EDUCATION ENHANCEMENT AND ATTRACTING STUDENTS TO STEM CAREER IN SHIPBUILDING AND MARINE INDUSTRY

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1.0 Abstract:

This paper aims to educate technicians in the area of shipbuilding. It is a multifaceted paper involving professional development for the college faculty and secondary school teachers, curriculum and education material enhancement, and career pathways development. This paper will improve and modernize technician education at the college level by preparing faculty and students with industry-relevant instructional modules and by attracting secondary school students to these educational pathways to provide a highly competent, well-educated and advanced workforce for the shipbuilding industry. The paper also increases career awareness about the shipbuilding-affiliated workforce with active learning kits while presenting a positive image of the industry. Its mission is to focus and coordinate member resources on issues, challenges, and opportunities facing the ship industry in Louisiana and across the nation. By way of these entities’ long and productive partnership with their collaborators, comprehensive industry needs have been surveyed and validated through literature review. This will familiarize students with technical knowledge about the critical technologies of Virtual Reality, Lean Manufacturing and Rapid Product Development. Such familiarization will equip students with the necessary knowledge and skills, thus helping them to tackle practical problems when they join the industry.

Keywords: Shipbuilding, Marine Engineering, students, teachers, Lean Manufacturing.
2.0 Introduction:

As we all know Shipbuilding is not an easy task. It requires immense planning and perfect execution in order to make the ship sustain any situation. This is why having good knowledge in building a Ship is very essential. The responsibility of Shipbuilding engineer is not only to build and design ships in the shipyards, but also needs to perform maintenance and repair work on a ship making sure that it can withstand and overcome any situation resulting in smooth sailing in the sea at any point of time. There are few universities which offer education on building a ship and steps to maintain it, to give the engineers a broader idea and motivate students to Shipbuilding Engineering is the main idea of this paper.

A person responsible for designing a ship, performing operation and maintenance of ship’s engines is called Marine Engineering. A Marine Engineer must be capable of dealing with many obstacles like physical space constraints, extreme weather conditions, deep water, and remote locations. Having this constraints in mind an Engineer has to develop a high quality operating platform which can adapt any circumstances. Ships are very important means of transport for imports and exports so duty of a Marine Engineer is not complete once he builds a ship. In fact the responsibility doubles in maintaining and operating the developed platform time to time. For maintaining the ship and designing it to sail safely from source to destination is the major task. The Engineer should be intelligent to judge the possible design problems and environment problems which they have to overcome. In order to safeguard the ship from all disasters.
3.0 Key Aspects for Students who wish to become a Marine Engineer:

- Huge scope of development as it is an never ending studies
- Huge demand in the market as they are very few marine engineers
- Very interesting field of study
- Should have good knowledge on terminology and functionality of building Ships
- Need to have in-depth knowledge on physics and mathematics
- Should be accurate in measuring the speed, length and distance to be maintained
- Make sure the ship is never out of fuel and is always under safe conditions
- Be prepared to sail for long periods of time when needed
- As Ships are the major means of transportation for exports and imports a Marine engineer will directly be serving a huge contributor for their Nations Pride.

4.0 Steps to follow before building the ship:

4.1 Purpose for building the Vessels

Before starting to build a ship an Engineer should analyze deeply about all functionality and working of the vessels. Should know about the history of the ships, its success rates its failures. The purpose for building the ship and contribution to the advancement by
building the ship. It is this gathering of bits and pieces of evidence that will create a defined outline of what the ship should or could have looked like.

4.2 Design the Ship

In order to build the ship with good effect it should have a perfect design. An outline structure should be designed of how a Ship should look like what is the capacity it can withstand, what is the distance it can travel, what should be the time incurred in developing the ship, the cost to be spent in building the ship. This perfect outline of Yacht and the vessels should help the engineer to proceed in building the ship according to the sketched plan.

4.3 Building of the Vessels.

Having the detailed structure towards the construction of ship. An Engineer should now focus on how to build a Ship allowing it to sail in any given conditions. Important factor which an engineer needs to remember is to measure the kinetic energy it needs to possess, the fuel is can hold, measure the time it need to take for sailing from one given point to destination. Starting with the construction of ship very importantly the platform which is the base of the ship should be very strong and according to the length we analyzed during design phase.

4.4 Rigging and Hoisting the Sails

Sailing of the ships are not designed or modeled earlier. It is the engineer’s choice to sail in the best possible ways. The sailing process should involve the efficient way of using the fuel, best ways to overcome from disasters. It is the engineer’s responsibility to make sure the ship is not over flooded with many round tripping mechanisms. Engineer should make sure the ship sails to the desired destination without any problems before he starts sailing in the sea.

4.5 Shipping

Shipping includes of either exchange of goods from one source to destination or moving passengers from one place to another. There are some ships which do only the specified work for which it is constructed, this is planned during the design phase. If the ship is modeled for exchanging goods then it is designed with much harder platform and bigger capacity. If the vessel is used for transporting passengers then it is built with less motors and increasing speed of time to reach destination.
4.6 Maintenance

Maintenance is an important phase of engineering. The responsibility of Marine Engineer is not complete only when he builds a vessel. It is very important to maintain it in every phase to make sure the ship is always safe from any disasters. A ship should go on sailing only after the engineers are sure on how to maintain it if there are any problems during the journey. There are many ways which effects and halts the ships from sailing like lack of fuel, environment changes, overloaded ship, fire in the ship, many more an Engineer should have mechanism to overcome every possible disasters ensure the ship and the possession inside the ship are always safe.

5.0 Examples

Example 1

<table>
<thead>
<tr>
<th>IDEA</th>
<th>Building a Ship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives</td>
<td>Students are placed in different departments to work on their assigned tasks</td>
</tr>
<tr>
<td>Responsible Tasks</td>
<td>Students have to calculate the Weight, draft and kinetic energy of the ship</td>
</tr>
<tr>
<td>Learning skills</td>
<td>Students learn about the components of a ship, operations within a shipyard, methods of ship construction, design calculations</td>
</tr>
</tbody>
</table>
### Material Requirements

- Teacher’s manual
- Student handout
- Student book
- Scissors
- Rulers
- Glue sticks
- Protractors
- Tape

### Example 2

**IDEA**

Construct a Submarine

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Students with enact as employees of PQR yard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible tasks</td>
<td>Identify the number of parts required in building a submarine, construction of a submarine and cost of a ship</td>
</tr>
<tr>
<td>Learning skills</td>
<td>Students will learn basics about ship, about submarines and the construction methodologies, How to estimate the cost and how to measure the required number of parts</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Material Requirements</td>
<td>Teacher’s manual, students handout, students book, cost estimator, ruler</td>
</tr>
</tbody>
</table>

**Example 3**

<table>
<thead>
<tr>
<th>IDEA</th>
<th>Identifying possible causes for disasters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives</td>
<td>Students should be able to estimate the possible causes for disaster and the immediate preventive measures of safeguarding the ship</td>
</tr>
</tbody>
</table>

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### Responsible Tasks

Students have to imagine as Disaster agencies and analyze what are the factors that cause disasters. Should model the design of the ship in such a way it can overcome the disasters.

### Learning skills

Students learn about the fundamental components of the ship. Importance of a strong design and preventive methods for a ship.

### Material Requirements

Teacher’s manual, Student handout, student book, Disaster agency manual.

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**Example 4**

<table>
<thead>
<tr>
<th>IDEA</th>
<th>To build an Sea perch robot</th>
</tr>
</thead>
</table>

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<table>
<thead>
<tr>
<th>Objectives</th>
<th>Students should be able to understand the underwater robotics program and ocean engineering principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible Tasks</td>
<td>Students need to build an underwater Remotely Operated Vehicle (ROV) which engineers all the operations done inside the sea.</td>
</tr>
<tr>
<td>Learning skills</td>
<td>Students learn about the fundamentals of Robotics, underwater functionalities, resources and live beneath the sea.</td>
</tr>
<tr>
<td>Material Requirements</td>
<td>Teacher’s manual, Student handout, student book, scissors, glue, Artificial Intelligence material for building the robot.</td>
</tr>
</tbody>
</table>

6.0 Conclusion

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In this paper we have presented the various benefits to the students by learning Marine Engineering. In purpose of creating interest for students towards ship building we have taken many examples to show how a ship is build what will be the responsibilities of the teacher and the student. We have illustrated about the challenges and advantages of marine Engineering, what are various aspects an engineer will look into before building the ship and the steps to follow to overcome any unconditional occurrence of disasters. Ship Building is very interesting concept to learn as till today ships are major means of transportation to exchange goods. This field is also best for the people who like traveling many place. In this advanced world, where we need to have immense knowledge towards a subject to prove ourselves eminent in the society Marine Engineering is really challenging and brings huge respect to us as we will be part towards our nations pride.

7.0 References

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