pipes and Valves                     |

Hands-on activities gave students insight about various important processes involved in shipbuilding and repair. Each student completed at least 6 activities and got their event passport stamped.

The description and layout for Hands-on activities is attached in Appendix B.

**c. Shipyard Tours:**

The tours of the working shipyards were designed to give students realistic idea about different departments and working conditions in the shipyards. The students were taken to the working shipyards. Northrop Grumman Shipbuilding (formerly NGSS) and Signal International conducted the tours throughout the day. Shipyard tour layout is attached in Appendix B.

**d. Food Arrangements for students and other participants:**

Lunch was served for 400 students and their teachers and counselors attending the career day event. Lunch included a 6-inch subway sandwich and a canned drink. The lunch was also served to the industry expo exhibitors and hands-on activities volunteers.

**2. Hampton Roads Career Day Event**

The Shipbuilding and Repair Career Day Event was held in the Ted Constant Convocation Center at the Old Dominion University on February 21, 2008. It offered an educational and fun-filled environment for middle and high school students to learn about various career options in shipbuilding and repair. The event was held from 8.00 am till 3.00 pm. About 600 students and 50 teachers from different schools in Virginia and North Carolina participated in this daylong event. The list of schools that participated is attached in Appendix C.

The career day event was divided into three major activities: 1) Industry Expo 2) Hands on Activity and 3) Shipyard Tours.

**a. Industry Expo:**

The purpose of this expo was to give students a chance to interact with the shipbuilding and repair industry professionals. This event was held in the front lobby of the Ted Constant Convocation Center.



Shipbuilding and repair companies, educational institutes and Government organizations displayed information about their products and services, career paths, salaries, and educational opportunities in this field. Among the industry participants were Northrop Grumman Shipbuilding (formerly NGNN and NGSS), Colonna's

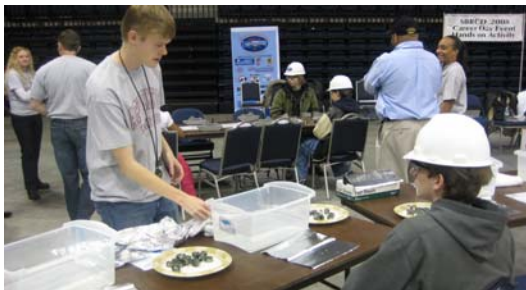
Shipyards Inc., BAE Systems Shipyards, METRO Machines, MHI, Earl Industries and Technico; while Old Dominion University College of Engineering, Tidewater Community College (TCC), Ship Maintenance and Repair Organization at ODU (SMRO) and NGNN Apprentice School represented educational institutes. Amongst the professional organizations and government agencies were American Society for Naval Engineers (ASNE), Mid Atlantic Maritime Institute, Maritime Administration (MARAD) and Occupational Safety and Health Administration (OSHA).

Industry Expo also included Remotely Operated Virtual Reality (ROVR) demonstration. ROVR provided students a virtual tour of sections of a ship. ROVR is a hi-tech tool used in ship design where designers can visualize their design in 3 dimensional environments using virtual reality.

Students talked to Industry professionals about their products, services and career opportunities and got their event passport stamped.

The layout of Industry Expo is attached in Appendix D.

#### **b. Hands-on Activities:**



This activity was designed to give students hands on experience on various processes used in the shipbuilding and repair industry. This event was held in the center arena of the Ted Constant Center at Old Dominion University.

All the hands-on-activities were organized and conducted by Northrop Grumman Shipbuilding, Newport News. The list of hands-on activities is given below.

1. Rigging Station
2. Machinist Station



3. Sheet Metal Station
4. Welder Inspection Station
5. Non Destructive Testing Station
6. Pipe Fitter Station
7. Ship Fitter / Fabricator
8. Electrical Station
9. Design Project Station
10. Dimensional Control Station

Northrop Grumman apprentices conducted all the hands-on activities for this event. Hands-on activities gave students insight about various important processes involved in shipbuilding and repair. Students were required to complete at least 6 activities and get their event passport stamped after completing each activity. The hands-on activities guided students through the real-life tasks and tested their practical knowledge. The description and layout for Hands-on activities is attached in Appendix D.

**c. Shipyard Tours:**

The tours of the working shipyards were designed to give students realistic idea about different departments and working conditions in the shipyards. The students were taken on the guided tours of the Colonna's Shipyard Inc or BAE Systems Shipyard in Norfolk. Students visited different departments such as machine shop, fabrication shop, trade activities, dry dock etc. to see the actual shipbuilding activities going on the shop floor.



The students were guided by the volunteers from two shipyards. The shipyard tour layouts are attached in Appendix D.

**d. Food Arrangements for students and other participants:**

Lunch was served to all 600 students and approximately 50 teachers attending the event. Pizza and soft drinks were served to students and teachers and also to the industry expo and hands-on-activities volunteers.

### **3. Pre and Post Event Surveys**

To measure the impact of the career day event students were given pre-event and post-event attitudinal surveys to fill out. The pre and post questionnaires along with results are attached in Appendix E.

#### **a. Results from Gulf Coast Career Day Event**

The results for the Gulf Coast Career Day are attached in Appendix F.

The general comparison of the pre and post event surveys clearly indicated the lack of knowledge amongst the middle and high school students about the shipbuilding and repair industry and also about the career paths in this industry. Higher positive responses in the post event survey indicate the positive impact of the program. The responses to all five questions show a differential of 12%-23%.

Students seem to agree that shipbuilding and repair industry offers high paying jobs after attending the event. An increase, though marginal can be seen in the responses for questions 6 and 7 where students were asked about the possibility of following careers in shipbuilding and repair.

#### **b. Results from Hampton Roads Career Day Event**

The results for the Hampton Roads Career Day are attached in Appendix F.

The general comparison of the pre and post event surveys clearly indicated the lack of knowledge amongst the middle and high school students about the shipbuilding and repair industry and also about the career paths in this industry. Higher positive responses in the post event survey indicate the positive impact of the program. The responses to all five questions show a differential of 13%-50%.

Significant increase can be seen in the positive responses for questions 6 and 7 where students were asked about their chances of taking up shipbuilding and repair as a career.

### **4. Career Day Event Evaluations**

In addition to assessing the change in attitude about shipbuilding and repair industry, students were asked to evaluate the Career Day Event for practical learning, effectiveness etc. The questionnaire is attached in Appendix G.

#### **a. Gulf Coast Career Day Event**

The average “strongly agree” response percentage is 45.1 and that for the “agree” responses is 31. So, more than 76% of the respondents felt that the event was well organized and provided first hand experience about processes used in shipbuilding and various job opportunities and career paths available in the industry.

**b. Hampton Roads Career Day Event:**

The average “strongly agree” response percentage is 47.4 and that for the “agree” responses is 25.72. So, more than 72% of the respondents felt that the event was well organized.

**5. Career Day Event Schedule**

**a. Gulf Coast Career Day Event:**

Figure 2 shows the schedule for the Career Day Event in the Gulf Coast.

SBRCD- Career Day Event - January 17, 2008				
Mississippi Gulf Coast Community College, Gautier, MS				
Schedule				
Time	HANDS ON	EXPO	TOUR	
			Signal	NGSS
8.30 am -10 am	Gautier High School (65)	T. L. Faulkner Career Tech (50)		Moss Point Vo-tech (100)
	E.H Keys Technology Center (24)	Magnolia Jr (40)		
	<b>Total</b>	<b>89</b>	<b>90</b>	<b>100</b>
10am -11.30am	Moss Point Vo-tech (100)	Gautier High School (65)	Vancleave Highschool (65)	
	Magnolia Jr (40)	E.H Keys Technology Center (24)	Jackson County Technology Center (15)	T. L. Faulkner Career Tech (50)
	Covington county Vo-Tech (15)	Bryant Career Tech Center (15)		Sandy Falgout (20)
		Adams Middle School, Al (50)		
	<b>Total</b>	<b>155</b>	<b>154</b>	<b>80</b>
11.30am-1.00pm	Vancleave Highschool(65)	Moss Point Vo-tech (100)	E.H Keys Technology Center (24)	Gautier High School (65)
	T. L. Faulkner Career Tech (50)	Covington county Vo-Tech (15)	Bryant Career Tech Center (15)	
	Jackson County Technology Center (15)	Sandy Falgout (20)	Magnolia Jr (40)	
	Adams Middle School, Al (50)			
	<b>Total</b>	<b>180</b>	<b>135</b>	<b>79</b>
1.00pm-2.30pm	Bryant Career Tech Center (15)	Jackson County Technology Center (15)	Covington County Vo-Tech (15)	
	Sandy Falgout (20)	Vancleave Highschool (65)	Adams Middle School, Al (50)	
	<b>Total</b>	<b>35</b>	<b>80</b>	<b>65</b>

**Figure 2 Gulf Coast Career Day Event Schedule**

A detailed schedule was prepared to smoothly rotate more than 400 students and teachers through three areas: Hands-on activities, Industry Expo and Shipyard Tours. Schools were scheduled in four different time slots starting at 8:30 in the morning. Any



special requirements of the schools about preferred time slots, like early arrival / early departure due to traveling distances, were taken care of while scheduling the event.

Each school group along with their teachers was given a short orientation of the event by the SBRCDD team. Each participating student was given a hard hat and a draw-string bag along with the event passport. Then each group was escorted by a volunteer through hands-on activities and industry expo. Local industry professionals volunteered for this event.

## b. Hampton Roads Career Day Event

Figure 3 shows the schedule for the Hampton Roads Career Day Event.

**SBRCDD- Hampton Roads, February 21 2008**  
Schedule

Time	HANDS ON Ted Main Arena	EXPO Ted Lobby	TOUR	
			Colonnas	BAE
8.30 am -9.45 am	Suffolk public schools (50)	I. C. Norcom High School (10)		VB Technical and Career education center (30)
		Norfolk Public High School (83) -arriving at 9.00		
	Total	93		30
9.45am - 11.00am	King's Fork Middle School (17)	Isle of Wright (40)	Syms Middle School (80)	Suffolk public schools (50)
	King's Fork Middle School (7)	Sussex Central Middle School (17)	Forest Glen Middle School ( 49)	Advanced Technology Center (40)
	King's Fork Middle School (13)	Sussex Central Middle School (10)		I. C. Norcom High School (10)
	King's Fork Middle School (10)	Southeast Halifax High School (20)		
	VB Technical and Career education center (30)	Churchland High School( 42)		
	Mathews High School (35)			
	Norfolk Public High School (83)			
	Total	129	129	100
11.00am - 12.15pm	Syms Middle School (80)	VB Technical and Career education center (30)	King's Fork Middle School (17)	Southeast Halifax High School (20)
	E. W. Wyatt Middle School (30)	Mathews High School (35)	King's Fork Middle School (7)	Norfolk Public High School (83)
	Advanced Technology Center (40)	Suffolk public schools (50)	King's Fork Middle School (13)	
	Churchland High School( 42)	Gloucester High School (40)	King's Fork Middle School (10)	
	I. C. Norcom High School (10)	Forest Glen Middle School ( 49)	Sussex Central Middle School (17)	
			Sussex Central Middle School (10)	
			Isle of Wright (40)	
	Total	204	114	103

12.15pm-1.30pm	Southeast Halifax High School (20)	King's Fork Middle School (17)	Churchland High School (42)	Mathews High School (35)
	Gloucester High School (40)	King's Fork Middle School (7)		E. W. Wyatt Middle School (30)
	Forest Glen Middle School (49)	King's Fork Middle School (13)		
	Isle of Wright (40)	King's Fork Middle School (10)		
	Sussex Central Middle School (17)	Syms Middle School (80)		
	Sussex Central Middle School (10)	Advanced Technology Center (40)		
Total	176	167	42	65
1.30pm-3.00pm		E. W. Wyatt Middle School (30)	Gloucester High School (40)	
Total		30	40	

Lunch Timing	
Time	Schools
11.00 am	VB Technical and Career education center (30)
	Norfolk Public High School (80)
	Churchland High School (42)
11.45 am	Mathews High School (35)
	Advanced Technology Center (40)
12.15 pm	Suffolk public schools (50)
	I. C. Norcom High School (10)
	King's Fork Middle School (17+7+10+13)
	Isle of Wright (40)
1.00 pm	Syms Middle School (80)
1.30 pm	Southeast Halifax High School (20)
	Gloucester High School (40)
	Forest Glen Middle School (49)
	E. W. Wyatt Middle School (30)
	Sussex Central Middle School (17)
	Sussex Central Middle School (10)

**Figure 3 Hampton Roads Career Day Event Schedule**

A detailed schedule was prepared to smoothly rotate more than 600 students and teachers through three areas: Hands-on activities, Industry Expo and Shipyard Tours. Schools were scheduled in four different time slots starting at 8:30 in the morning. Any special requirements of the schools about preferred time slots, like early arrival / early departure due to traveling distances, were taken care of while scheduling the event.

Each school group along with their teachers was given a short orientation of the event by the SBRCD team. Each participating student was given a hard hat and a draw-string bag along with the event passport. Then each group was escorted by a volunteer through hands-on activities and industry expo. Old Dominion University students volunteered for this event.



## 6. Industry Sponsors for the Gulf Coast and Hampton Roads

In order to increase the impact of SBRC D project, the technical team decided to extend the original number of participating students from 300 to 400 in the Gulf Coast and to 600 in the Hampton Roads area. The technical team decided to raise funds through the corporate sponsorships. Sponsorship money was used to cover the cost of additional hard hats, bags, lunches, T – shirts for volunteers and additional simulation kits. Six industry sponsors supported the Gulf Coast event and seven for the Hampton Roads event. The sponsors are listed in the table in Appendix H.

## 7. Design and Development of Simulation Kits

Four simulation kits related to shipbuilding and repair activities were developed. The original proposal included development of only two simulation kits. Two additional simulations were developed to address teachers' request for open-ended problems. These additional activities included ship stability simulation and ship disaster investigation simulation.

- a) **Shipyard Operation Simulation** simulates operations within a shipyard. During this activity, students learn how various work stations like Plasma cutting, bending and welding work together to build a ship. Students use card stock paper to design and build a container ship. This simulation demonstrates modular construction of a ship and targets multiple standards of Learning in math and science.
- b) **Ship Construction Simulation** simulates construction of a ship through successful project management. The middle school simulation involves construction of a clipper ship and high school simulation involves construction of a submarine. During the simulation, students learn about bill of material, sales tax, labor cost, inventory cost and project management.
- c) **Ship Stability Simulation** teaches students about basic scientific principles involved in the design and operation of a ship. It involves the understanding of center of gravity, center of buoyancy, Archimedes Principle and effect of salinity on ship's buoyancy. Students use a foam hull model to experiment with the buoyancy of ship.

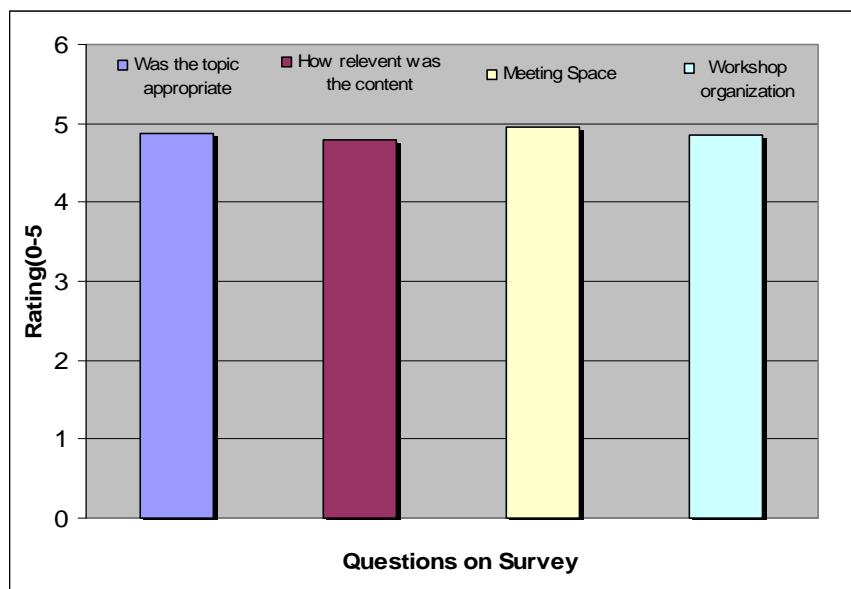
- d) **Ship Disaster Investigation** simulation involves ship disaster case studies. Students play the roles of Ship Disaster Investigation Agency (SDIA) agents and analyze the reasons for ship disaster. They identify possible causes behind the disaster. In this open ended problem, students must use the scientific principles learnt in the previous three simulation activities. Students work in groups to collaboratively learn about fundamentals of ship design, ship loading, terminology used in the shipbuilding and shipping industry and the best practices followed in ship design, construction and shipping.

All documents related to the simulations and associated training programs have been updated on the website. One-page summaries of all the four simulation activities are also provided in Appendix I.

## 8. Counselor and Teacher Workshops

Counselor and teacher workshops for the Gulf Coast were successfully conducted on September 14 and 15 at the Mississippi Gulf Coast Community College, Jackson county campus in Gautier, Mississippi. Thirty four counselors, fourteen teachers, two industry representatives and one government representative (MARAD) attended the workshops. The purpose of the workshops was to make counselors and teachers excited about the project and to train them in the use of the simulation activities. Twenty five high school and fourteen middle school kits were given to teachers and counselors. The list of attendees is provided in Appendix J.

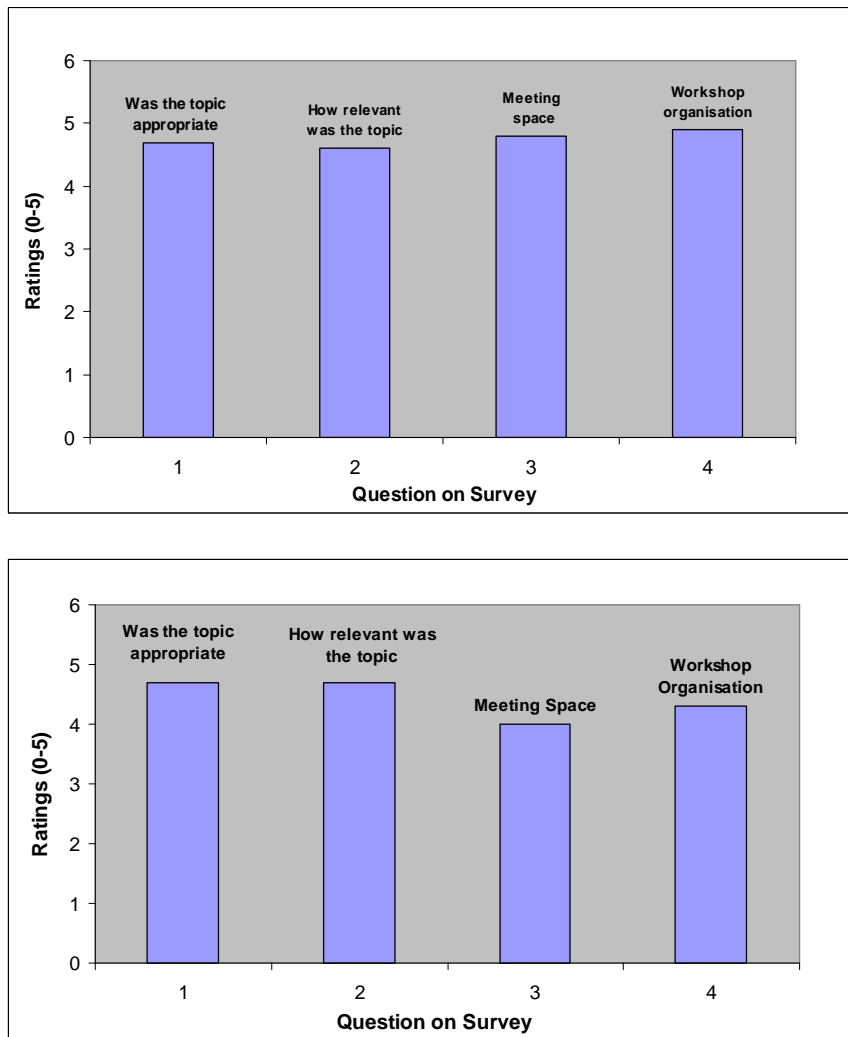
Figure 4 shows the participant response from the counselor workshop conducted in Gautier, MS on a scale of 0-5, 5 being excellent. Average response for all questions on the survey is 4.8/5.0 or higher.



**Figure 4:** Gulf Coast Counselor Workshop Response

Counselor and teacher workshops within the Hampton Roads area were successfully conducted on October 12 and 13 at the Webb Center, Old Dominion University, Norfolk, Virginia. Nineteen counselors, twenty seven teachers, four industry representatives attended the workshops. The purpose of these workshops was to make counselors and teachers excited about the project and to train them in the use of the simulation activities. Twenty five high school and fourteen middle school kits were given to teachers and counselors. The list of attendees is provided in Appendix K.

Figure 5 shows the participant response from the teacher workshop conducted in Norfolk, VA on a scale of 0-5, 5 being excellent. Average response for all questions on the survey is 4.75/5.0 or higher. Figure 4 shows response from the counselor workshop averaging 4.3 / 5.0 or higher.



**Figure 5: Hampton Roads Counselor Workshop Response**



## 9. Technology Transfer

### a. SBRCD Website



**Figure 6:** SBRCD Website Homepage

The SBRCD Website can be found at the following web link:

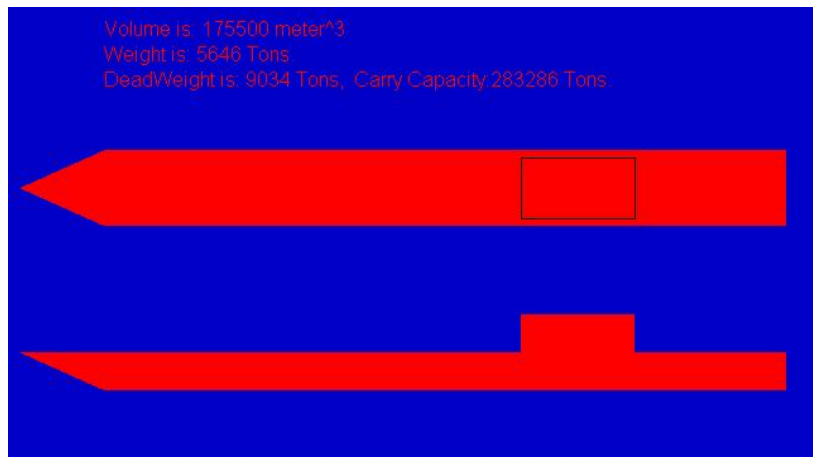
<http://www.lions.odu.edu/~averma/sbrcd/SBRCDIndex.htm>

Figure 6 shows home page of the SBRCD website. This website contains separate sections for students, industries and teachers-counselors. Figure 7 shows the various information available on the website within each section.

Students	Teachers / Counselors	Industry
<ul style="list-style-type: none"><li>• Information about Career Day Event</li><li>• Information on Hands-on Activities</li><li>• Information on Shipyard Tours</li><li>• Career Links</li><li>• Online Simulation</li></ul>	<ul style="list-style-type: none"><li>• Information about Career Day Event</li><li>• Information about Workshops</li><li>• Downloadable Simulation Activity Documents</li><li>• Flyers and One Page Simulation Summaries</li></ul>	<ul style="list-style-type: none"><li>• Information about Career Day Event</li><li>• Sponsorship Information</li><li>• Online Registration</li><li>• Flyers, Posters and One Page Simulation Summaries</li></ul>

**Figure 7:** Information Available on SBRCD Website





**Figure 8:** Container Ship Design Activity

The web site also includes an interactive experience for students in ship design as shown in figure 8. Students design a container ship by specifying various design parameters and the web site provides a way for them to test the validity of their design. This website also provides information about the project along with the flyers for students and industry. The meeting schedules, meeting minutes and reports are also available on this website. Registration forms for the participating schools, industry, and teachers and counselors are available on this website for the Career Day Events and workshops. Information about the simulation kits has also been posted on the website.

### **b. Advertisements in the Local Media**

A black and white advertisement, 2 columns x 3 inch in size was published in the local newspapers. This advertisement ran on Friday during the week prior to the career day event; and on Monday and Wednesday during the week of the career day event. SBRCD team worked with the sales department of the local newspapers to finalize the advertisements. Figure 7 shows the advertisements that appeared in the local media.

Advertisements for the Gulf Coast appeared in the following news papers:

1. Sun Herald
2. Mississippi Press
3. Mobile Register

These advertisements ran on 12/21/07

Advertisements for the Hampton Roads appeared in the following papers:

1. Virginian Pilot
2. Daily Press

These advertisements ran on 01/17/08

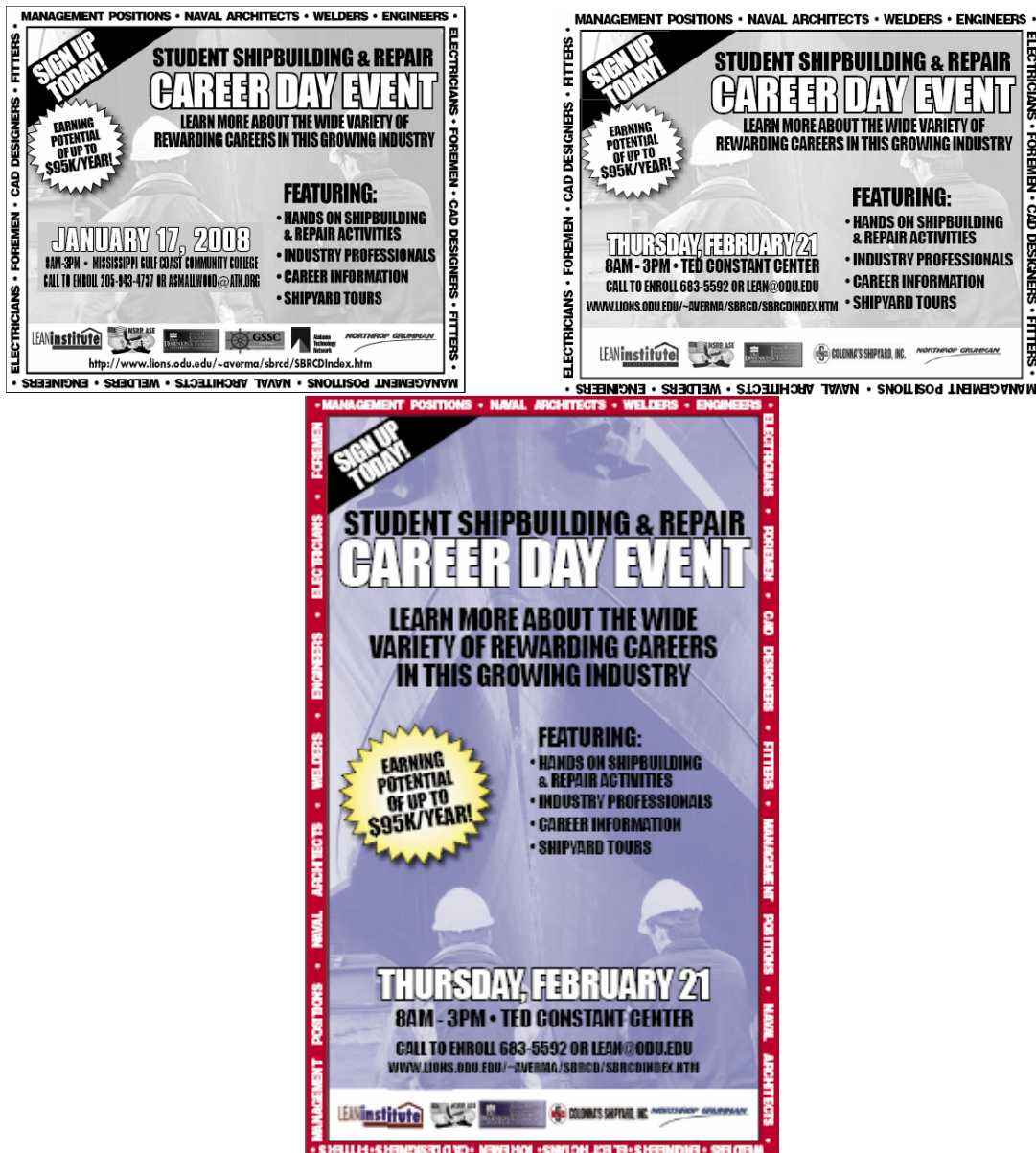


Figure 7: SBRCD Advertisements

### c. Presentations at Conferences/Workshops

Information about SBRCD project and results were presented at the following conferences:

“Marine Kits- Promoting Inquiry Based Learning in Introduction to Engineering Class.” Alok K. Verma, Presented at the LAI Ed Net Educators Conference, Boston, MA, April 24-25, 2008.

“Shipbuilding and Repair Career Day Event and SBRC D Project.” Alok K. Verma Presented at the HRQMC workshop hosted by Lean Institute, Old Dominion University, Norfolk, VA, February 14, 2008.

“Shipbuilding and Repair Career Day Event and SBRC D Project.” Alok K. Verma Presented at the Teacher Workshop, Old Dominion University, Norfolk, VA October 13, 2007.

“Shipbuilding and Repair Career Day Event and SBRC D Project.” Alok K. Verma Presented at the Counselor Workshop, Old Dominion University, Norfolk, VA October 12, 2007.

“Shipbuilding and Repair Career Day Event and SBRC D Project.” Alok K. Verma, Presented at the Teacher Workshop, MGCCC, Gautier, MS, September 15, 2007.

“Shipbuilding and Repair Career Day Event and SBRC D Project.” Alok K. Verma, Presented at the Counselor Workshop, MGCCC, Gautier, MS, September 14, 2007.

“Improving Ship Building & Repair Career Awareness among Middle and High School Students via Simulations (SBRC D Project).” Alok K. Verma, Presented at the LAI Ed Net Summer Workshop, Boeing Headquarters, Chicago, IL, July 29-Aug 1, 2007.

“Enhancing Student Learning in Engineering Technology Programs – A Case for Physical Simulations.” Alok K. Verma, Proceedings of the ASEE Annual Conference, Honolulu, HI, June 24-27, 2007.

“Improving Shipbuilding and Repair Workforce through Career Day Events.” Alok K. Verma and Carol Considine, Presented at the LAI Plenary Conference, Cambridge, MD, April 18, 2007.

“Shipbuilding and Repair Career Day Events Organized by Lean Institute at ODU.” Alok K. Verma, Presented at the Maritime & Transportation Center Summit, TCC, Portsmouth, VA, April 4, 2007.

“Shipbuilding and Repair Career Day Events.” Alok K. Verma, Presented at the Lean Academic Network Meeting at the Shingo Prize Conference, Jacksonville, FL, March 27, 2007.

## **10. Realized Benefits to Industry and Navy**

SBRCDD has produced long term cost savings for the US Navy by creating a large pool of middle and high school students who view the shipbuilding and repair industry in a favorable light. Some of these students will choose shipbuilding as a career path and will fill the critical need in the workforce for this industry in the future. The SBRCDD project has established a pipeline for the future workforce.

SBRCDD has provided a single venue to answer all career related questions for students, counselors, and teachers. By bringing together all players at a single event, it has provided an efficient and cost effective method to focus the recruitment effort for the shipbuilding and repair industry as a group. It has introduced students and teachers to marine science principles and shipyard operations via project based learning activities. It has also provided opportunities for students and teachers to interact with industry professionals.

In summary the expected benefits include:

1. Reduced cost of recruitment and retention for shipyards
2. Larger pool of qualified candidates
3. Established pipeline for future recruitment
4. A student population that is better informed about shipyard operations.
5. Students knowledgeable about careers in the shipbuilding and repair industry.
6. Enhanced collaboration between various shipbuilding and repair companies for recruitment and retention.
7. Enhanced image of the shipbuilding and repair industry among the general public.
8. Schools, teachers, counselors that view shipbuilding and repair in a favorable sight.

It is important to sustain this effort and replicate it in the other major shipbuilding areas. Continued implementation of SBRCDD Career Day Events will lead to long-term reduction in the cost of recruitment and retention.

## **11. Project Summary**

The SBRCDD project was a great success. Work on the web site design and deployment, design of flyers, design of advertisements, development of simulation kits and associated training programs was completed on schedule without any problems. The success of SBRCDD events has encouraged organizers, industry partners to organize a similar event next year. The workshops for the counselors and teachers were conducted successfully at Mississippi Gulf Coast Community College, Gautier Mississippi and at Old Dominion University, Norfolk, Virginia. The workshop review comments and evaluations from both teachers and counselors were excellent. Two Career Day Events were held successfully in Gulf Coast and Hampton Roads. Target enrollments for both the events were not only met but exceeded. Pre and post survey results indicate a positive impact on the participating students. In addition, evaluations from both of these events

indicate that students enjoyed participating in all three components of the event. Comments from teachers have been very positive. In summary, the SBRCDD project has been completed successfully and we would like to thank the executive control board of the NSRP for funding the project and ATI for successfully managing the project. We will continue the critical task of workforce development to make the industry globally competitive.

**Appendices:**

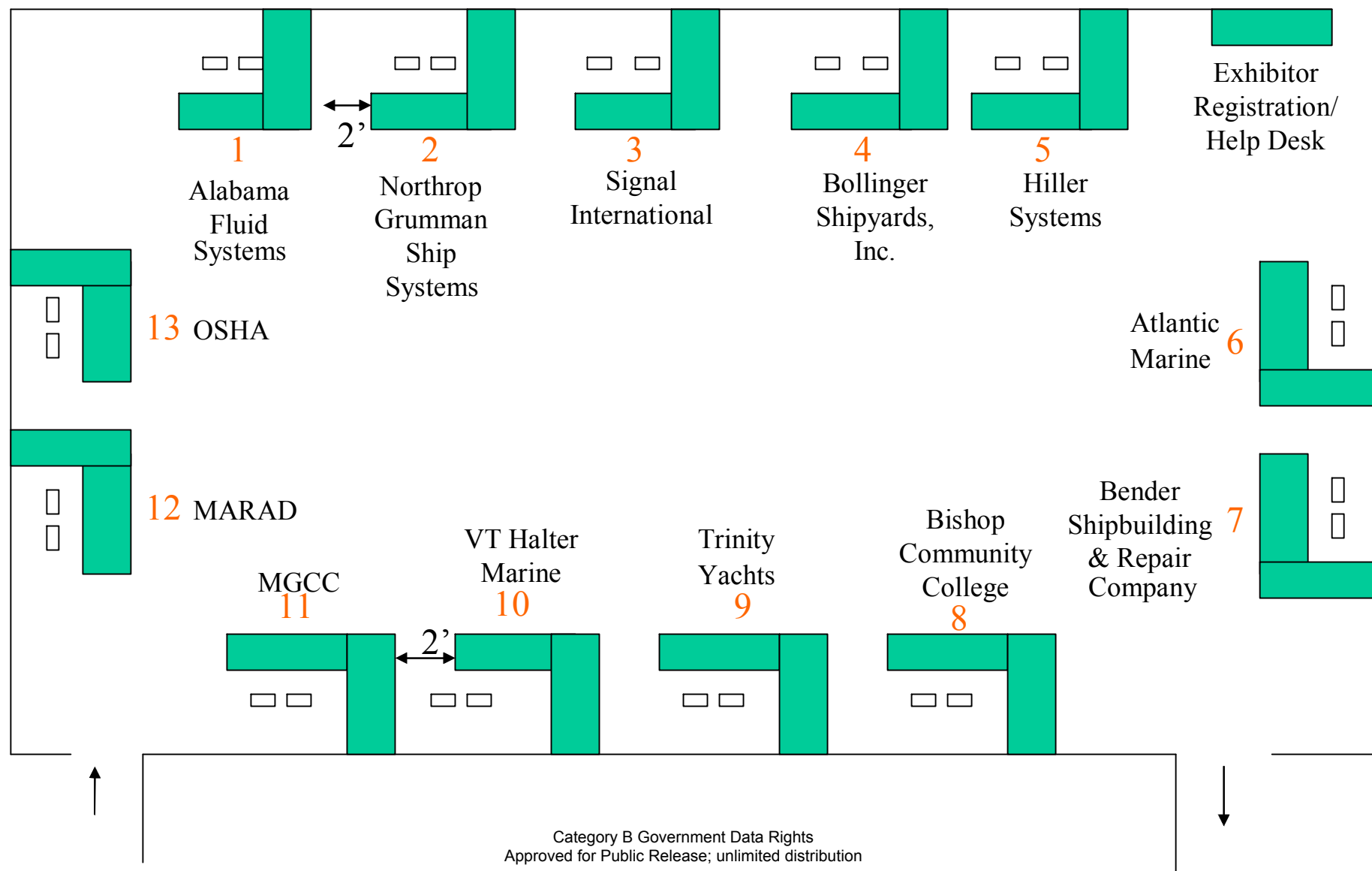
- A. List of Participating Schools – Gulf Coast
- B. Layout of Hands-on Activities, Industry Expo and Shipyard Tours – Gulf Coast
- C. List of Participating Schools - Hampton Roads
- D. Layout of Hands-on Activities, Industry Expo and Shipyard Tours - Hampton Roads
- E. Pre and Post Questionnaires with Results
- F. Results of Attitudinal Survey
- G. Results of Student Evaluations
- H. List of Industry Sponsors
- I. One Page Summaries of Simulations
- J. List of Attendees: Teachers and Counselors Workshops

## Gulf Coast Career Day Event Student Registration

Sr.No.	School	No. of Students	Contact	Title	email	Phone
1	Adams Middle School, Al	30	Tammera Carbo		<a href="mailto:tmcarbo@mcpss.com">tmcarbo@mcpss.com</a>	2512212000
2	Covington county Vo-Tech, MS	15	Laura Cameron	Counselor	<a href="mailto:lubroom@hotmail.com">lubroom@hotmail.com</a>	601-765-8253
3	Jackson County Technology Center	10	Kim Aflague	Counselor	<a href="mailto:kaflague@jaco.k12.ms.us">kaflague@jaco.k12.ms.us</a>	228-826-5944
4	Moss Point Vo-tech	100	Carol Redding	Counselor	<a href="mailto:clredding@mp.k12.ms.us">clredding@mp.k12.ms.us</a>	228-474-1455
5	Gautier High School	65	Bill Massey	Career Center Technician	<a href="mailto:bmassey@psd.k12.ms.us">bmassey@psd.k12.ms.us</a>	228-52208790
6	Vancleave Highschool	21	Helen Fletcher	Counselor	<a href="mailto:hfletcher@jaco.k12.ms.us">hfletcher@jaco.k12.ms.us</a>	228-826-0920
7	E.H Keys Technology Center	24	Linda Pasgushi	Counselor	<a href="mailto:lpasquini@ossd.k12.ms.us">lpasquini@ossd.k12.ms.us</a>	228-872-3411
8	Magnolia	40				
9	Bryant Career Tech Center	20	Glenn Lowery	Welding Instructor	<a href="mailto:glowery@mcpss.com">glowery@mcpss.com</a>	251-957-2845
10	Adams Middle School, Al	50	Corliss Wilcher	teacher	<a href="mailto:cwilcher@mcpss.com">cwilcher@mcpss.com</a>	251-455-9629
11	T. L. Faulkner Career Tech	50	Sharon Hornsby	Counselor	<a href="mailto:schornsby@mcpss.com">schornsby@mcpss.com</a>	2512215431
		425				



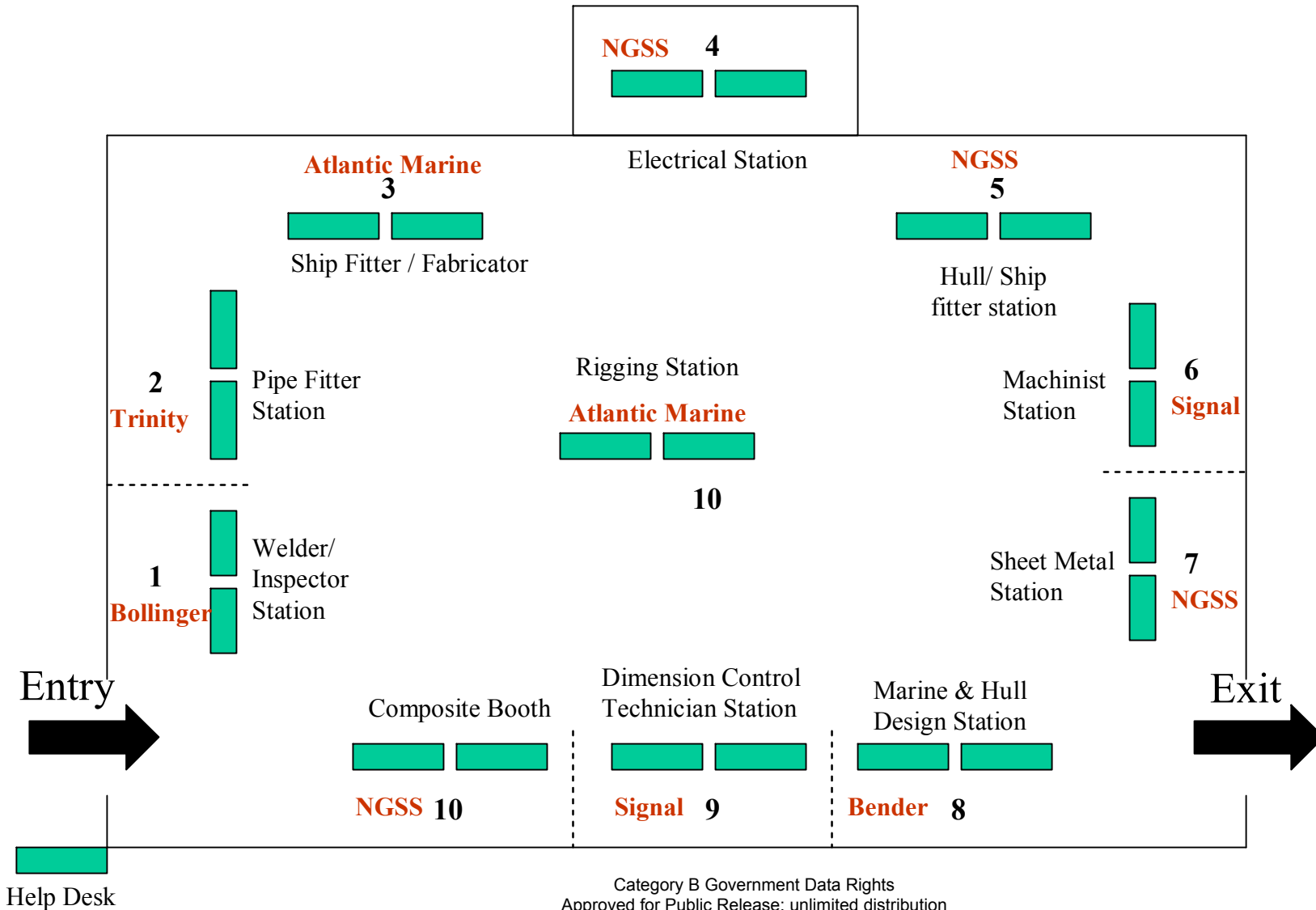
# Layout for Expo Area at MGCCC WPB Lecture Hall



# SBRCDC - Gulf Coast Hands on Activities Layout

APPENDIX B

## Health Physical and Acquatic Education Bldg.- (GYM) - MGCCC



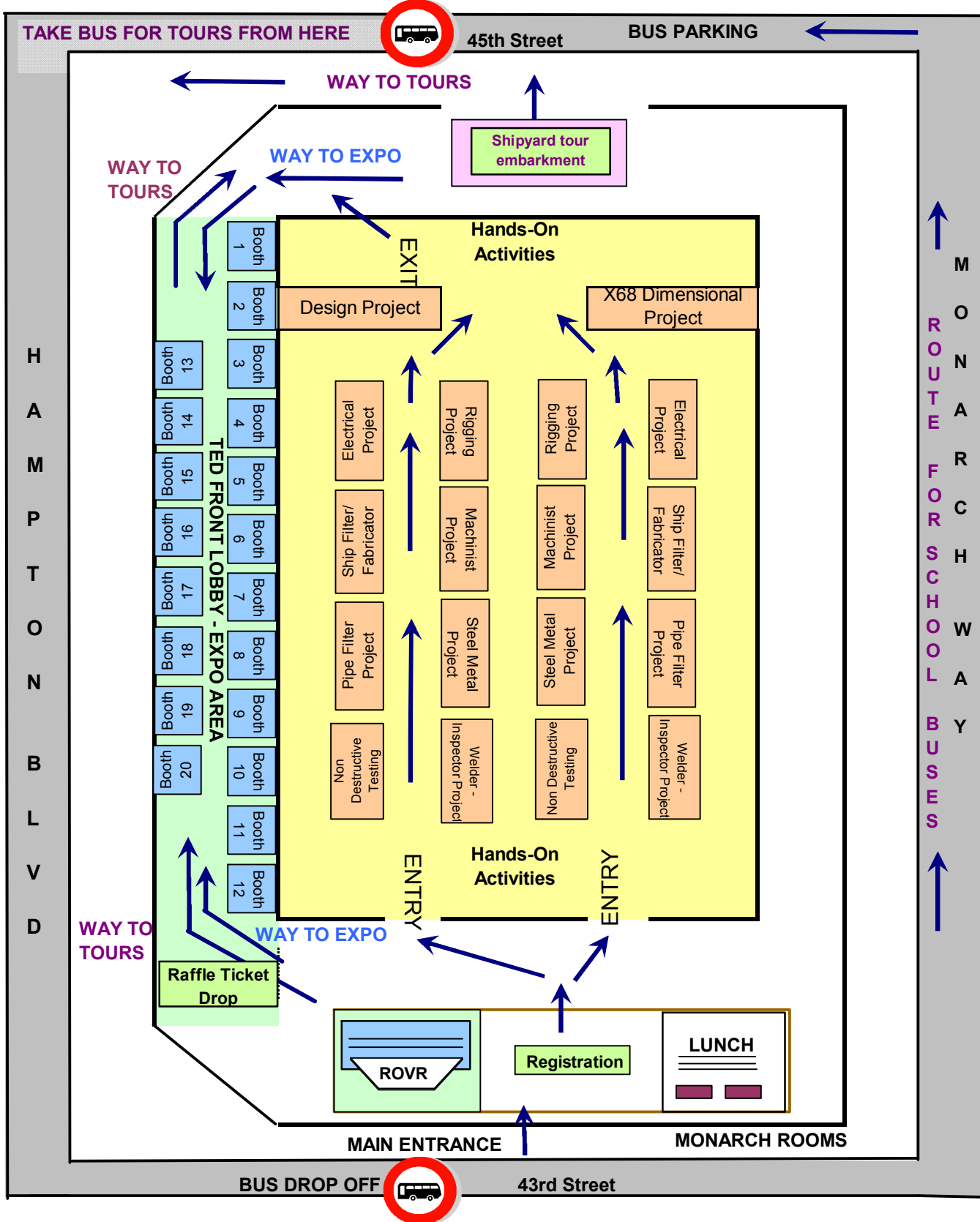


1 - Land Based Test Facility	12 - Bays/Integration Area
2 - Wheelabrator	13 - Goliath
3 - Panel Shop	14 - Pontoon
4 - Covered Slab Area	15 - Wet Dock Building
5 - Shell Shop	16 - Metal Processing Plant
6 - Steel Fab Shop	17 - Combination Shops
7 - Hospital	18 - Warehouses
8 - Component Packing Area	19 - Maintenance
9 - Outfitting Hall	20 - Blast and Paint Hall
10 - PC Central	21 - Thermal Coating Facility
11 - Stacking Hall	

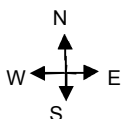
## Hampton Roads Career Day Event Student Registration

Sr.No.	School	No. of Students	Contact	Title	email	Phone
1	Sussex Central Middle School	10	Shawnrell Blackwell	Asst. Principal	<a href="mailto:sblackwell@sussex.k12.va.us">sblackwell@sussex.k12.va.us</a>	434-246-2251
2	Syms Middle School	100	Mr. Jawaun Wheaton	Counselor	<a href="mailto:jwheaton@sbo.hampton.k12.va.us">jwheaton@sbo.hampton.k12.va.us</a>	757-850-5050
3	King's Fork Middle School	17	Barbara Edwards	Teacher	<a href="mailto:baredwards@spsk12.net">baredwards@spsk12.net</a>	757-923-5246
4	King's Fork Middle School	7	Mary K. Rollins	Teacher	<a href="mailto:marrollins@spsk12.net">marrollins@spsk12.net</a>	757-923-5246
5	Southeast Halifax High School	20	Broderick Ward	Teacher	<a href="mailto:wardb@se.halifax.k12.nc.us">wardb@se.halifax.k12.nc.us</a>	252-445-2027
6	King's Fork Middle School	7	Ms. Joyce Baker	Special Ed Teacher	<a href="mailto:JoyBaker@spsk12.net">JoyBaker@spsk12.net</a>	757-923-5246
7	Forest Glen Middle School	34	Maryland Roberts	CHROME Club Sponsor	<a href="mailto:marroberts@spsk12.net">marroberts@spsk12.net</a>	757-925-5780
8	Gloucester High School	15	Susan Maria Emory			
9	Sussex Central Middle School	17	Alvina Matthews	Counselor	<a href="mailto:amatthews@sussex.k12.va.us">amatthews@sussex.k12.va.us</a>	434-246-2251
10	Mathews High School	35	Renee Johnson	Counselor	<a href="mailto:rjohnson@mathews.k12.va.us">rjohnson@mathews.k12.va.us</a>	804-725-3702
12	Suffolk public schools	23	Christine Lafferty			
13	Churchland High School	26	Aaron Russell		<a href="mailto:aaron.russell@pps.k12.va.us">aaron.russell@pps.k12.va.us</a>	
15	I. C. Norcom High School	12	Mary White	Teacher	<a href="mailto:MARY.G.WHITE@PPS.K12.VA.US">MARY.G.WHITE@PPS.K12.VA.US</a>	(757) 393-5442
16	King's Fork Middle School	10	Calvin Hart		<a href="mailto:calhart@spsk12.net">calhart@spsk12.net</a>	757-923-5246
18	E. W. Wyatt Middle School	28	Helena Henson	Guidance Counselor	<a href="mailto:hhenson@gcps1.com">hhenson@gcps1.com</a>	434-634-5150
19	Newport News Public Schools	0	Eleanor Blowe	Instructional Supervisor-Career and Technical Education	<a href="mailto:eleanor.blowe@nn.k12.va.us">eleanor.blowe@nn.k12.va.us</a>	757-591-4577
20	Newport News School Board Office	0	Barbara Smith-White	CTE Instructional Supervisor	<a href="mailto:barbara.smithwhite@nn.k12.va.us">barbara.smithwhite@nn.k12.va.us</a>	757-591-4567
21	Virginia Beach Technical and Career Education Center	31	James Jones	Welding Teacher	<a href="mailto:JamesC.Jones@vbschools.com">JamesC.Jones@vbschools.com</a>	757-427-5300 ext. 51520
22	Advanced Technology Center	23	Ann Marie C. Garvey	Assistant Director	<a href="mailto:amgarvey@vbschools.com">amgarvey@vbschools.com</a>	757-468-8960
23	Isle of Wight	34				
24	Norfolk Public School	85				
	Total	534				

## Traffic Flow and Activity Layout - Ted Constant Center



Hands on  
Expo  
Tours

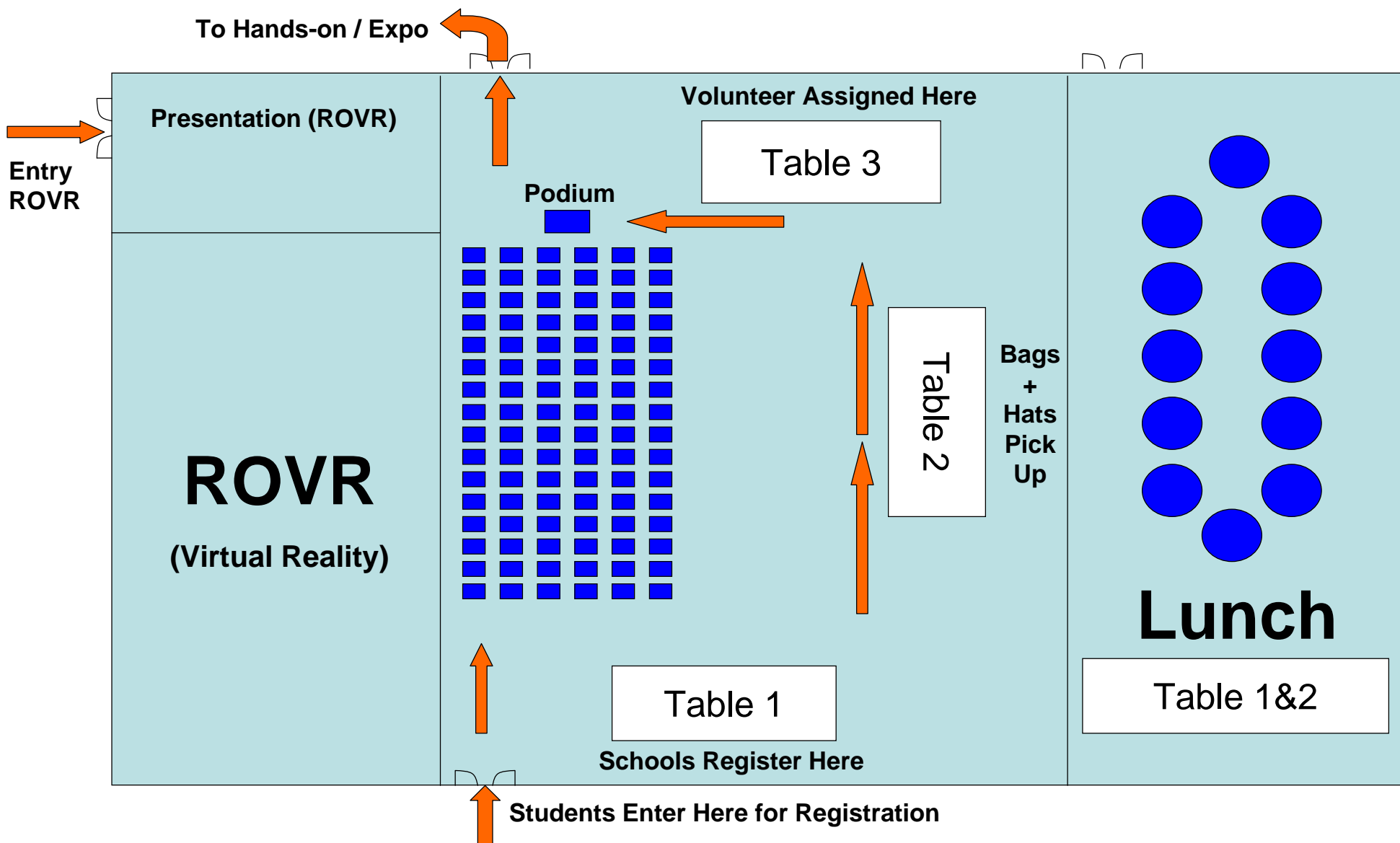


Booth 1- Colonnas Shipyard  
Booth 2- NGNN  
Booth 3- BAE  
Booth 4- AMMA  
Booth 5- METRO  
Booth 6- MHI  
Booth 7- EARL Industries  
Booth 8- ASNE  
Booth 9- Technico  
Booth 10- Miller Systems  
Booth 11- NGSS  
Booth 12- ODU- BCET  
Booth 13- TCC  
Booth 14- TNCC  
Booth 15- Mid Atlantic Maritime  
Booth 16- OSHA  
Booth 17- MARAD  
Booth 18- VSRA Education Foundation  
Booth 19- NGNN- Apprentice School  
Booth 20- SMRO- ODU



# Ted Constant Multipurpose (Monarch) Room Layout

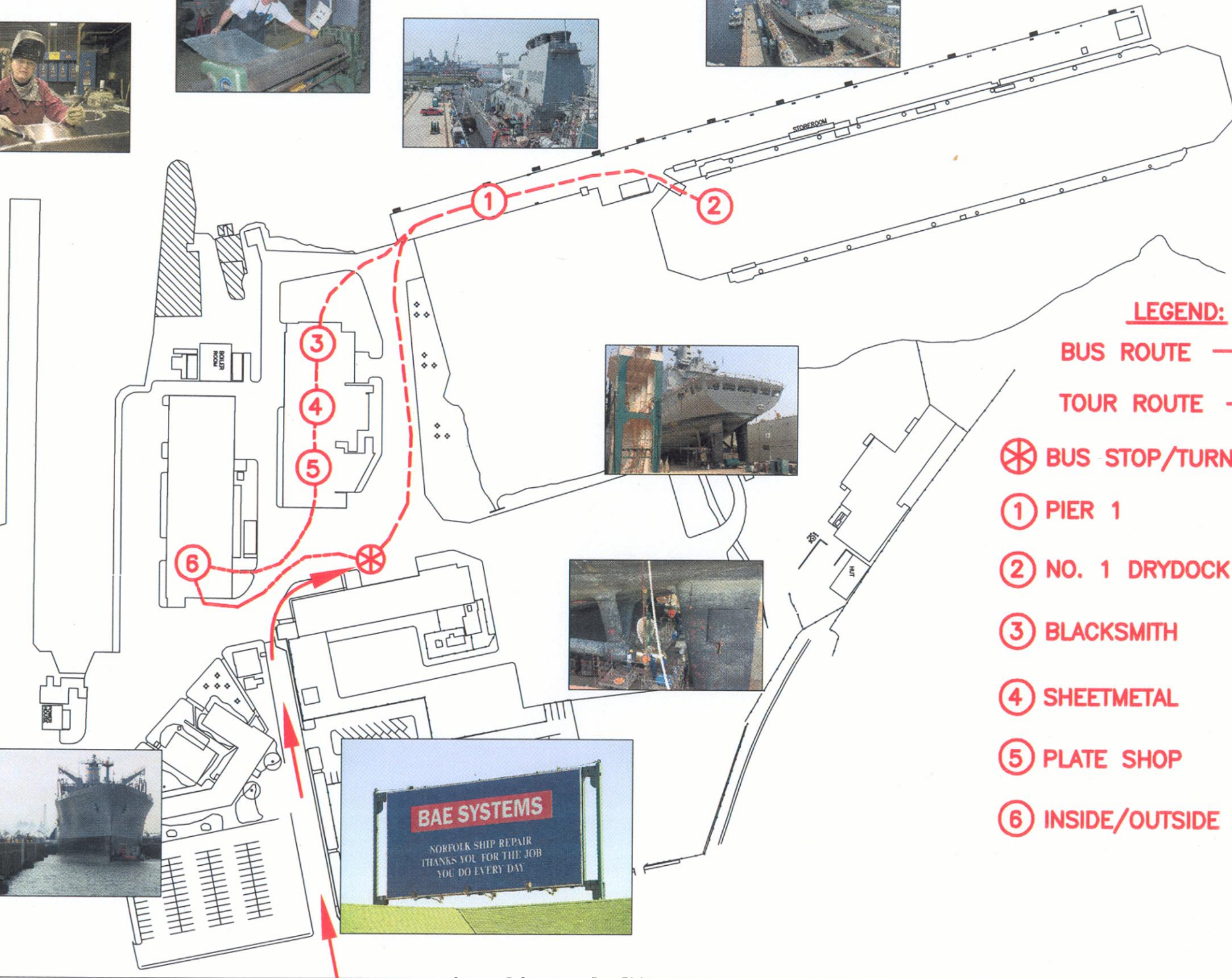
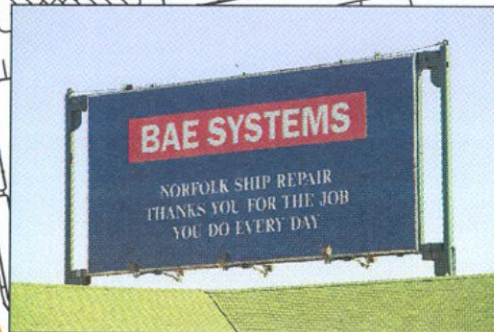
APPENDIX D





# BAE SYSTEMS

## NORFOLK SHIP REPAIR



### LEGEND:

BUS ROUTE ———→

TOUR ROUTE - - - - -

⊗ BUS STOP/TURNAROUND

① PIER 1

② NO. 1 DRYDOCK (TITAN)

③ BLACKSMITH

④ SHEETMETAL

⑤ PLATE SHOP

⑥ INSIDE/OUTSIDE MACHINIST



- 

REV.	DESCRIPTION:						DATE:	DRAWN BY:	CHECKED BY:
									
COLONNA'S SHIPYARD & CO									
PLANT FACILITIES									
PROJECT:									
LOCATION: 400 EAST INDIAN RIVER ROAD									
CUSTOMER:									
APPROVED BY: [signature]		3-21-07		SHEET:	DRAWING NO:			REV:	
DESIGNED BY: SMT				E	1 of 1			0	
SCALE: 1/8" = 1'-0"									

Category B Government Data Rights  
Approved for Public Release; unlimited distribution

Bus Route →  
Tour Route →

Pre-Survey of Results SBRC Event - Gulf Coast					
Questions	Number of Students:				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There are a lot of career opportunities in the field of Shipbuilding and repair.	113	95	41	6	11
Shiprepair operations include repainting,overhauling,shipconversions and alterations.	87	105	55	6	13
dimensions,weight,load carrying capacity or their intended service.	71	110	66	11	8
Labor shortage has reduced profits, impacted construction cost and delayed project completion for most shipyards.	43	85	101	26	11
Many shipyards have difficulty in attracting and retaining an adequate supply of	44	82	98	29	13
	<b>TRUE</b>	<b>FALSE</b>			
Shipbuilding and repair industries have high paying job positions?	241	25			
I would consider a career in the ship building and repair industry?	177	89			

**Total number of students submitte 266**

Post-Survey Results of SBRCDC Event Gulf Coast					
Questions	Number of Students:				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There are a lot of career opportunities in the field of Shipbuilding and repair.	120	43	15	3	2
Shiprepair operations include repainting,overhauling,shipconversions and alterations.	84	74	17	5	3
Ships are often classified by their basic dimensions,weight,load carrying capacity or their intended service.	77	68	26	5	7
Labor shortage has reduced profits, impacted construction cost and delayed project completion for most shipyards.	48	76	44	8	7
Many shipyards have difficulty in attracting and retaining an adequate supply of qualified production workers.	52	58	46	16	12
	<b>TRUE</b>	<b>FALSE</b>			
Shipbuilding and repair industries have high paying job positions?	178	5			
I would consider a career in the ship building and repair industry?	123	60			

**Total number of post survey      183**

Pre-Survey of Results SBRCD Event Hampton Roads					
Questions	Number of Students:				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There are a lot of career opportunities in the field of Shipbuilding and repair.	105	115	40	14	26
Shiprepair operations include repainting,overhauling,shipconversions and alterations.	83	125	53	30	9
Ships are often classified by their basic dimensions,weight,load carrying capacity or their intended service.	50	90	130	20	10
Labor shortage has reduced profits, impacted construction cost and delayed project completion for most shipyards.	63	87	87	54	9
Many shipyards have difficulty in attracting and retaining an adequate supply of qualified production workers.	24	45	199	24	8
	<b>TRUE</b>	<b>FALSE</b>			
Shipbuilding and repair industries have high paying job positions?	147	153			
I would consider a career in the ship building and repair industry?	135	165			

<b>Total number of students submitted:</b>	<b>300</b>
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Post-Survey Results of SBRCD Event Hampton Roads					
Questions	Number of Students:				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There are a lot of career opportunities in the field of Shipbuilding and repair.	149	80	17	8	5
Shiprepair operations include repainting,overhauling,shipconversions and alterations.	134	83	22	10	10
Ships are often classified by their basic dimensions,weight,load carrying capacity or their intended service.	128	82	32	8	9
Labor shortage has reduced profits, impacted construction cost and delayed project completion for most shipyards.	137	70	28	16	8
Many shipyards have difficulty in attracting and retaining an adequate supply of qualified production workers.	112	79	47	14	6
	<b>TRUE</b>	<b>FALSE</b>			
Shipbuilding and repair industries have high paying job positions?	208	51			
I would consider a career in the ship building and repair industry?	207	53			

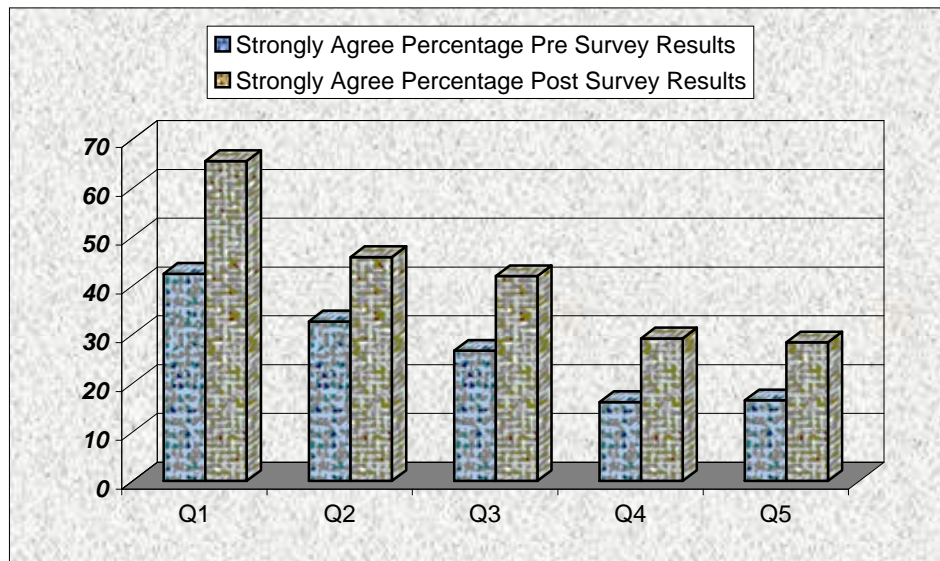
<b>Total number of post survey received:</b>	<b>259</b>
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# Results of Student Attitudinal Survey on Shipbuilding and Repair

SBRCD Career Day Event  
Gulf Coast, January 17, 2008.

<b>Strongly Agree</b>		
	<b>Percentage Pre Survey Results</b>	<b>Percentage Post Survey Results</b>
Q1	42.48	65.57
Q2	32.7	45.9
Q3	26.7	42
Q4	16.16	29.22
Q5	16.54	28.42



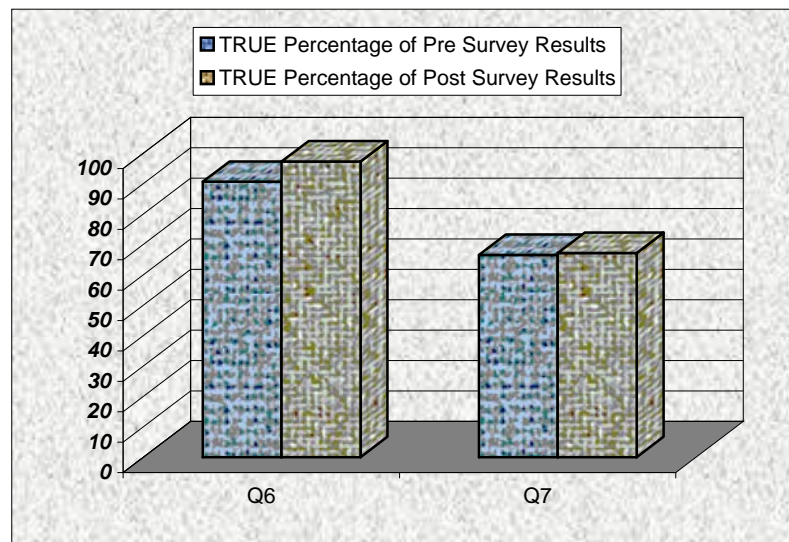
Q1	There are a lot career opportunities in the field of shipbuilding and repair.
Q2	Ship repair operations include repainting, overhauls, ship conversions and alterations
Q3	Ships are often classified by their basic dimensions, weight, load carrying capacity or their intended service.
Q4	Labor shortages have reduced profits, impacted construction costs and delayed project completion for most shipyards.
Q5	Many shipyards have difficulty attracting and retaining an adequate supply of qualified production workers.

<b>Total Number Of Pre Survey Responses(N1)</b>	<b>266</b>
<b>Total Number Of Post Survey Responses(N2)</b>	<b>183</b>

# Results of Student Attitudinal Survey on Shipbuilding and Repair

SBRCD Career Day Event  
Gulf Coast, January 17, 2008.

<b>TRUE</b>		
	<b>Percentage of Pre Survey Results</b>	<b>Percentage of Post Survey Results</b>
Q6	90.6	97.26
Q7	66.54	67.21



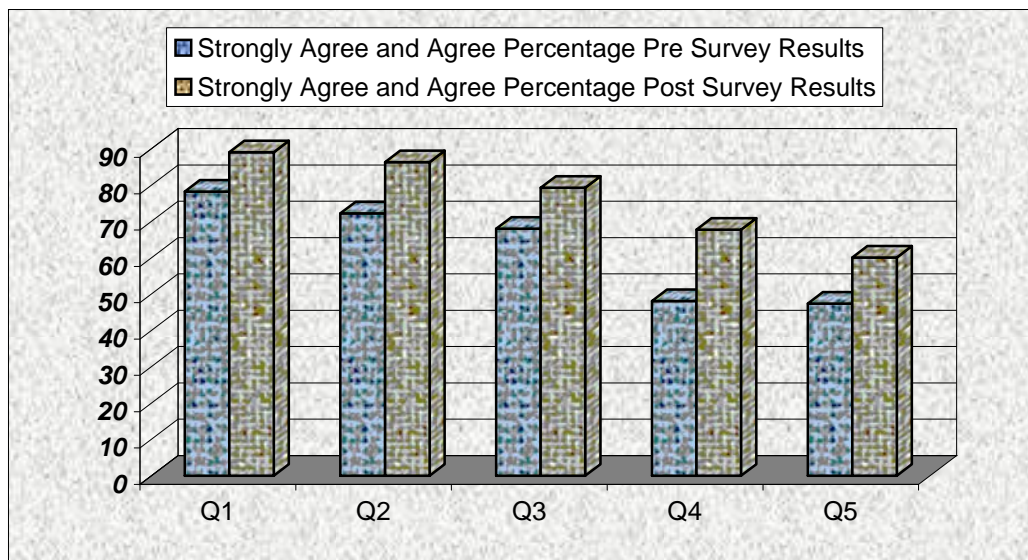
Q6	Shipbuilding and repair industries have high paying job positions?
Q7	I would consider a career in the shipbuilding and repair industry.

<b>Total Number Of Pre Survey Responses(N1)</b>	<b>266</b>
<b>Total Number Of Post Survey Responses(N2)</b>	<b>183</b>

# Results of Student Attitudinal Survey on Shipbuilding and Repair

SBRCD Career Day Event  
Gulf Coast, January 17, 2008.

<b>Strongly Agree and Agree</b>		
	<b>Percentage Pre Survey Results</b>	<b>Percentage Post Survey Results</b>
Q1	78.19	89.07
Q2	72.18	86.34
Q3	68	79.23
Q4	48.12	67.76
Q5	47.36	60.1



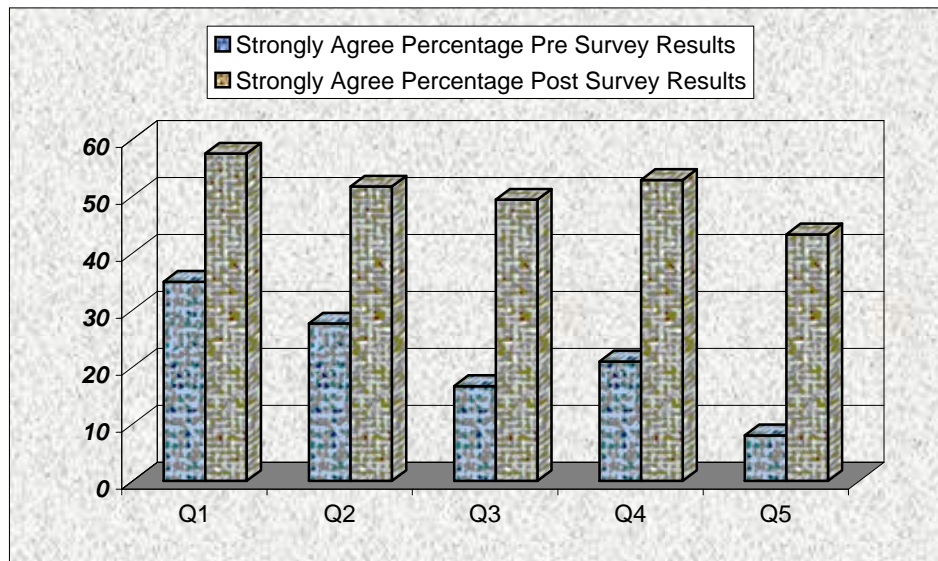
Q1	There are a lot career opportunities in the field of shipbuilding and repair.
Q2	Shiprepair operations include repainting, overhauls, ship conversions and alterations
Q3	Ships are often classified by their basic dimensions, weight, load carrying capacity or their intended service.
Q4	Labor shortages have reduced profits, impacted construction costs and delayed project completion for most shipyards.
Q5	Many shipyards have difficulty attracting and retaining an adequate supply of qualified production workers.

<b>Total Number Of Pre Survey Responses(N1)</b>	<b>266</b>
<b>Total Number Of Post Survey Responses(N2)</b>	<b>183</b>

# Results of Student Attitudinal Survey on Shipbuilding and Repair

SBRCD Career Day Event  
TED Constant Center, February 21, 2008.

<b>Strongly Agree</b>		
	<b>Percentage Pre Survey Results</b>	<b>Percentage Post Survey Results</b>
Q1	35	57.53
Q2	27.67	51.74
Q3	16.67	49.42
Q4	21	52.9
Q5	8	43.34



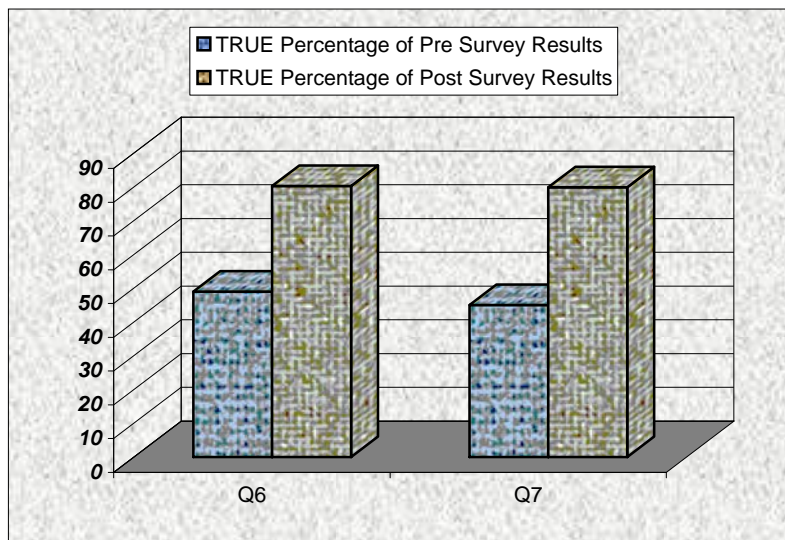
Q1	There are a lot career opportunities in the field of shipbuilding and repair.
Q2	Ship repair operations include repainting, overhauls, ship conversions and alterations
Q3	Ships are often classified by their basic dimensions, weight, load carrying capacity or their intended service.
Q4	Labor shortages have reduced profits, impacted construction costs and delayed project completion for most shipyards.
Q5	Many shipyards have difficulty attracting and retaining an adequate supply of qualified production workers.

<b>Total Number Of Pre Survey Responses(N1)</b>	<b>300</b>
<b>Total Number Of Post Survey Responses(N2)</b>	<b>259</b>

# Results of Student Attitudinal Survey on Shipbuilding and Repair

SBRCD Career Day Event  
TED Constant Center, February 21, 2008.

<i>TRUE</i>		
	<i>Percentage of Pre Survey Results</i>	<i>Percentage of Post Survey Results</i>
Q6	49	80.3
Q7	45	79.92



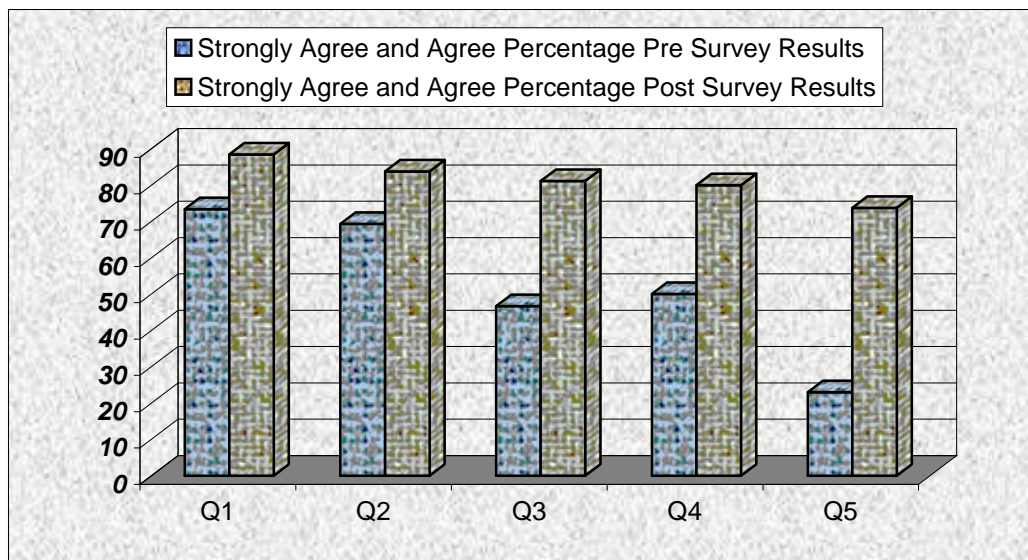
Q6	Shipbuilding and repair industries have high paying job positions?
Q7	I would consider a career in the shipbuilding and repair industry.

<b>Total Number Of Pre Survey Responses(N1)</b>	<b>300</b>
<b>Total Number Of Post Survey Responses(N2)</b>	<b>259</b>

# Results of Student Attitudinal Survey on Shipbuilding and Repair

SBRCD Career Day Event  
TED Constant Center, February 21, 2008.

<b>Strongly Agree and Agree</b>		
	<b>Percentage Pre Survey Results</b>	<b>Percentage Post Survey Results</b>
Q1	73.33	88.41
Q2	69.33	83.78
Q3	46.67	81.08
Q4	50	79.92
Q5	23	73.74



Q1	There are a lot career opportunities in the field of shipbuilding and repair.
Q2	Ship repair operations include repainting, overhauls, ship conversions and alterations
Q3	Ships are often classified by their basic dimensions, weight, load carrying capacity or their intended service.
Q4	Labor shortages have reduced profits, impacted construction costs and delayed project completion for most shipyards.
Q5	Many shipyards have difficulty attracting and retaining an adequate supply of qualified production workers.

<b>Total Number Of Pre Survey Responses(N1)</b>	<b>300</b>
<b>Total Number Of Post Survey Responses(N2)</b>	<b>259</b>



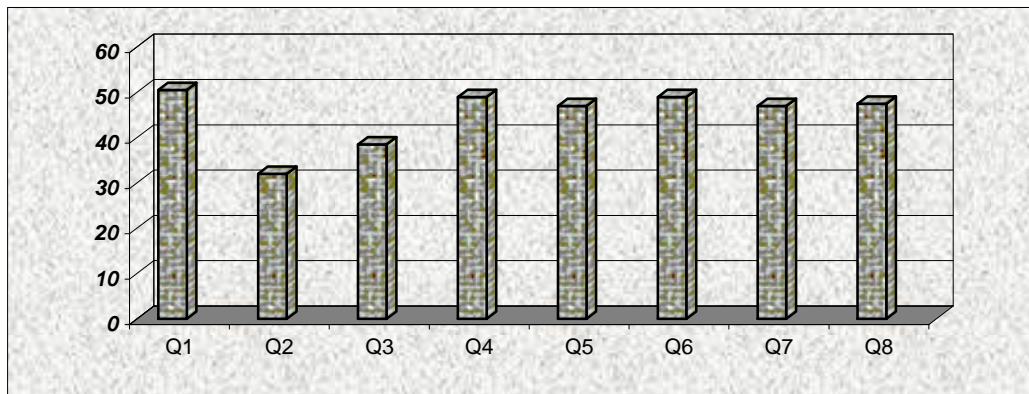
Evaluation Of SBRCDC Event Gulf Coast					
Questions	Number of Students:				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
<b>Hands-on Activities</b>					
Hands-on Activities gave you an overview of the processes used in shipbuilding and repair industry.	101	63	26	6	13
You gained some practical knowledge about the processes used in the shipbuilding and repair industry.	64	80	27	9	10
Shipbuilding and Repair industry uses sophisticated manufacturing processes.	77	71	33	6	11
<b>Industry Expo</b>					
Industry Expo provided you knowledge about various career paths in the shipbuilding and repair industry.	98	52	36	7	7
Industry Professionals did have good knowledge about the industry in general and career paths in the industry.	94	55	34	6	8
Industry professionals responded to your questions.	98	55	30	9	7
<b>Shipyard Tours</b>					
You were able to see the important manufacturing processes in the shipyard.	94	57	26	11	12
Shipyards employ people in variety of positions.	95	63	24	6	13

<b><i>Number of students submitted</i></b>	<b><i>200</i></b>
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# Results of Student Evaluation Survey on Shipbuilding and Repair

SBRCD Career Day Event  
Gulf Coast, January 17, 2008.

Strongly Agree	
Percentage of Results	
Q1	50.5
Q2	32
Q3	38.5
Q4	49
Q5	47
Q6	49
Q7	47
Q8	47.5



Q1	Hands-on Activities gave you an overview of the processes used in shipbuilding and repair industry.
Q2	You gained some practical knowledge about the processes used in the shipbuilding and repair industry.
Q3	Shipbuilding and Repair industry uses sophisticated manufacturing processes.
Q4	Industry Expo provided you knowledge about various career paths in the shipbuilding and repair industry.
Q5	Industry Professionals did have good knowledge about the industry in general and career paths in the industry.
Q6	Industry professionals responded to your questions.
Q7	You were able to see the important manufacturing processes in the shipyard.
Q8	Shipyard employ people in variety of positions.

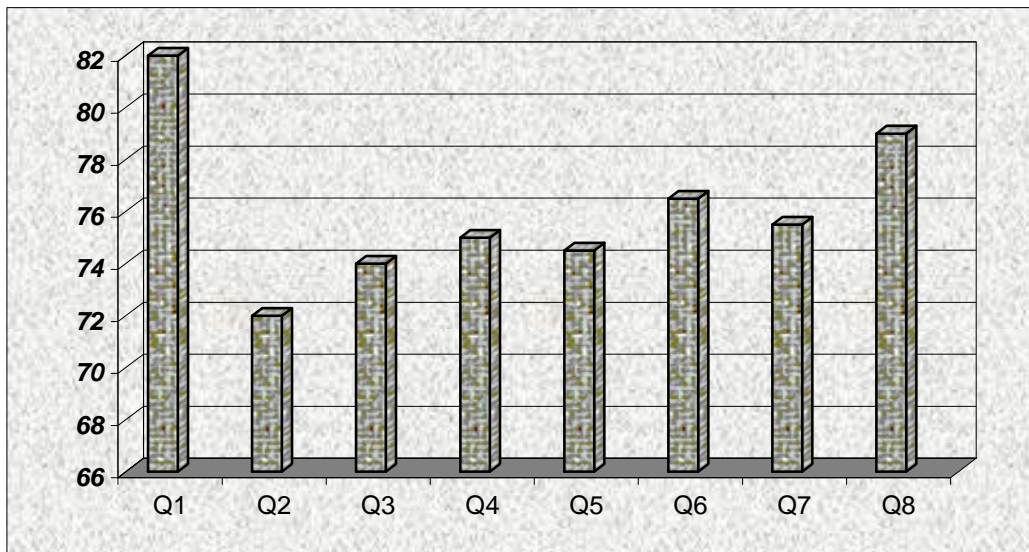
<b>Number of students responses</b>	<b>200</b>
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## Results of Student Evaluation Survey on Shipbuilding and Repair

SBRCD Career Day Event

Gulf Coast, January 17, 2008.

Strongly Agree and Agree Percentage of Results	
Q1	82
Q2	72
Q3	74
Q4	75
Q5	74.5
Q6	76.5
Q7	75.5
Q8	79



Q1	Hands-on Activities gave you an overview of the processes used in shipbuilding and repair industry.
Q2	You gained some practical knowledge about the processes used in the shipbuilding and repair industry.
Q3	Shipbuilding and Repair industry uses sophisticated manufacturing processes.
Q4	Industry Expo provided you knowledge about various career paths in the shipbuilding and repair industry.
Q5	Industry Professionals did have good knowledge about the industry in general and career paths in the industry.
Q6	Industry professionals responded to your questions.
Q7	You were able to see the important manufacturing processes in the shipyard.
Q8	Shipyard employ people in variety of positions.

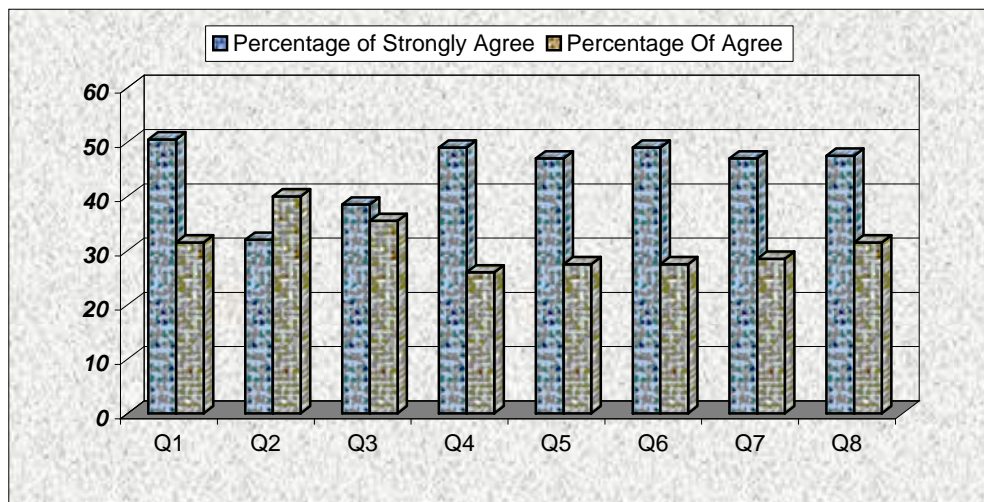
**Number of students responses**

**200**

# Results of Student Evaluation Survey on Shipbuilding and Repair

SBRCD Career Day Event  
Gulf Coast, January 17, 2008.

<b><i>Strongly Agree and Agree</i></b>		
	<b><i>Percentage of Strongly Agree</i></b>	<b><i>Percentage Of Agree</i></b>
Q1	50.5	31.5
Q2	32	40
Q3	38.5	35.5
Q4	49	26
Q5	47	27.5
Q6	49	27.5
Q7	47	28.5
Q8	47.5	31.5



Q1	Hands-on Activities gave you an overview of the processes used in shipbuilding and repair industry.
Q2	You gained some practical knowledge about the processes used in the shipbuilding and repair industry.
Q3	Shipbuilding and Repair industry uses sophisticated manufacturing processes.
Q4	Industry Expo provided you knowledge about various career paths in the shipbuilding and repair industry.
Q5	Industry Professionals did have good knowledge about the industry in general and career paths in the industry.
Q6	Industry professionals responded to your questions.
Q7	You were able to see the important manufacturing processes in the shipyard.
Q8	Shipyard employ people in variety of positions.

***Number of students responses***

***200***

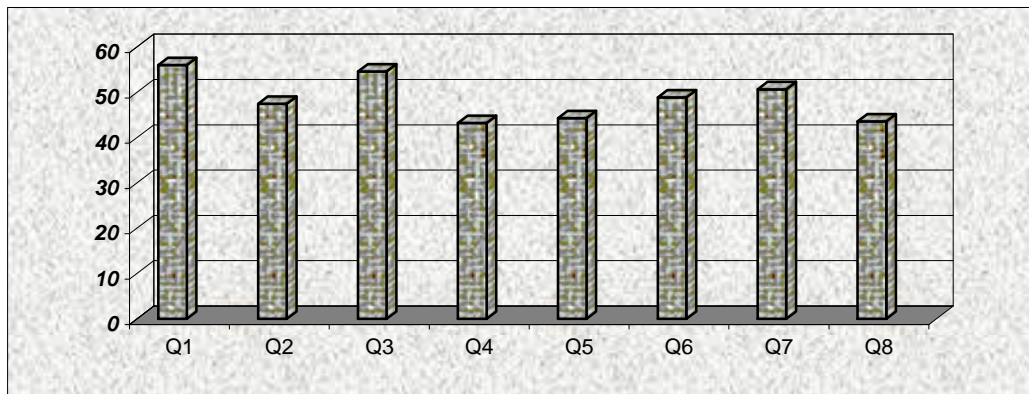
Evaluation Of SBRC D Event Hampton Roads					
Questions	Number of Students:				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
<b>Hands-on Activities</b>					
Hands-on Activities gave you an overview of the processes used in shipbuilding and repair industry.	158	67	27	20	10
You gained some practical knowledge about the processes used in the shipbuilding and repair industry.	134	83	29	27	9
Shipbuilding and Repair industry uses sophisticated manufacturing processes.	154	69	42	8	9
<b>Industry Expo</b>					
Industry Expo provided you knowledge about various career paths in the shipbuilding and repair industry.	122	103	26	23	7
Industry Professionals did have good knowledge about the industry in general and career paths in the industry.	125	92	28	29	8
Industry professionals responded to your questions.	138	86	26	15	17
<b>Shipyard Tours</b>					
You were able to see the important manufacturing processes in the shipyard.	143	83	25	16	14
Shipyard employ people in variety of positions.	123	81	45	21	12

<b>Number of students submitted</b>	<b>282</b>
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# Results of Student Evaluation Survey on Shipbuilding and Repair

SBRCD Career Day Event  
TED Constant Center, February 21, 2008.

Strongly Agree Percentage of Results	
Q1	56.02
Q2	47.51
Q3	54.6
Q4	43.26
Q5	44.32
Q6	48.93
Q7	50.7
Q8	43.61



Q1	Hands-on Activities gave you an overview of the processes used in shipbuilding and repair industry.
Q2	You gained some practical knowledge about the processes used in the shipbuilding and repair industry.
Q3	Shipbuilding and Repair industry uses sophisticated manufacturing processes.
Q4	Industry Expo provided you knowledge about various career paths in the shipbuilding and repair industry.
Q5	Industry Professionals did have good knowledge about the industry in general and career paths in the industry.
Q6	Industry professionals responded to your questions.
Q7	You were able to see the important manufacturing processes in the shipyard.
Q8	Shipyard employ people in variety of positions.

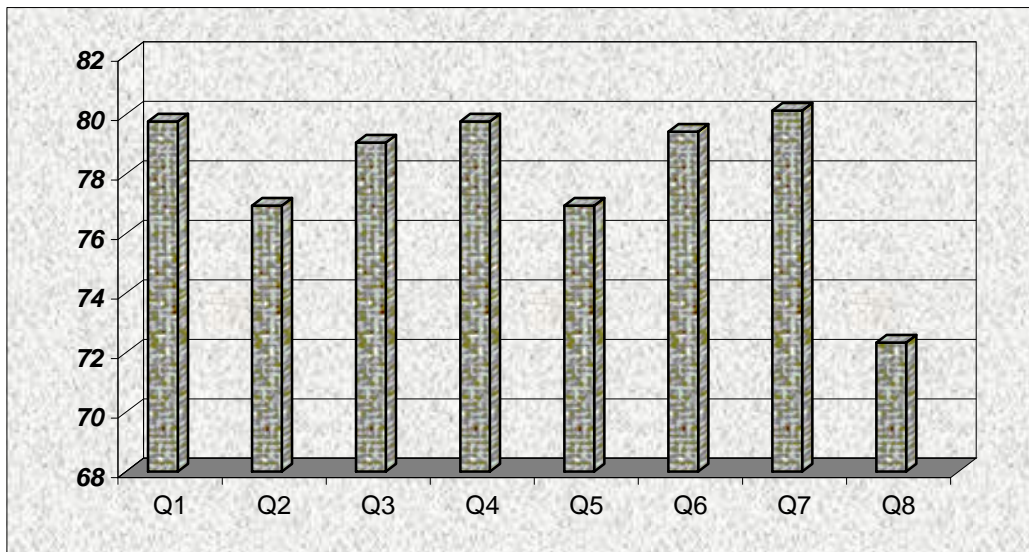
<b>Number of students responses</b>	<b>282</b>
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# Results of Student Evaluation Survey on Shipbuilding and Repair

SBRCD Career Day Event  
TED Constant Center, February 21, 2008.

Strongly Agree and Agree Percentage of Results	
Q1	79.78
Q2	76.95
Q3	79.07
Q4	79.78
Q5	76.95
Q6	79.43
Q7	80.14
Q8	72.34



Q1	Hands-on Activities gave you an overview of the processes used in shipbuilding and repair industry.
Q2	You gained some practical knowledge about the processes used in the shipbuilding and repair industry.
Q3	Shipbuilding and Repair industry uses sophisticated manufacturing processes.
Q4	Industry Expo provided you knowledge about various career paths in the shipbuilding and repair industry.
Q5	Industry Professionals did have good knowledge about the industry in general and career paths in the industry.
Q6	Industry professionals responded to your questions.
Q7	You were able to see the important manufacturing processes in the shipyard.
Q8	Shipyard employ people in variety of positions.

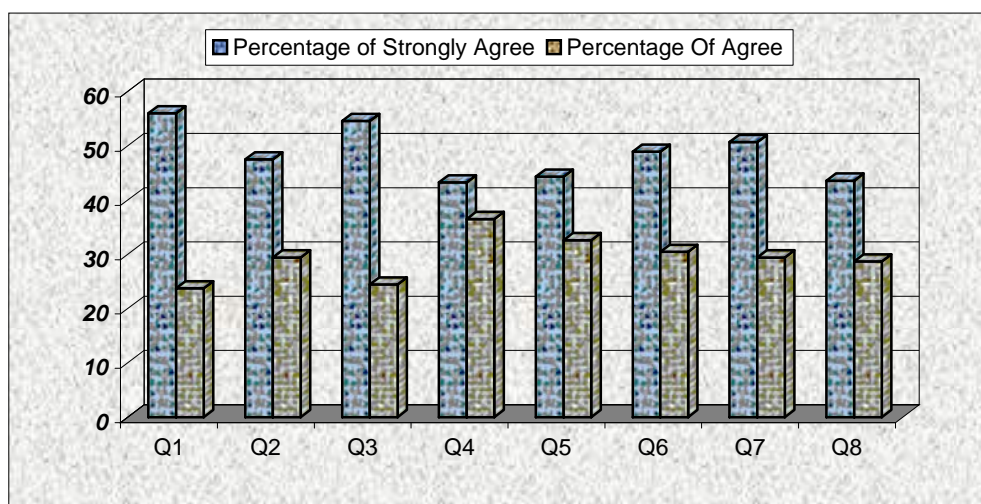
<b>Number of students responses</b>	<b>282</b>
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# Results of Student Evaluation Survey on Shipbuilding and Repair

SBRCD Career Day Event

TED Constant Center, February 21, 2008.

<b><i>Strongly Agree and Agree</i></b>		
	<b><i>Percentage of Strongly Agree</i></b>	<b><i>Percentage Of Agree</i></b>
Q1	56.02	23.75
Q2	47.51	29.43
Q3	54.6	24.46
Q4	43.26	36.52
Q5	44.32	32.62
Q6	48.93	30.49
Q7	50.7	29.43
Q8	43.61	28.72



Q1	Hands-on Activities gave you an overview of the processes used in shipbuilding and repair industry.
Q2	You gained some practical knowledge about the processes used in the shipbuilding and repair industry.
Q3	Shipbuilding and Repair industry uses sophisticated manufacturing processes.
Q4	Industry Expo provided you knowledge about various career paths in the shipbuilding and repair industry.
Q5	Industry Professionals did have good knowledge about the industry in general and career paths in the industry.
Q6	Industry professionals responded to your questions.
Q7	You were able to see the important manufacturing processes in the shipyard.
Q8	Shipyard employ people in variety of positions.

***Number of students responses***

***282***

**SBRC D Project**  
**List of Sponsors and Exhibitors**

<b>Gulf Coast</b>	
Sponsors & Exhibitors	
1	Bender Shipbuilding and Repair Inc
2	Trinity Yatch
3	Bollinger Shipyards Inc
4	Signal International
5	Northrop Grumman Ship Systems
6	Atlantic Marine
	Exhibitors
1	Hiller Systems
2	Alabama Fluids Systems
3	MGCCC
4	Bishop CC
5	MARAD
6	OSHA

<b>Hampton Roads</b>	
Sponsors & Exhibitors	
1	Colonna's Shipyard Inc
2	BAE Systems Shipyard
3	METRO
4	NGNN
5	Technico
6	ASNE
7	MHI
8	AMMA
9	Earl Industries
	Exhibitors
1	TCC
2	TNCC
3	ODU
4	MARAD
5	OSHA

# SHIPYARD OPERATIONS SIMULATION

1

Simulation involves operations associated with ship building. Students are employed in different departments while building the ship. They calculate the weight, draft and kinetic energy of the ship.

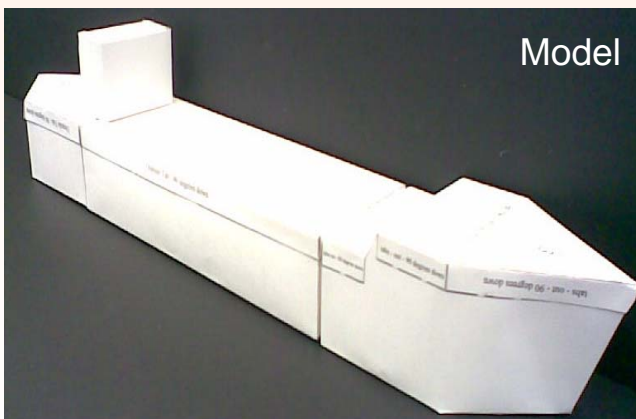
## Learning Objectives

- Components of a ship
- Operations within a shipyard
- Methods of ship construction
- Design calculations

## Simulation Activity

- Simulate operations within a shipyard
- Weight estimation
- Draft calculations
- Kinetic energy calculations

Kit contains: Teacher's manual, Student handout, Student worksheets, Two pair of scissors, Four rulers, Two glue sticks, Two protractors and Tape



# SHIP CONSTRUCTION SIMULATION

**Middle School**

**2**

This simulation involves construction of a submarine. Students play the role of employees of ABC yard. They first estimate the cost of the ship and then build it.

## Learning Objectives

- Basic ship terminology
- Fundamentals of submarine construction
- Processes involved in cost estimation & part acquisition

## Simulation Activity

**Day 1**

Identify the number of parts using the student handouts

& Cost estimation

**Day 2**

Construction of submarine

**Kit Contents:** Teacher's manual, Student's handouts, K'nex parts, Cost estimation form and ruler.

Model



Kit





# SHIP CONSTRUCTION SIMULATION

## High School

2

This simulation involves construction of a clipper ship. Students play the role of employees of ABC yard. They first estimate the cost of the ship and then build it.

### Learning Objectives

- Basic ship terminology
- Fundamentals of ship construction
- Processes involved in cost estimation & part acquisition

### Simulation Activity

Day 1

Identify the number of parts using the student handouts

& Cost estimation

Day 2

Construction of clipper ship

**Kit Contents:** Teacher's manual, Student's handouts, K'nex parts, Cost estimation form, fake money and ruler.

Model



Kit





# SHIP STABILITY SIMULATION

3

Simulation involves studying the effect of center of buoyancy on ship's stability. Also applying Archimedes principle and comparing the draft of model-ship in saline and fresh water.

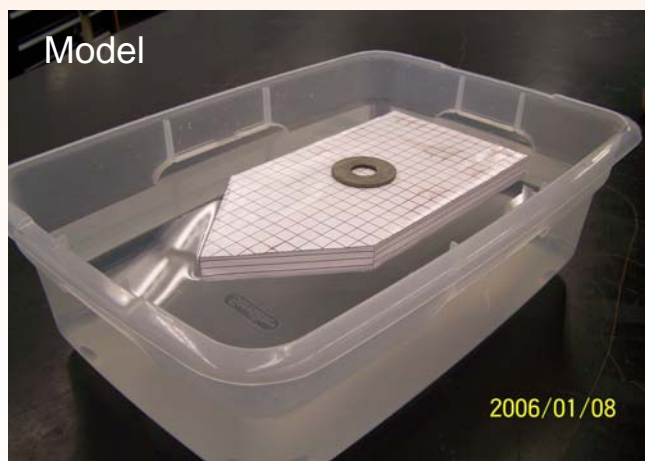
## Learning Objectives

- Finding the center of buoyancy
- Applying Archimedes principle to find weight and volume of displaced water.
- Observing the effect of salinity on the draft.

## Simulation Activity

- Find the center of buoyancy and weight of displaced water by experiment.
- Calculate weight and volume of displaced water
- Study effect of Salinity

**Kit Contents: Foam model, Teacher's manual, ruler, measuring cup, weights (16 washers) and marker**



# SHIP DISASTER INVESTIGATION

4

Simulation involves ship disaster case studies. Students play role of Ship Disaster Investigation Agency (SDIA) agents analyzing the ship disaster. They identify possible causes for the disaster.

## Learning Objectives

- Basic ship terminology
- Fundamentals of ship design and construction
- Best practices followed in the ship design, construction and shipping industry

## Simulation Activity

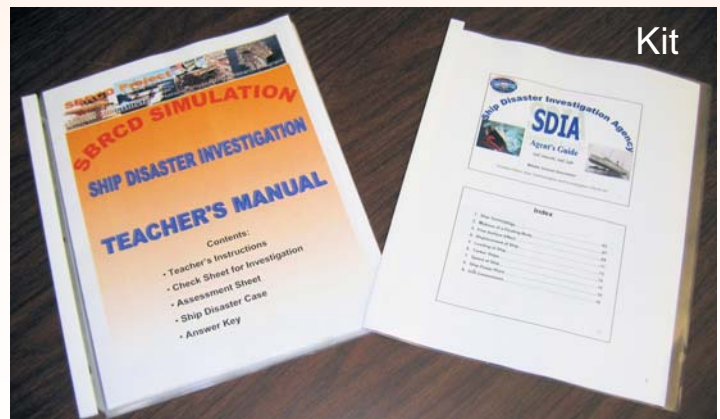
- Analyze the ship disasters
- Consult SDIA agent's guide
- Find out the flaws and suggest modifications
- Present the findings

**Kit Contents:** SDIA agent manual, Check- sheet, Ship disaster cases for middle and high school

### 1. Ship Terminology



Bow : Front part of the ship  
Stern : Rear part of the ship  
Starboard : Right side of the ship  
Port : Left side of the ship



Kit

## Gulf Coast Counselor Workshop List of Attendees

	School Name	School Address	Name	Title	Phone Number	email	Grade Level
1	Adams Middle School	401 Baldwin St, Saraland, AL 36571	Lionell Dais	counselor	2212000	<a href="mailto:ldais@mcpss.com">ldais@mcpss.com</a>	6-8
2	Adams Middle School	402 Baldwin St, Saraland, AL 36571	Tammera CARbo	counselor	2212000	<a href="mailto:tmcarbo@mcpss.com">tmcarbo@mcpss.com</a>	6-8
3	Bryant Career Technical Center	8950 Padgett Switch Road, Irvington, AL 36544	Mico Carter	counselor	2519572845	<a href="mailto:mjcarter@mcpss.com">mjcarter@mcpss.com</a>	9-12
4	Gulfport High School	100 Perry Street, Gulfport, MS 39507	Catherine Newkirk	Guidance Counselor	(228) 897-6031	<a href="mailto:catherine.newkirk@gulfportschools.org">catherine.newkirk@gulfportschools.org</a>	10-12
5	Covington County Vocational Technical Complex	P.O. Box 1268 Collins, MS 39428	Laura Cameron	Counselor	601-765-8253	<a href="mailto:lcameron@cov.k12.ms.us">lcameron@cov.k12.ms.us</a>	high school
6	Mary G. Montgomery High School	4275 Snow Road, Semmes, AL 36575	Kim P. Howell	Guidance Counselor	251-221-3155 ext. 46007	<a href="mailto:khowell@mcpss.com">khowell@mcpss.com</a>	9th, 10th
7	Vancleave Highschool	1224 Highway 57, Vancleave, MS 39565	Helen Fletcher	Career Center Manager	228-826-0920	<a href="mailto:hfletcher@jaco.k12.ms.us">hfletcher@jaco.k12.ms.us</a>	9-12
8	Bay High School	751 Blue Meadow Road, Bay St. Louis, MS 39520	Kathryn Noblitt	School Counselor	228-467-5297	<a href="mailto:knoblitt@bwsd.org">knoblitt@bwsd.org</a>	9-12
9	Magnolia Jr. High School	6601 Orange Grove Road, Moss Point, MS 39563	Miriam Spain	Counselor	228-475-1429 ext 4004	<a href="mailto:maspain@mp.k12.ms.us">maspain@mp.k12.ms.us</a>	8th grade
10	Faulkner Career Technical Center	33 W. Elm St. Prichard, AL 36610	Sharon Hornsby	Career Counselor	(251) 221-5431; (251) 367-0982	<a href="mailto:sharonhornsby@hotmail.com">sharonhornsby@hotmail.com</a>	9-12
11	Magnolia	6601 Orange Grove Rd. Moss Point, Ms 39563	Ava L. Barbour	Counselor	(228) 475-1429	<a href="mailto:ABarbour@mp.k12.ms.us">ABarbour@mp.k12.ms.us</a>	7 & 8
12	Long Beach School District	300 W Old Pass Rd	Mike Crawford	Student Services Coordinator	228-860-9055	<a href="mailto:mike.crawford@mgccc.cc.ms.us">mike.crawford@mgccc.cc.ms.us</a>	10-12
13	Mississippi Gulf Coast Community College	Post Office Box 100 Gautier, Mississippi 39553	Sheila Lyon	Counselor	228-497-7636	<a href="mailto:sheila.lyon@mgccc.edu">sheila.lyon@mgccc.edu</a>	College
14	Citronelle High School	19325 Rowe Street, Citronelle, AL 36522	Cheryl Sutton	Counselor	2512213444	<a href="mailto:csutton@mcpss.com">csutton@mcpss.com</a>	9-10

	School Name	School Address	Name	Title	Phone Number	email	Grade Level
15	Moss Point Vocational Center	4924 Church St., Moss Point, MS 39563	Carol Redding	Counselor	228-474-1455	<a href="mailto:clredding@mp.k12.ms.us">clredding@mp.k12.ms.us</a>	9-12
16	Moss Point Vocational Center	4924 Church St., Moss Point, MS 39563	Kimberly McNair	Career Center Manager	228-474-1455	<a href="mailto:kdmcnair@mp.k12.ms.us">kdmcnair@mp.k12.ms.us</a>	9-12
17	Long Beach High School	300 East Old Pass Road Long Beach, MS 39560	Connie Tucker	Career Center Manager	228-864-4586	<a href="mailto:tuckerc@lbsd.k12.ms.us">tuckerc@lbsd.k12.ms.us</a>	9-12
18	Theodore High	6201 Swedetown Rd Theodore, Al	Sharon Lawless	Counselor	251 221-3351	<a href="mailto:slawless1@mcpss.com">slawless1@mcpss.com</a>	11
19	Theodore High	6201 Swedetown Rd Theodore, Al	Brian Chandler	Counselor	251 221-33251	<a href="mailto:bschandler@mcpss.com">bschandler@mcpss.com</a>	9
20	Moss Point High School	4924 Church Street, Moss Point, MS 39563	Sylvia Williams	Career Counselor	228-474-2472	<a href="mailto:sylviaawms@aol.com">sylviaawms@aol.com</a>	6-12
21	MATTIE T. BLOUNT HIGH SCHOOL	5450 LOTT ROAD EIGHT MILE, AL 36613	SHERYL YATES	Counselor	251 221-3070	<a href="mailto:syates@mcpss.com">syates@mcpss.com</a>	11/12th
22	Citronelle High School	19325 Rowe Street Citronelle, AL 36522	Mary Finley	Counselor	(251) 221-3444	<a href="mailto:mrfinley@mcpss.com">mrfinley@mcpss.com</a>	11&12
23	Theodore High School	6201 Swedetown Road	Marsha Shaw	Counselor	251-221-3351	<a href="mailto:mshaw@mcpss.com">mshaw@mcpss.com</a>	
24	East Central Highschool	21700 Slider Road, Moss Point, MS 39562	Karen Dock	Career Center Manager	228-588-7051	<a href="mailto:kdock@jaco.k12.ms.us">kdock@jaco.k12.ms.us</a>	9-12
25	Long Beach High School	300 East Old Pass Road, Long Beach, MS 39560	Shirley Hillman	Counselor	228-864-4496	<a href="mailto:hillmans@lbsd.k12.ms.us">hillmans@lbsd.k12.ms.us</a>	9-12
26	Bryant High School	14001 Hurricane Blvd.	Gina McDaniel	Counselor	251-824-3213	<a href="mailto:gmcdaniel@mcpss.com">gmcdaniel@mcpss.com</a>	
27	Moss Point High School	4924 Church Street, Moss Point, MS 39563	Sylvia Williams	Career Counselor	228-474-2472	<a href="mailto:sylviaawms@aol.com">sylviaawms@aol.com</a>	6-12
28	Murphy High School	100 South Carlen St. Mobile, Al 36606	Leslie Franklin	Counselor	251-221-3186 ext. 213	<a href="mailto:lfrankl@mcpss.com">lfrankl@mcpss.com</a>	11
29	Bay High School	750 Blue Meadow Road, Bay St. Louis, MS 39525	Gayle Moore	Academy Coordinator	228-467-6611 (ext. 866)	<a href="mailto:gmoore@bwsd.org">gmoore@bwsd.org</a>	9-12
30	W.P. Davidson High School	3900 Pleasant Valley Road	Jennifer Gregory	Counselor	251221.084	<a href="mailto:jmyatt-gregory@mcpss.com">jmyatt-gregory@mcpss.com</a>	12
31	Mississippi Gulf Coast Community College	2800 Highway 90 Gautier, MS 39553	Linda Mizell	Counselor	228-497-7623	<a href="mailto:linda.mizell@mgccc.edu">linda.mizell@mgccc.edu</a>	College Level

	School Name	School Address	Name	Title	Phone Number	email	Grade Level
32	Mississippi Gulf Coast Community College	PO Box 100 Gautier, Ms. 39553	Wiley Ckark	Career Counselor	228-497-7641	<a href="mailto:wiley.clark@mgccc.edu">wiley.clark@mgccc.edu</a>	Post Secondary
33	ATN		Byron Dunn				
34	MARAD		Jim Babin				
35	Moss Point High School	4913 Weems Street	Lisa Coleman	GED Coordinator	228-474-3398 ext.2075	<a href="mailto:lkcoleman@mp.k12.ms.us">lkcoleman@mp.k12.ms.us</a>	9-12



## List of Attendees of Hampton Roads Counselor Workshop

	School Name	School Address	Name	Title	Phone Number	email	Grade Level
1	Lakeland High School	214 Kenyon Road	Dr. Thad Frattalone	Counselor	757-925-5530 ext 617	<a href="mailto:thaftrattalone@spsk12.net">thaftrattalone@spsk12.net</a>	9-12
2	Turlington Woods (Suffolk Public Schools)	629 Turlington Road	Glenda Jones	Guidance Counselor	757-934-6215	<a href="mailto:glejones@spsk12.net">glejones@spsk12.net</a>	1st - 12th
3	Norview High School	6501 Chesapeake Boulevard, Norfolk 23513	Linda Baldwin	Counselor	757-852-4500	<a href="mailto:lbaldwin@nps.k12.va.us">lbaldwin@nps.k12.va.us</a>	9-12
4	Granby High School	7101 Granby St. Norfolk, Virginia, 23505	Michael Burnett	Counselor	757-451-4116	<a href="mailto:mburnett@nps.k12.va.us">mburnett@nps.k12.va.us</a>	9th
5	Advanced Technology Center/VBCPS	1800 College Crescent, Virginia Beach, VA 23453	Ann Marie C. Garvey	Assistant Director of Student Programs and Business Development	757-468-8960 ext. 0	<a href="mailto:amgarvey@vbschools.com">amgarvey@vbschools.com</a>	11 and 12
6	Bethel High School	1067 BIG BETHEL ROAD	TIFFANY SUTTON	SCHOOL COUNSELOR	757-825-4501	<a href="mailto:TMSUTTON@SBO.HAMPTON.K12.VA.US">TMSUTTON@SBO.HAMPTON.K12.VA.US</a>	BY ALPHA
7	Kecoughtan	52 Woodland Rd	Danita Warmack		757 850-5023	<a href="mailto:dwarmack@sbo.hampton.k12.va.us">dwarmack@sbo.hampton.k12.va.us</a>	9-12
8	Deep Creek High School	2900 Margaret Booker Drive, Chesapeake, VA 23323	Bob Bierman	Career Counselor	757-558-5300	<a href="mailto:biermrma@cps.k12.va.us">biermrma@cps.k12.va.us</a>	9-12
9	Charles City Middle School	10035 Courthouse Rd, Charles City, Va 23030	Melaniann Hicks	School Counselor	804-829-9252	<a href="mailto:mkhicks@ccps.net">mkhicks@ccps.net</a>	6-8
10	Virginia Beach City Schools Dept of Guidance Services	520 S. Independence Blvd, Virginia Beach, VA 23452	Tracy Jackson	Guidance Instructional Specialist	757-493-5429	<a href="mailto:tracy.jackson@vbschools.com">tracy.jackson@vbschools.com</a>	K-12
11	Charles City High School	10035 Courthouse Rd, Charles City, Va 23030	Sandra Dutton	Counselor	804-829-2407	<a href="mailto:SKDUNTON@ccps.net">SKDUNTON@ccps.net</a>	9-12
12			Belize Hendrix	Counselor	252-445-2027		
13	Warhill High School	4615 Opportunity Way	Laurie Artman	Counselor	757-565-9132	<a href="mailto:artmanl@wjcc.k12.va.us">artmanl@wjcc.k12.va.us</a>	9-11
14	Chesapeake Center for Science and Technology	1617 Cedar Road, Chesapeake, VA 23322	Jenise Bond	Guidance Director	757-547-0134	<a href="mailto:bondjbo@cps.k12.va.us">bondjbo@cps.k12.va.us</a>	9-12
15	Mathews High School	P.O.Box 38 , Mathews, VA 23109	Renee Johnson	Counselor	804-7253702	<a href="mailto:rjohnson@mathews.k12.va.us">rjohnson@mathews.k12.va.us</a>	9-12
16	I C Norcom High School		Paulette Turner	Counselor			
17	Landgrown High		M. Hirsch				
18	Landgrown High		Andrew Blackmore				



List of Attendees for Hampton Roads Techers Workshop

	School Name	School Address	Name	Title	Phone Number	email	Grade Level
1	Northrop Grumman Newport News Education	Technical Learning Center Bldg 802 Suite 195 / 4101	Derrick Holton	TECHNICAL INSTRUCTOR	757- 688 - 46728	<a href="mailto:Derrick.Holton@ngc.com">Derrick.Holton@ngc.com</a>	Various
2	Woodrow Wilson High School	1401 Elmhurst Lane, Portsmouth, VA 23701	(James) Roy White	Technology Drafting (Auto CADD) Teacher	757-465-2907	<a href="mailto:james.white@pps.k12.va.us">james.white@pps.k12.va.us</a>	9-12
3	I. C. Norcom High School	1801 London Blvd, Portsmouth, VA 23704	Mary White	Teacher	(757) 393-5442	<a href="mailto:MARY.G.WHITE@pps.k12.va.us">MARY.G.WHITE@pps.k12.va.us</a>	9-12
4	Gloucester High School	6680 Short Lane, Gloucester, VA 23061	Susan Emory	Geometry Teacher	804-694-0414	<a href="mailto:semory@gc.k12.va.us">semory@gc.k12.va.us</a>	9-12
5	Churchland High School	4301 Cedar Lane Portsmouth, VA 23703	Velvoria B. Carey	Teacher	(757) 686-2500	<a href="mailto:Velvoria.Carey@pps.k12.va.us">Velvoria.Carey@pps.k12.va.us</a>	9-12
6	Smithfield High School	14171 Turner Drive, Smithfield, VA 23430-6675	Carol Westly	Teacher	357-5783	<a href="mailto:cwestley@iwcs.k12.va.us">cwestley@iwcs.k12.va.us</a>	9-12
7	Gloucester High School	6680 Short Lane, Gloucester, VA 23061	David Pluim	Mathematics Teacher	757-869-1982	<a href="mailto:dpluim@gc.k12.va.us">dpluim@gc.k12.va.us</a>	9-12
8	New Kent Middle School	11825 New Kent Highway, New Kent, VA 23124	Rick Easton	Gifted Program Resource Teacher for Math Science	(804) 966-9655	<a href="mailto:wrickjr@aol.com">wrickjr@aol.com</a>	6-12
9	Gloucester High School	6680 Short Lane Gloucester VA 23061	Anne Fary	Math Teacher	804-693-9095	<a href="mailto:afary@gc.k12.va.us">afary@gc.k12.va.us</a>	10-12
10	Reservoir Middle School	15638 Warwick Blvd, Newport News, VA 23608	Michelle Pfeifer	lead science teacher	888-3310	<a href="mailto:michelle.pfeifer@nn.k12.va.us">michelle.pfeifer@nn.k12.va.us</a>	8
11	Warhill High School	6415 Opportunity Way, Williamsburg, VA 23188	Roger Hunt	Teacher	757.503.4488	<a href="mailto:huntr@wjcc.k12.va.us">huntr@wjcc.k12.va.us</a>	High School
12	Gloucester High School	6680 Short Lane, Gloucester, VA 23061	Lori A. Eanes	Teacher	804-693-2526	<a href="mailto:leanes@gc.k12.va.us">leanes@gc.k12.va.us</a>	9-12
13	Bethel High School	1067 Big Bethel Road, Hampton, VA 23666	Melissa Spencer	Teacher	(757) 826-1744	<a href="mailto:mspencer@sbo.hampton.k12.va.us">mspencer@sbo.hampton.k12.va.us</a>	9, 11-12
14	Woodside High School	13450 Woodside Lane Newport News Virginia 23608	Barbara Stewart	math teacher	757-224-1289	<a href="mailto:barbara.stewart@nn.k12.va.us">barbara.stewart@nn.k12.va.us</a>	9-12
15	T.H. Badger Technical Center - north campu	P.O. Box 69, Oak Hall, Va., 23416	Glenn Muhle Jr.	welding instructor	757-824-4659	<a href="mailto:gmuhle@ahs.accomack.k12.va.us">gmuhle@ahs.accomack.k12.va.us</a>	11th and 12th
16	Lindsay Middle School	1636 Briarfield Road Hampton, VA 23661	Shui (Sue) Lin	Math Teacher	757-581-1494	<a href="mailto:slin@sbo.hampton.k12.va.us">slin@sbo.hampton.k12.va.us</a>	8
17	Bruton High School	185 E Rochambeau Drive, Williamsburg VA 23188	Steve Colwell	Technology Ed. Teacher	(757) 879-1516	<a href="mailto:scolwell@ycsd.york.va.us">scolwell@ycsd.york.va.us</a>	9 thru 12
18	Forest Glen Middle School	200 Forest Glen Middle School	Maryland Roberts	Teacher	757-925-5780	<a href="mailto:marroberts@spsk12.net">marroberts@spsk12.net</a>	8
19	Southeast Halifax High School	16683 highway 125, Halifax N.C. 27839	Broderick Ward	Electrical Trades teacher	252-445-2027	<a href="mailto:wardb@se.halifax.k12.nc.us">wardb@se.halifax.k12.nc.us</a>	9-12
20	FOREST GLEN	200 Forest Glen Middle School	LARRY D. GAMBLE	TEACHER	757/925/5780	<a href="mailto:largamble@spsk12.net">largamble@spsk12.net</a>	8
21	King Fork Middle School	390 King Fork Road Suffolk, VA	Barbara S. Edwards	Teacher	757-934-9838	<a href="mailto:baredwards@spsk12.net">baredwards@spsk12.net</a>	Alternative Ed (2-8)
22	Oscar Smith Middle School	2500 Rodgers Street Chesapeake, VA 23324	Gary Scott	Science Dept Chair	757.494.7590	<a href="mailto:scottgle@cps.k12.va.us">scottgle@cps.k12.va.us</a>	Eighth
23	King's Fork Middle School	390 King Fork Road Suffolk, VA	Mary K. Rollins	Sp. Ed. Teacher	757-923-5246	<a href="mailto:marrollins@spsk12.net">marrollins@spsk12.net</a>	6-8
24	Kings Fork Middle School	390 King Fork Road Suffolk, VA	Joyce Baker	Teacher	757-923-5246	<a href="mailto:joybaker@spsk12.net">joybaker@spsk12.net</a>	7
25	Hugo A Owens Middle School	1997 Horseback Run; Chesapeake, Va 23323	Melissa Brichacek	Classroom Teacher	412-779-7609	<a href="mailto:melissa.a.brichacek@gmail.com">melissa.a.brichacek@gmail.com</a>	8
26	Churchland high	4301 Cedar Ln Portsmouth, VA 23703	Helena Fenner	teacher	757-686-2500	<a href="mailto:helena.fenner@pps.k12.va.us">helena.fenner@pps.k12.va.us</a>	9-12
27	Sussex Central Middle School	21356 Sussex Drive Sussex, VA 23084	Judy Adams	Algebra 1 Teacher	4342462251	<a href="mailto:jadams@sussex.k12.va.us">jadams@sussex.k12.va.us</a>	8
28	Sussex Central Middle School	21356 Sussex Drive Sussex, VA 23884	Bennie Jenkins	Science Teacher	434-246-2251	<a href="mailto:bjenkins@sussex.k12.va.us">bjenkins@sussex.k12.va.us</a>	8
29	Arcadia High School	P.O. Box 69, Oak Hall, Va., 23416	Dave McElroy		757-824-5613	<a href="mailto:dmcelroy@">dmcelroy@</a>	9-12
30	Arcadia High School	P.O. Box 69, Oak Hall, Va., 23416	Charles Love		757-824-5614	<a href="mailto:clove@ahs.accomack.k12.va.us">clove@ahs.accomack.k12.va.us</a>	9-12
31	Woodrow Wilson High School	1401 Elmhurst Lane	Darrell Lassiter		757 465-2907	<a href="mailto:DARRELL.LASSITER@pps.k12.va.us">DARRELL.LASSITER@pps.k12.va.us</a>	9-12
32		124 W. Queens Drive, Williamsburg, Va 23185	Eddie Chengiah		757-258-7662	<a href="mailto:echengiah@ycsd.york.va.us">echengiah@ycsd.york.va.us</a>	6-8

## Gulf Coast Teacher Workshop: List of Attendees

Sr.No	School Name	School Address	Name	Title	Phone Number	email	Grade Level
1	Bryant Career Tech Center	8950 Padgett Switch Road	Glenn Lowery	Welding Instructor	251-957-2845	<a href="mailto:glowery@mcpss.com">glowery@mcpss.com</a>	9th-12th
2	BRYANT CAREER TECH CENTER	8950 PADGETT SWITCH RD, IRVINGTON, AL 36544	ALLAN BROWN	ELECTRICAL INST	251-957-2845	<a href="mailto:abrown@mcpss.com">abrown@mcpss.com</a>	9th-12th
3	Jackson County Technology Center	12425 Hwy 57 Vancleave, MS 39565	Kim Aflague	Counselor	228-826-5944	<a href="mailto:kaflague@jaco.k12.ms.us">kaflague@jaco.k12.ms.us</a>	10-12
4	Bay High School	750 Blue Meadow Road, Bay St. Louis, MS 39520	Amy Richardson	Teacher	2284675297	<a href="mailto:arichardson@bwsd.org">arichardson@bwsd.org</a>	9-12
5	Bay High School	750 Blue Meadow Road, Bay St. Louis, MS 39520	Gayle Moore	Teacher	2284675297	<a href="mailto:gmoore@bwsd.org">gmoore@bwsd.org</a>	9-12
6	Mobile County School District	49 Snow Rd, Semmes, AL	Gesa Capers	Science Teacher	251 221 3153	<a href="mailto:BlackLabBeach@cs.com">BlackLabBeach@cs.com</a>	9-12
7	Biloxi High School	1845 Richard Drive Biloxi, MS 39532	Imogene Fortenberry	Teacher	(228) 539-2258	<a href="mailto:imogene.fortenberry@biloxi.schools.net">imogene.fortenberry@biloxi.schools.net</a>	10 - 12
8	Gautier High School	4307 Gautier-Vancleave Road, Gautier, MS 39553	Billy Walker	Science Teacher	228.218.9535	<a href="mailto:bwalker@psd.k12.ms.us">bwalker@psd.k12.ms.us</a>	10-12
9	Faulkner Career Technical Center	33 W. Elm St. Prichard, AL 36610	Tim Vargus	Welding Teacher	(251) 221-5431; (251) 367-0982	<a href="mailto:tdevargus@mcpss.com">tdevargus@mcpss.com</a>	9-12
10	Mobile County School System		Brenda Brazile	Chemistry Teacher			9-12
11	Long Beach High School	300 E. Old Pass Rd. Long Beach, MS 39560	Chris Stevens	Teacher	228-860-7501		9-12
12	Vancleave High School	1224 Highway 57, Vancleave, MS 39565	Karen Tootle	Math Teacher	228-826-0920	<a href="mailto:ktootle@jaco.k12.ms.us">ktootle@jaco.k12.ms.us</a>	9-12
13	Vancleave High School	12424 Highway 57, Vancleave, MS 39565	Jason Diaz	Technology Discovery Teacher	228-861-4826	<a href="mailto:Jdiaz@jaco.k12.ms.us">Jdiaz@jaco.k12.ms.us</a>	9th
14	Long Beach High School	300 E. Old Pass Rd. Long Beach, MS 39560	Thomas Mallini	Teacher	228-342-8983	<a href="mailto:tomsdojo@aol.com">tomsdojo@aol.com</a>	9-12
15	Vancleave Middle School	4725 Bulldog Lane Vancleave, MS 39565	Carolyn Layton	Computer Discovery Teacher	228-826-0883	<a href="mailto:lytpnts@aol.com">lytpnts@aol.com</a>	Eighth Grade
16	Murphy High School		Don Jones	Advanced Math Teacher		<a href="mailto:donjones@mcpss.com">donjones@mcpss.com</a>	
17	ATN		Byron Dunn				

# **SBRCD Project Results**

## **Title**

Ship Building and Repair Career Day Events (SBRCD)  
TIA 2007-375

## **Executive Overview (What?)**

During the past several years, workforce issues have emerged as a dominant concern for the shipbuilding and repair industry. Related issues include concern about workforce aging, lack of basic technical education, career transition processes, recruitment and training of the new workforce, retention and training of the incumbent workforce, image of the industry and lack of career information for middle and high school students.

The Shipbuilding Career Days project provided two day-long educational events for students to learn about various career options in shipbuilding and ship repair in the two major shipbuilding areas namely Hampton Roads and Gulf Coast. It addressed the knowledge gap that exists among middle and high school students about careers in the shipbuilding and repair industry and promoted a positive industry image to students and the general public.

The project team, led by Old Dominion University, developed four simulation kits for use by counselors and teachers that provide a valuable learning experience for students about various trade activities and processes involved in building a ship. The career day events included hands-on activities to provide realistic experiences about the work environment and processes that are used in shipbuilding and the ship repair industry. The career days also included programs to educate counselors and teachers about the needs of the shipbuilding and repair industry.

The ultimate goal of this effort was to improve the shipbuilding and repair industry's ability to recruit qualified candidates by creating a larger pool of interested candidates and establishing a pipeline for future recruitment.

Feedback comments from both teachers and counselors were excellent. Comments from participants indicate that students enjoyed participating in all three components of the event namely hands-on activities, industry expo and shipyard tour. Comments from teachers have been equally positive. In summary, the SBRCD project has been well received and the organizers are planning a similar event in 2009 with the support from industry.

## Description of Methodology (How?)

Research has shown that students are making decisions about careers in the middle schools, but they lack the knowledge about the career paths and job opportunities in the shipbuilding and repair industry. Similar knowledge gap exists among teachers and counselors.

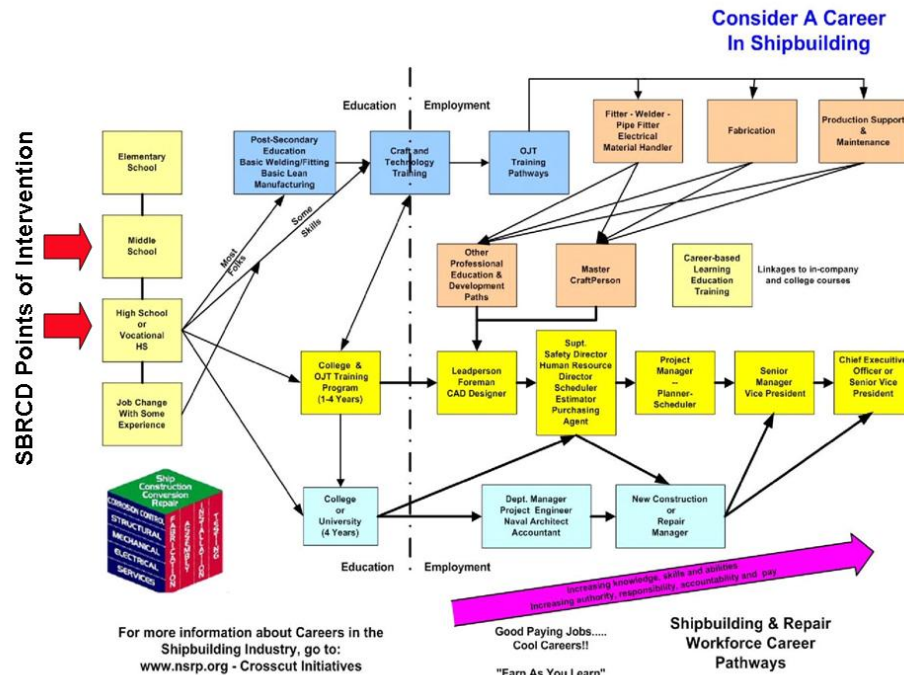


Figure 1. Shipbuilding Career Paths  
(Bender Shipbuilding & Crosscut Initiative Panel Presentation)

To address this lack of awareness, a number of shipbuilding companies have developed career paths based on the one used by the construction industry. Figure 1 show the career path diagram used by Bender and Senesco Marine and also shows the points of intervention for this project. Consequently, the focus of this project was on the middle school, high school and vocational technology students. The objective was to increase career awareness at an early stage along with projecting a positive image of the industry to attract a large pool of potential candidates.

## Implementation and Technology Transfer

Key elements of implementation and technology transfer are described in detail below:

### 1. Gulf Coast Career Day Event

The first Shipbuilding and Repair Career Day Event was held in Mississippi Gulf Coast Community College (MGCCC), Gautier, Mississippi on January 17, 2008. It

offered an educational and fun-filled environment for middle and high school students to learn about various career options in shipbuilding and repair. It also provided school counselors and teachers a realistic picture of shipbuilding and repair industry. The event was held from 8.00am till 3.00pm. About 400 students and 35 teachers from different schools in Mississippi and Alabama participated in this daylong event.

## **2. Hampton Roads Career Day Event**

The Shipbuilding and Repair Career Day Event was held in the Ted Constant Convocation Center at the Old Dominion University on February 21, 2008. It offered an educational and fun-filled environment for middle and high school students to learn about various career options in shipbuilding and repair. The event was held from 8.00am till 3.00pm. About 600 students and 50 teachers from different schools in Virginia and North Carolina participated in this daylong event.

## **3. Simulation Kits**

Four simulation kits related to shipbuilding and repair activities were developed. These kits were designed to address specific standards of Learning (SOLs) in math and physical sciences. The simulation kits engage students with hands-on activities related to shipbuilding and repair processes.

## **4. Workshops for Teachers and Counselors**

Workshops for teachers and counselors were conducted in Hampton Roads and Mississippi area to make them aware of career paths in ship building and repair industry. Invited speakers from industry provided information about career opportunities within the industry. Teachers and counselors were trained in using the simulation kits and were given each a set of four kits.

## **5. Development of SBRCDD Website**

The dedicated SBRCDD website was developed and used for student and teacher registration. Three separate sections of website were developed for students, teachers-counselors and industry.

- a) **Students:** The students section has information useful for students. It contains information about the career day events in Gulf Coast and Hampton Roads areas, information about shipyard tours, online ship design simulation, summary of four simulations developed under SBRCDD project, hands-on activities and useful career links.
- b) **Teachers / Counselors:** This section includes the flyers for teachers and counselors and other relevant information about the project and career day event. This section also includes downloadable simulation documents and bill of materials to make the kit.

- c) **Industry:** This section has information about career day event, sponsorship information for the industry as well as online registration for companies to participate in the expo.

## **6. Advertisements in Local Media**

A black and white advertisement, 2 columns x 3 inch in size was published in the local newspapers. This advertisement ran on Friday in the week prior to the career day event; and on Monday and Wednesday during the week of the career day event. SBRCD team worked with the sales department of the local newspapers to finalize the advertisements.

Advertisements for the Gulf Coast appeared in the following news papers:

1. Sun Herald
2. Mississippi Press
3. Mobile Register

Advertisements for Hampton Roads appeared in the following papers:

1. Virginian Pilot
2. Daily Press

## **7. Presentations at Conferences / Workshops**

Project director Dr. Alok Verma presented information about the SBRCD project at a number of national industry conferences. List of presentations is provided below:

“Marine Kits- Promoting Inquiry Based Learning in Introduction to Engineering Class.” Alok K. Verma, Presented at the LAI Ed Net Educators Conference, Boston, MA, April 24-25, 2008.

“Shipbuilding and Repair Career Day Event and SBRCD Project.” Alok K. Verma Presented at the HRQMC workshop hosted by Lean Institute, Old Dominion University, Norfolk, VA, February 14, 2008.

“Shipbuilding and Repair Career Day Event and SBRCD Project.” Alok K. Verma Presented at the Teacher Workshop, Old Dominion University, Norfolk, VA October 13, 2007.

“Shipbuilding and Repair Career Day Event and SBRCD Project.” Alok K. Verma Presented at the Counselor Workshop, Old Dominion University, Norfolk, VA October 12, 2007.

“Shipbuilding and Repair Career Day Event and SBRCD Project.” Alok K. Verma, Presented at the Teacher Workshop, MGCCC, Gautier, MS, September 15, 2007.



“Shipbuilding and Repair Career Day Event and SBRC D Project.” Alok K. Verma, Presented at the Counselor Workshop, MGCCC, Gautier, MS, September 14, 2007.

“Improving Ship Building & Repair Career Awareness among Middle and High School Students via Simulations (SBRC D Project).” Alok K. Verma, Presented at the LAI Ed Net Summer Workshop, Boeing Headquarters, Chicago, IL, July 29-Aug 1, 2007.

“Enhancing Student Learning in Engineering Technology Programs – A Case for Physical Simulations.” Alok K. Verma, Proceedings of the ASEE Annual Conference, Honolulu, HI, June 24-27, 2007.

“Improving Shipbuilding and Repair Workforce through Career Day Events.” Alok K. Verma and Carol Considine, Presented at the LAI Plenary Conference, Cambridge, MD, April 18, 2007.

“Shipbuilding and Repair Career Day Events Organized by Lean Institute at ODU.” Alok K. Verma, Presented at the Maritime & Transportation Center Summit, TCC, Portsmouth, VA, April 4, 2007.

“Shipbuilding and Repair Career Day Events.” Alok K. Verma, Presented at the Lean Academic Network Meeting at the Shingo Prize Conference, Jacksonville, FL, March 27, 2007.

### **Resources Needed for Implementation**

- Shipyard employees and apprentices for conducting hands-on activities related to various trades.
- Industry sponsorship to support the cost of advertisements, teacher’s stipend, lunch for participants, banners and signs and planning for the event.
- Student volunteers to manage facilities, student flow on the day of the event.
- University or community college faculty to train the teachers in using simulation kits.
- Simulation kits and Instructional manuals for the simulation activities for each teacher and counselor. These kits can be purchased from the Lean Institute at ODU.

### **Evaluation and Analysis Methods**

SBRC D project received excellent remarks from teachers and counselors. Teachers were very enthusiastic about using the four simulation kits in their class rooms. Counselors found the information about careers, especially the apprenticeship program in the shipbuilding and repair industry very helpful. Pre and Post surveys and student evaluations were used to assess the impact of this project.

Pre-Survey of Results SBRCD Event - Gulf Coast					
Questions	Number of Students:				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There are a lot of career opportunities in the field of Shipbuilding and repair.	113	95	41	6	11
Shiprepair operations include repainting,overhauling,shipconversions and alterations.	87	105	55	6	13
dimensions,weight,load carrying capacity or their intended service.	71	110	66	11	8
Labor shortage has reduced profits, impacted construction cost and delayed project completion for most shipyards.	43	85	101	26	11
Many shipyards have difficulty in attracting and retaining an adequate supply of	44	82	98	29	13
	TRUE	FALSE			
Shipbuilding and repair industries have high paying job positions?	241	25			
I would consider a career in the ship building and repair industry?	177	89			

Total number of students submitte 266

Post-Survey Results of SBRCD Event Gulf Coast					
Questions	Number of Students:				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There are a lot of career opportunities in the field of Shipbuilding and repair.	120	43	15	3	2
Shiprepair operations include repainting,overhauling,shipconversions and alterations.	84	74	17	5	3
Ships are often classified by their basic dimensions,weight,load carrying capacity or their intended service.	77	68	26	5	7
Labor shortage has reduced profits, impacted construction cost and delayed project completion for most shipyards.	48	76	44	8	7
Many shipyards have difficulty in attracting and retaining an adequate supply of qualified production workers.	52	58	46	16	12
	TRUE	FALSE			
Shipbuilding and repair industries have high paying job positions?	178	5			
I would consider a career in the ship building and repair industry?	123	60			

Total number of post survey 183

## Gulf Coast Career Day Event

The general comparison of the pre and post event surveys clearly indicated the lack of knowledge amongst the middle and high school students about the shipbuilding and repair industry and also about the career paths in this industry. Higher positive responses in the post event survey indicate the positive impact of the program. The responses to all five questions show a differential of 12%-23%.

Students seem to agree that shipbuilding and repair industry offers high paying jobs after attending the event. An increase, though marginal can be seen in the

responses for questions 6 and 7 where students were asked about the possibility of following careers in shipbuilding and repair.

### Hampton Roads Career Day Event

The general comparison of the pre and post event surveys clearly indicated the lack of knowledge amongst the middle and high school students about the shipbuilding and repair industry and also about the career paths in this industry. Higher positive responses in the post event survey indicate the positive impact of the program. The responses to all five questions show a differential of 13%-50%.

Significant increase can be seen in the positive responses for questions 6 and 7 where students were asked about their chances of taking up shipbuilding and repair as a career.

Pre-Survey of Results SBRCD Event Hampton Roads					
Questions	Number of Students:				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There are a lot of career opportunities in the field of Shipbuilding and repair.	105	115	40	14	26
Shiprepair operations include repainting,overhauling,shipconversions and alterations.	83	125	53	30	9
Ships are often classified by their basic dimensions,weight,load carrying capacity or their intended service.	50	90	130	20	10
Labor shortage has reduced profits, impacted construction cost and delayed project completion for most shipyards.	63	87	87	54	9
Many shipyards have difficulty in attracting and retaining an adequate supply of qualified production workers.	24	45	199	24	8
	TRUE	FALSE			
Shipbuilding and repair industries have high paying job positions?	147	153			
I would consider a career in the ship building and repair industry?	135	165			
Total number of students submitted:		300			

Post-Survey Results of SBRC Event Hampton Roads					
Questions	Number of Students:				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There are a lot of career opportunities in the field of Shipbuilding and repair.	149	80	17	8	5
Shiprepair operations include repainting,overhauling,shipconversions and alterations.	134	83	22	10	10
Ships are often classified by their basic dimensions,weight,load carrying capacity or their intended service.	128	82	32	8	9
Labor shortage has reduced profits, impacted construction cost and delayed project completion for most shipyards.	137	70	28	16	8
Many shipyards have difficulty in attracting and retaining an adequate supply of qualified production workers.	112	79	47	14	6
	TRUE	FALSE			
Shipbuilding and repair industries have high paying job positions?	208	51			
I would consider a career in the ship building and repair industry?	207	53			
Total number of post survey received:		259			

## Career Day Event Evaluations

In addition to assessing the change in attitude about shipbuilding and repair industry, students were asked to evaluate the Career Day Event for practical learning, effectiveness etc.

### Gulf Coast Career Day Event

The average “strongly agree” response percentage is 45.1 and that for the “agree” responses is 31. So, more than 76%of the respondents felt that the event was well organized and provided first hand experience about processes used in shipbuilding and various job opportunities and career paths available in the industry.

### Hampton Roads Career Day Event

The average “strongly agree” response percentage is 47.4 and that for the “agree” responses is 25.72. So, more than 72%of the respondents felt that the event was well organized.

### Cost Benefit analysis/ROI

It is anticipated that construction and repair yards in Hampton Roads and Gulf Coast will have a larger pool of applicants for technical jobs in future. It is too early to measure the impact on students since it has been just over a year since the last career day event was held.

## **Lessons Learned**

Based upon the results of the attitudinal surveys and feedback comments from the teachers, counselors and industry participants, the SBRCD project was a grand success. Enrollment target for the teachers and counselor's workshop and career day events were met. Information dissemination within gulf coast school districts was a problem. Several teachers learnt about the workshop from their peers and not from the school management. Stipend for participation was welcomed by the teachers. Teachers enjoyed presentations by industry professionals about career paths and job opportunities. Teachers were enthusiastic about implementing simulation activities within their classrooms. Money raised through industry sponsorship paid for lunch which was welcomed by all participants. The hard hats and drawstring bags were popular with the students.

For more information, please visit [www.lions.odu.edu/~averma/sbrcd/SBRCDIndex.htm](http://www.lions.odu.edu/~averma/sbrcd/SBRCDIndex.htm).