

**Basic Naval Knowledge and
Seamanship e-Learning Web Portal
for
Sri Lanka Navy**

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Basic Naval Knowledge and Seamanship e-Learning Web Portal for Sri Lanka Navy

**A dissertation submitted for the Degree of Master of
Information Technology**

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2016



Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

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Abstract

Basic Naval Knowledge and Seamanship web portal is for Sri Lanka navy in order to provide a solution for under trainees of the Sri Lanka navy and it may expand to all other naval persons, and also beneficial for the who are in the field of maritime domain.

Currently the Sri Lnaka Navy training or education mainly focused on paper based learning and teaching system. Due to the advancement of technology and low price of the digital computing equipment, many young individuals use the mobile devices and laptops more than books. And it is a good thing if we can reduce the printed materials and encourage the e-learning methods. And it will save time of naval persons who having very hard time during training. By introducing a web portal trainees get more advantages in reviewing and understanding subjects.

This web portal is focused on catering the trainees of Sri Lanka Navy with Naval Knowledge and Seamanship subject area with the use of multimedia tools (video, audio and images). It will help the trainees to gain their knowledge in 24x7 and also help other relevant persons to update the knowledge on subject area.

The web portal is developed using a content management system based on apache web server as the server environment, PHP as the development language and My SQL as the database management system because they are the most trusted stable solutions to provide a low cost efficient solution. And other multimedia equipment and Software are used for create relevant contents.

Basic naval knowledge and seamanship helps the trainees to use the technology in a useful manner and help Sri Lanka Navy to improve the standard of training.

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List of Abbreviations

HTTP – Hyper Text Transfer Protocol

ICT - Information and Communication Technologies

MDLC - Multimedia Development Life Cycle

PHP – Hyper Text Pre Processor (Recursive Term)

RDMS – Relational Database Management System

RUP - Rational Unified Process

SQL – Structured Query Language

UCSC – University of Colombo School of Computing

UML - Unified Modeling Language

SLN- Sri Lanka Navy

NMA – Naval and Maritime Academy

SLNS- Sri Lanka Naval Ship

CHAPTER 1

INTRODUCTION

CHAPTER 1 – Introduction

1.1 Introduction

This chapter contains the information about the client and their company, the problem, motivation factors to give a solution to the problem, objectives which should be achieved, the project scope and system requirements for implementation of the project.

1.2 The Client and Business Background

Sri Lanka navy plays the major role in country's defense since the country been an Island Nation. Sri Lanka Navy is a well-balanced and cohesive force, capable of operating in waters around Sri Lanka effectively safeguarding our national interests. Sri Lanka Navy provides assistance to other three forces including Sri Lanka Army, Sri Lanka Air Force and Sri Lanka Police to maintain law and order during operational requirements and other emergencies with the primary responsibility of sea around the country being golden fence. At present, Sri Lanka Navy consist of huge cadre, around 50,000 including Regular and Volunteer Naval forces of both Officers and Sailors.

Each and every naval person who are recruited or enlisted to Sri Lanka navy should follow Basic Naval Training Course which covers all the knowledge to sail in the sea as well as administrative works in the land and ships. Above all other subjects covered in basic training course, conducted in training establishments of Sri Lanka navy, Basic Seamanship and Naval Knowledge is a comprehensive and most significant subject which teach them the about mechanical, technical aspects of ships and naval culture and tradition.

Sri Lanka Navy has six training establishment around the country. All these establishments conduct courses for varies levels of naval persons. Above all training establishment in the SLN Naval and Maritime Academy (NMA) plays the most prominent role by training for both Officers and Senior / Junior ratings. NMA has international standards ISO 9001:2000 Quality Management System Certifications awarded by the Sri Lanka Standards Institution, since 2007. This was upgraded to ISO 9001:2008 in the year 2010. Even though, it is an ISO Standard training Institution, but still there is no mean of web base learning tools used and the learning strategies including traditional method of face to face teaching and power point base presentation sessions are used with the aid of professional instructors specialized on their field of subject. However, despite the instructional approach, E-learning system will provide –

teaching aids on naval subjects via digital technologies with the aid of e-learning tools which can be replaced live representations of practical sessions by instructors.

1.3 Problem Domain and the Motivation

In the learning environment with the development of the technology multimedia related audio visual components seems to be getting popular other than paper based learning materials. Especially for practical subjects and even for theoretical subjects most of the people feel the lack of online resources for relevant subjects. Although there are audios and videos in internet we don't have the facility to use them from one place. During the lectures it is very oblivious most students don't pay attention to what the teacher teaches. Sometimes they hardly pay attention to what is taught at lectures. When they go out and try to study them alone they find it extremely difficult to understand what is in notes. Most of the time notes contain only the topics and very brief description and the lecturer who teach that tend to explain in huge detail. If the students don't pay attention to what is taught then they can't catch up what is in the slides.

Learning environment is completely different in a military academy not like in university or any other higher education intuition. The student or under trainees are governed by many strict rules and regulations. The trainees have to follow the routine or time schedule which is given to them so they are having a very busy time schedule during their training period. Despite all other routing military duties, trainees have to follow lectures and learn the professional knowledge required to them in future to operate ships and crafts. Currently all the lectures are delivered by professional instructors in class room environments face to face with the aid of power point presentations. In a Subject like seamanship and naval knowledge where lot of physical equipment are used and these are showed to student as separate parts but until they go for their last term on-board ship training they do not get a chance to experience those equipment some parts cannot be seen from outside of a ship too. Although each and every student must attend all the lectures but when it comes to examination lack of finding study materials are a problem. Also concentration on class room instructions and taking notes is bit difficult with the hard morning physical activities and with short time of period it is very hard to read all big reference books and garbed the sufficient knowledge.

Every naval person must sit for the promotional exams to promote for the next rank /rate. For these exams seamanship and naval knowledge is compulsory subject for all branches. Other than sea going branches naval persons all other braches naval persons does not get a chance to involve in the seamanship subject during their day to day work. But there all have to face for same examination to promote to the next rank or rate. My self be an IT office enlisted to Navy in 2011

as direct lieutenant I have personally experienced all above mention problems during my naval career.

By implementing an eLearning web portal students will get a chance to enhance the knowledge effectively and efficiently using intranet in any time anywhere. Most of the above mention problems can be overcome with the use of web base eLearning tool with high use of multimedia. It will help to upgrade the standard of the academy and other training establishment

1.4 Goals & Objectives to be addressed

- The main objective of this project is to create an e-learning website which consists of multimedia tools for trainees in training establishments of Sri Lanka navy.
- The proposed website will be used not only by trainees and it will help instructors and those who interested in naval knowledge subject area.
- It will make the day-to-day activities of the trainees' fast, effective, and efficient.
- To give under trainees' real feeling on traditional naval ceremonial proceedings on board ship and naval equipment which cannot be experience during their basic training period.
- Provide supportive materials for trainees who can't catch up the lectures and for people who not present during the class room instructions.
- Provide a mechanism for trainees to study lessons individually.
- Provide an opportunity for trainees to select certain subject area and study.

1.5 Project Scope

Scope of the project is based on syllables of the subject naval knowledge and seamanship for Cadet Officers and Chapter 02 of Sri Lanka Navy Book of References No.11 (Handbook of Naval Knowledge). The syllables is consisted of 3 main sections of

- Naval Knowledge
- Basic Seamanship
- Basic Rigging

and each sections have sub topics. There will be videos, audios and also 3D models where demonstrations are needed. This will be access via Sri Lanka Navy internal Network (LAN). So anyone inside the naval premises can be access the web anytime. Also there will be FAQs for each and every chapter. And also planning to implement forums, so that students can ask for any further clarifications and instructors can add their views and ideas.

1.6 Structure of the Dissertation

Chapter 1: Introduction

This chapter introduces the background for project with the problem to be solved and the motivation for the project.

Chapter 2: Background/Literature review

This gives the background and literature review. The reader is introduced how the requirements were found. Techniques used to find requirements and a summary of requirements identified.

Chapter 3: Analysis and Design

Third chapter is based on the design stage of the project. It gives the reader understanding of what approaches were used to design system and why. And some interfaces of the system.

Chapter 4: Implementation

This explains the implementation of the proposed system. Implementation tools and techniques which will be used to development the system are included. Sample codes also given here.

Chapter 5: Evaluation

Developed system will be tested against the user requirements which are gathered at the beginning. Actual data from the users are used. Test cases and test results are also stated.

Chapter 6: Conclusion

This includes conclusions, achievements and future enhancements of the project.

CHAPTER 2

BACKGROUND/LITERATURE REVIEW

CHAPTER 2 BACKGROUND/LITERATURE REVIEW

2.1 Introduction

E-learning describes the cognitive science principles of effective multimedia learning using electronic educational technology., and it is one of the tools emerged from information technology. It has been integrated in many universities education programs, shifting from traditional way of education to electronic environment. Deeper learning is observed when words and relevant graphics are both presented than when words are presented alone (also called the multimedia effect) [1]. Simply put, the three most common elements in multimedia presentations are relevant graphics, audio narration, and explanatory text. Combining any two of these three elements works better than using just one or all three.

2.2 Existing Systems

Currently there is no online or web based tools for the trainees in training establishments of Sri Lanka navy to use for the learning or studying propose. All the studying and learning is done using traditional methods. Trainees have class room lectures and there have to take notes and study that for the examination end of the training period. But these all studying is have to done using given short time period with other physical and administrative duties.

Because the website should be developed from the sketch, and there is no current system that analyst can get an idea from observing or inspecting, first analyst should get an idea about relevant systems which are operational in the industry. There are Learning management systems of varies education Institute which can be study for designing of the website interface and other aspects which should be included. And there are eLearning tools design for the merchant Navy which carry a similar concept but follows different traditional aspects than war ships.

2.2.1 Case Study 1: Navy Knowledge Online of US Navy

Navy Knowledge Online (NKO) is a portal used by active duty, reserve and retired enlisted and officers of the United States Navy. NKO provides information and resources such as career management, personal development, leadership, learning, references and more.

Much of these resources can be used for personal and professional development. Navy e-learning provides courses related to the career and courses that can be used if you retire or get out. The Information Technology (IT) courses are an example of education you can use in several setting including home, work and play.

Allowing Navy retired personnel access to Navy Knowledge Online is one smart strategy the uses to tap into a large pool of knowledge available to current active duty and reserve personnel. By keeping the channels open between retired, active duty and reserve, the communications pipeline stays open and knowledge is shared.

Sharing knowledge is many times done through the Navy Knowledge Online forum. One interesting way of sharing information is through the Community of Practice (COP) program. COP allows people to share best practices, advice and expertise in organizational, functional and operational knowledge in a specific interest group. The focus is on continuous learning, mutual exchange and collaboration.

Navy Knowledge Online is one tool enlisted leaders should use and encourage others to use. When supervisors have a new check-in, they should check to see if they have an account with Navy Knowledge Online. This is a good way to assist new members with personal and professional growth. [2]

2.2.2 Case Study 2: Seamanshiptutor.com

This website is designed and developed by Farhan Saeed to provide maritime students free educational supporting material to help them achieve their educational goals.

The website consists of sets Flash based animated videos which explains ship handling with the control room handling animations. The website is only consisted of Merchant Navy accepts which are different form procedures followed by war ships. [3]

2.3 Summary

The requirement of the client is to develop an eLearning website for under trainees of the Sri Lanka Navy. So that under trainees can study and understand the subject matters well and access at any time.

Studying the above systems first Navy Knowledge Online (NKO) is very good web portal which allow naval parsons to study for career courses.

seamanshiptutor.com is very much similar to the propose system but it is design specially for merchant navy and Sri Lankan navy follows different methods, culture and traditions.

CHAPTER 3

ANALYSIS AND DESIGN

CHAPTER 3 ANALYSIS AND DESIGN

3.1 Introduction

Analysis phase is the most significant from the software development life cycle. It is necessary to get a clear idea about the problem domain and what are the user's requirements for the new system before start developing a system.

3.2 Requirement gathering and fact finding

Every system has been designed to fulfill the need of a client. Those goals called requirements. To give the best solution to an identified problem, the analyst must go through every single aspect of the existing system and has to collect details from every level in an organization. To get a good idea about the requirements, author has to use several requirement gathering methods.

3.2.1 Fact Finding Methods Used

- **Interviews:** By interviewing few of the trainees from all levels of courses, and directing staff members has been able to get good idea of the system from the views of all levels of persons involving in training. Author has been able to find out what are the features that have to be included in the website in the future.
- **Gather data from existing documents:** altogether there is no previously- created web based there are lot of pictures or else images related to the subject are available. Most of them are attached in power point presentations. Reviewing the existing documents and other materials in schools computers author able to find out some of the videos too.
- **Site visit:** visiting to the sites and locations, analyst has been able to click some photographs and recoded videos and audios for later use.
- **Observation:** since I'm working in a Sri Lanka Navy and presently station in a training establishment author has observed lot about the problem domain.

- **Studying Similar Systems:** Followed by the collected information from interviews, Site visit, Observation and research studied systems which have been developed with same or similar functionalities.
- **PACT Analysis:** PACT (People, Activities, Contexts, and Technologies) is a useful framework for thinking about a design situation in relation to an interactive system. Performing a PACT analysis would be useful for both analysis and design activities and understanding the current situations, seeing where possible improvements can be made and envisioning future situations.

3.3 Requirement Analysis and Outcome

Gathered data should be carefully checked and it should analyses to get a clear idea of the requirements. Same data can be collected in different ways; those data may give ambiguous meanings. So in analyzing phase, analyst have to make the connections and understand what is really needed by the client and how will it be. Gathered requirements can be categorized into two main categories as functional requirements and non-functional requirements.

3.4 Identified Requirements

Before creating any website its common practice to visualize the layout, the design and all the features you intend to incorporate. In addition, you think about how users will interact with each page and how the site should perform (behavior, load time etc.). In software engineering, establishing a list of requirements for a program is referred to as developing the functional and non-functional requirements.

It is a key step in development process and one that is not only applied to software development, but website development as well.

3.4.1 Functional requirements

- a. Anyone should be able to surf the website form any place using Sri Lanka navy internal network with any internet enable device.
- b. should have a search functions
- c. Do not need any registration or signup to view any page in website.
- e. The site must be compatible with all latest versions of web browsers

3.4.2 Non-functional requirements

Performance: Site performance will be a critical factor since it handles lot images, videos, and Audios to be processed and needs grater bandwidth and server performance.

Appearance and Interactive: Since the website is mainly targeting on trainees, it should be more attractive and interactive. Appearance of the site should be beautiful and the visitors should not feel bored to visit the site.

Availability: System should not crash with high workload or any failure it should be available to the users when it is needed.

Capacity: The Site is coping with high multimedia which requires high capacity with the increasing number and many students interact with the system, so the capacity of the server must be high.

User-friendly: Because most of the trainees is new to an IT system, anyone should be able to easily understand the website and work with it without any problem.

Security: Although Security is critical factor in website. It is not much of consideration here because website is only operates in Sri Lankan navy internal network.

3.5 Design of Solution

System design phase produces the design specification for the system to be developed. It is necessary to draw the relevant diagrams while designing the system. Well drawn diagrams will ease the designer's job. Development methodology should also need to confirm here on the design phase.

3.6 Methodological Approach

3.6.1 Rational Unified Process (RUP)

RUP is the methodological approach which will be used in the proposed system. It is an iterative software development framework created by Rational Software Cooperation. The phases of the RUP are organized and named primarily for what is achieved, [Figure 1]

1. **Inception phase** – Identify the system scope by gathering the user requirements correctly. Business case is established. Should be concerned about the cost/schedule estimate, risk assessment etc.
2. **Elaboration phase** – Mitigate the key risks identified from the previous stage. Develop an overall project plan. Complete the use case diagrams up to 80%.

3. **Construction phase** – Main focus is on the development of the codes.
4. **Transition phase** - End user training and acceptance testing is carried out here.

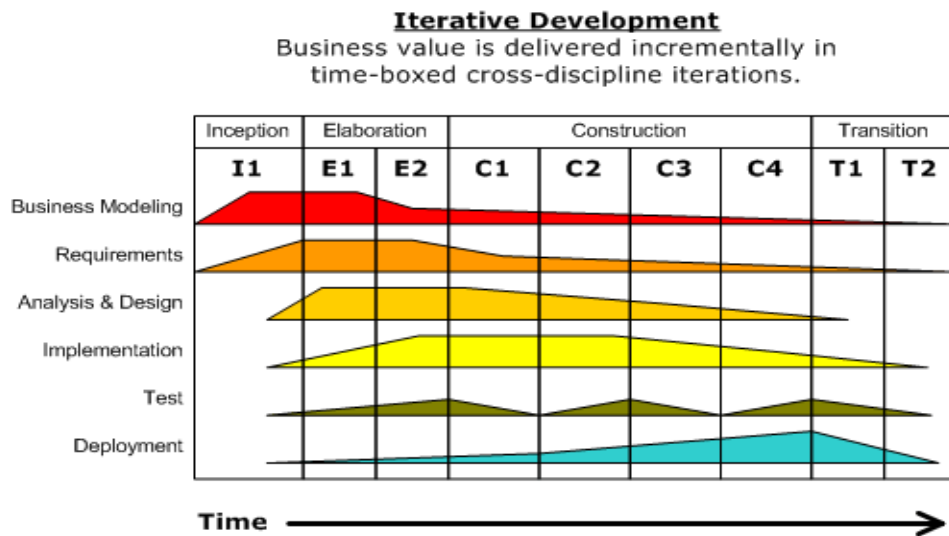


Figure 1 - RUP phases and disciplines

In contrast there are alternative design methodologies which can be used. [4]

3.6.2 The Multimedia Development Lifecycle

Godfrey [5] provides a method which is derived from classical methods of software development known as the Waterfall. Godfrey calls the method with the Multimedia Development Lifecycle (MDL) whereas the method of Waterfall called Godfrey with the Systems Development Lifecycle (SDL). Godfrey method shown in the figure [Figure 2]. From the picture above, it can be concluded that both methodologies (SDL and MDL) only use different terms, but actually doing the same thing can be said.

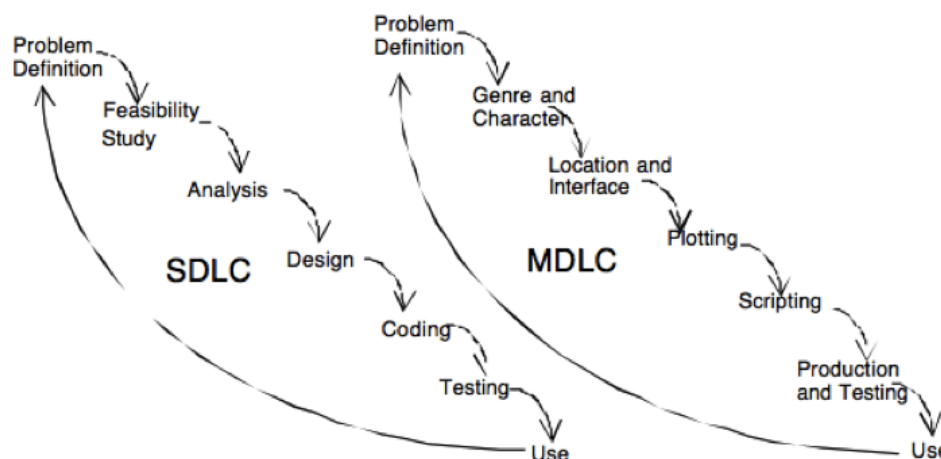


Figure 2 – SDLC and MDLC

3.7 Selecting a Development Approach

Since the project requirements are not well defined and requirements may change along with the development Waterfall Methodology was not chosen as the development approach. In waterfall methodology requirements should be well defined and each phase is started one after other.

According to the user requirements user requests a low cost effective solution. As the development methodology this system will be developed iteratively and use of several methodologies like waterfall, formal methods as well as using multimedia development life cycle.

3.8 System Structure

This is a web based system which is based on client server architecture. A server will be handling client requests and responding them accordingly which is illustrated in the figure [Figure 3]. Because the multimedia components add a lot of capacity and traffic to the server. The uploaded items will be automatically resampled and enhanced, stored as optimized to save bandwidth and space.

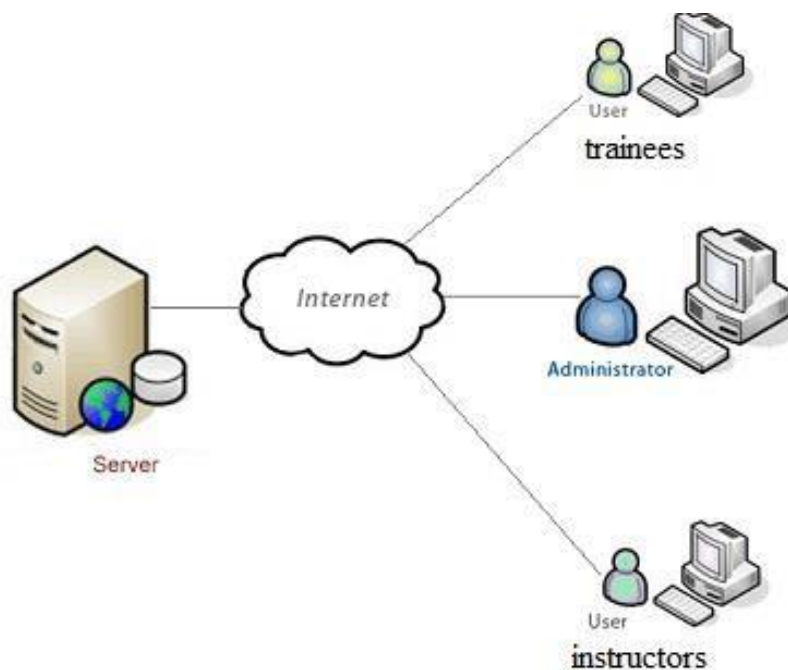


Figure 3- client server architecture

3.9 High level Navigation Structure

The Navigational Structure is important for a Multimedia project since the user need to access all the components. A navigation map outlines the structure of the entire web project [Figure 4] showing all of the HTML pages and the connections from one page to others. It is useful for organizing and clearly seeing how material should be connected.

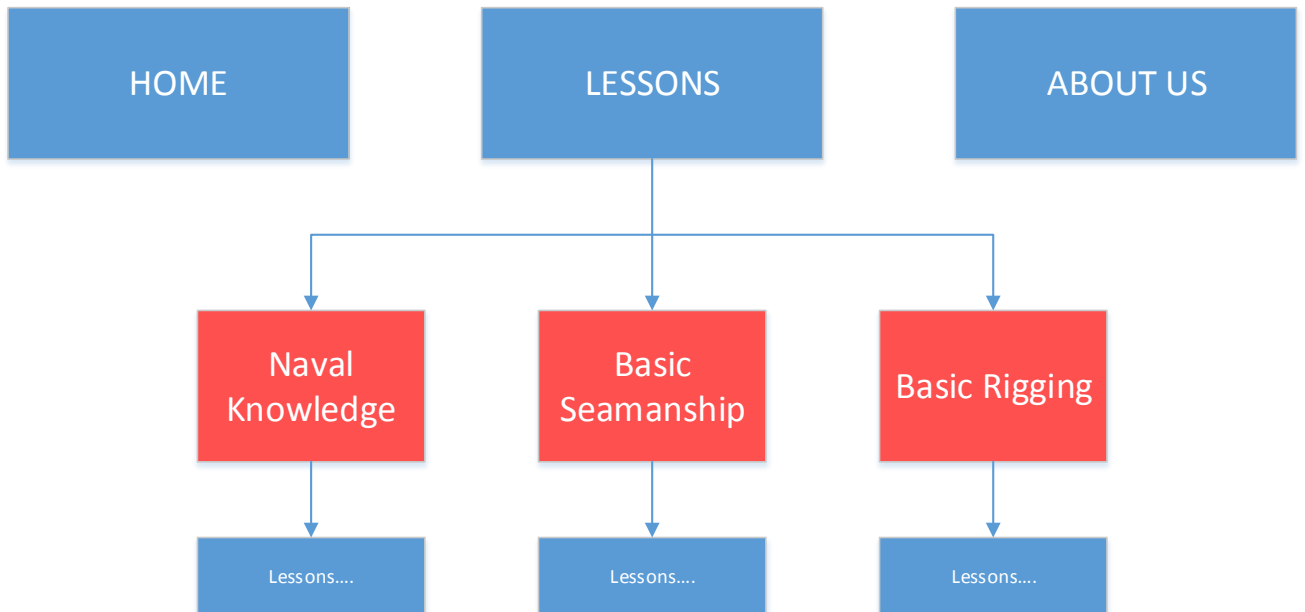


Figure 4 - High level Navigation Structure

3.10 Wireframes of the system

Wireframes are one of the important steps in any screen design process. It primarily allows you to define the information hierarchy of your design, making it easier for you to plan the layout according to how you want your user to process the information. [Figure 5] shows the wireframe of the home page of the system. More wireframes of the system is attached in appendix section

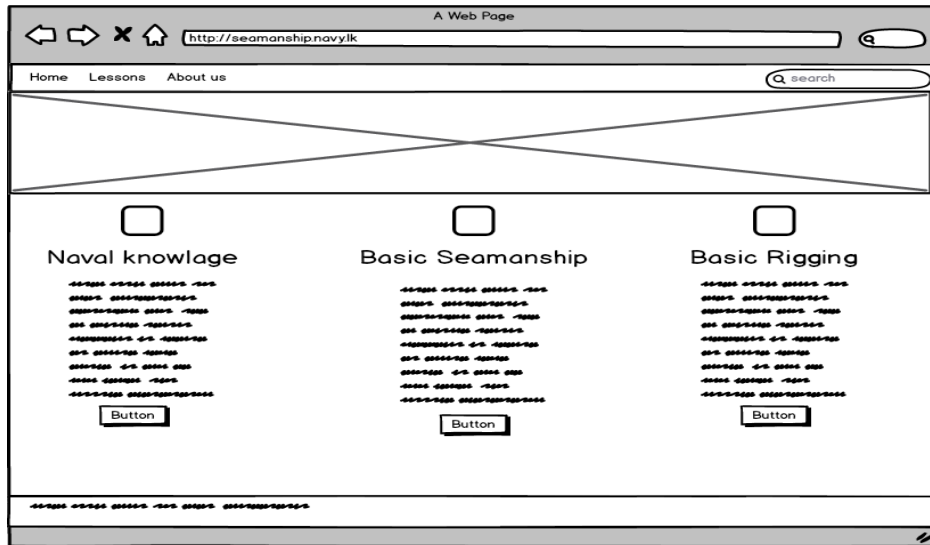


Figure 5 - Wireframes of the home page

3.11 High level Use case Diagram of System Functionalities

Use case diagrams from the Unified modeling language which is drawn to represent the graphical overview of the system users (actors) and their actions and tasks, and some actors have dependencies which mean they must do before proceeding to the next segment, by drawing the use case diagrams [Figure 6] understanding the system functionality and the roles of the system users.

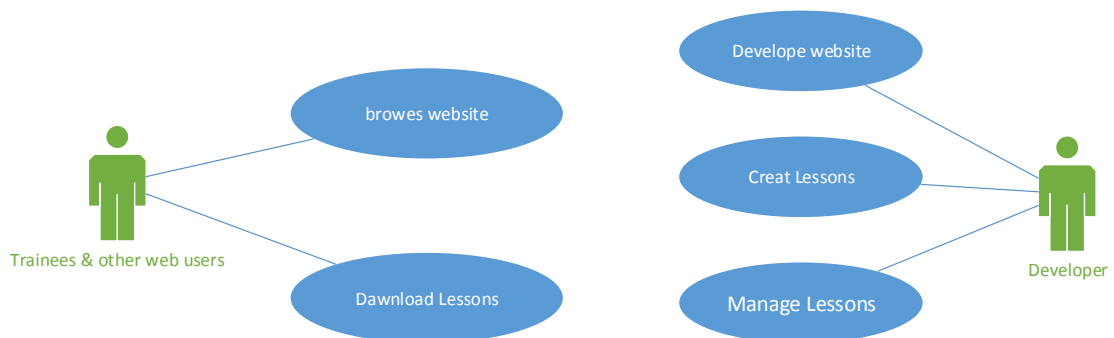


Figure 6 - High level Use case Diagram

3.12 User Interfaces

The goal of user interface design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals (user-centered design). User Interfaces [Figure 7] are designed with HTML, CSS and JavaScript with help of bootstrap framework for Mobile friendly designs. User interface designs are attached on Appendices.

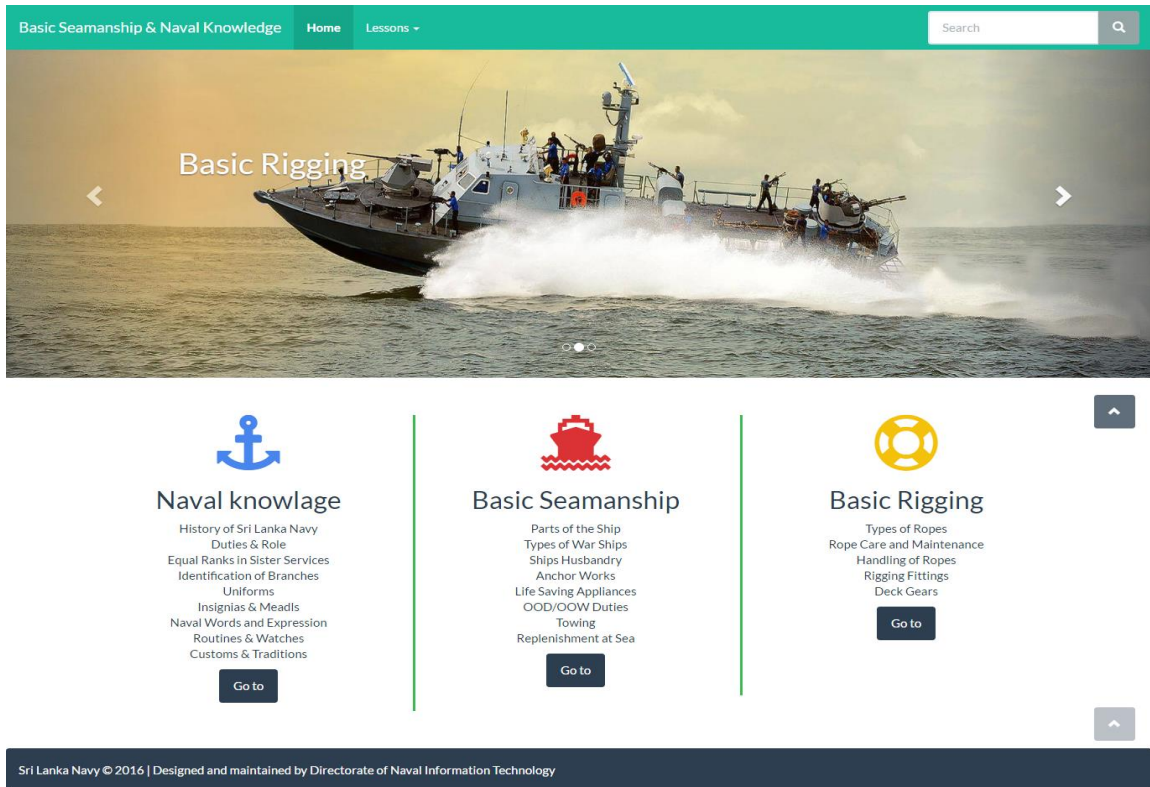


Figure 7 - user interface design of home page

3.13 Storyboard Sample

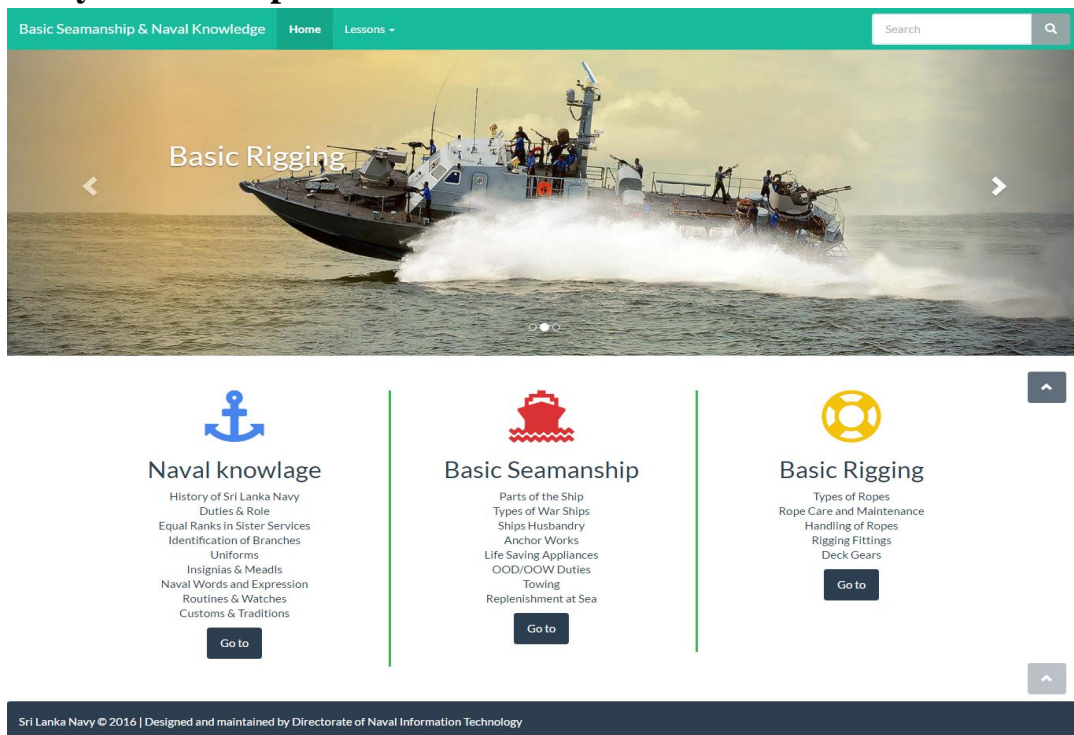


Figure 8 - Storyboard Sample

Font-family: "Lato", "Helvetica Neue", Helvetica, Arial, sans-serif;

Body Font Size: 15px

Header Colour: #149c82

Header size: Full width (auto) x 60px *Responsive layout*

Body Font Size: 15px

Content Colour: #2c3e50

carousel Width: Full width x 500px (*Responsive layout*)

Content Width: 400px (3 col)

Site Background: #fff

Footer Colour: #2c3e50

3.14 Chapter Summery

This chapter describes how the requirements discovered in the analysis phase were assigned with the proper development model. UML modeling diagrams were used to aid this process. Use-case diagrams were used to model the development environment. Also the multimedia content was structured properly with the use of storyboards and navigation structures.

CHAPTER 4

IMPLEMENTATION

CHAPTER 4 IMPLEMENTATION

In this chapter it is explained how the clients requirements that have been analyzed and logically designed content is actually converted to a physical system. The development tools, technologies and hardware requirements are also explained in this chapter. Important code parts are also explained in this chapter.

4.1 Development environment

Hardware Configuration	Software Configuration
Intel core i5 3.2Ghz Processor	Apache Web Server
8GB of RAM	PHP 5 +
200GB Free HDD Space	My SQL 5 +
1024 x 786 Compliant Color Monitor	Adobe Dreamweaver
	Adobe Photoshop
	Adobe Aftereffects
	Adobe Premiere Pro
	Adobe Audition
	3DS MAX

Table 1 - Development Environment

4.2 Web Server

Hardware Configuration	Software Configuration
3.0GHz Intel Xeon Processor	Apache Web Server
8GB of RAM	PHP 5 +
100GB Free HDD Space	My SQL 5 +

Table 2 - Web Server

4.3 Users Minimum

Hardware Configuration	Software Configuration
Any stranded internet enable device	Web browser

Table 3 - User minimum

4.4 Development tools used

- **Adobe Photoshop**

Adobe Photoshop was used to design images for the system and interfaces of the system. It was useful for creating images of the lessons and editing of pictures taken for the lessons.

- **Adobe Dreamweaver**

Adobe Dreamweaver is a WYSIWIG code editor for HTML, CSS , JavaScript and supports scripting languages like PHP, JSP, and ASP etc. This tool was used to code and develop the system.

- **Adobe Audition**

Adobe Audition is a powerful audio editing and mastering tool. This software was used to enhance and optimize the recorded audio clips from lessons.

- **Adobe Premiere Pro**

This software was used to edit and optimize the recorded video clips from lessons.

- **3DS Max**

This software is used to model 3D models for the lessons.

4.5 Software Tools used

The Clients request was to provide a stable economical solution. The best possible option was using open source software.

- **Apache web server**

Apache is an open source HTTP web server which is most widely used in the internet and also apache works on many system platforms. Since April 1996 Apache has been the most popular HTTP server software in use. Apache is used by 55.5% of all the websites whose web server we know. It's a reliable efficient solution for the project as the web server.

- **My SQL**

My SQL is a widely used RDBMS. This is also open source software that is reliable and used for many existing web systems and standalone software systems. Since the system needs a database to store user and image information My SQL was selected.

- **PHP**

As the development language of the system PHP was selected. As it is an open source widely used scripting language with platform independence. And as the web server and RDBMS software are perfectly compatible with PHP.

MODX content management system which is developed using above mentions open source software is used for easy management of the webpages of the system and for the forum component.

4.6 Chapter Summery

This chapter describes how the analyzed project structure was converted to physically working software. It also describes the hardware and software environments used and development software and platforms used to develop the software.

CHAPTER 5

EVALUATION AND TESTING

CHAPTER 5 Evaluation and Testing

5.1 Introduction

Testing is the process of validating and verifying the system. It is required to have a test plan to test the system for any flaws and to verify the requirements of the client are fulfilled. After testing evaluation of the overall project is an essential element of a successful project implementation. This chapter discusses how a comprehensive evaluation was carried out to assess the degree of success associated with the project. The chapter sets out by emphasizing the importance of evaluation, user evaluation approach and defining a set of evaluation criteria. Thereafter, the chapter will focus on selecting target evaluators and discuss the evaluation results obtained by the author.

5.2 Testing Levels

Testing can also be grouped by where they are added in the development process, or by the level of specificity of the test. The main levels testing during the development process can be mainly identified as

- Usability Testing
- Functional Testing
- Compatibility Testing
- Security Testing
- Performance Testing

5.2.1 Usability Testing

In usability testing the application flow is tested so that a new user can understand the application easily. Basically system navigation is checked in Usability testing. A usability test establishes the ease of use and effectiveness of a product using a standard usability test practices.

Usability Test Scenarios:

- Web page content should be correct without any spelling or grammatical errors
- All fonts should be same as per the requirements.
- All the text should be properly aligned.

- All the error messages should be correct without any spelling or grammatical errors and the error message should match with the field label.
- Tool tip text should be there for every field.
- All the fields should be properly aligned.
- Enough space should be provided between field labels, columns, rows, and error messages.
- All the buttons should be in a standard format and size.
- Home link should be there on every single page.
- Disabled fields should be grayed out.
- Check for broken links and images.
- Confirmation message should be displayed for any kind of update and delete operation.
- Check the site on different resolutions (640 x 480, 600x800 etc.?)
- Check the end user can run the system without frustration.
- Check the tab should work properly.
- Scroll bar should appear only if required.
- Title should display on each web page
- All fields (Textbox, dropdown, radio button etc) and buttons should be accessible by keyboard shortcuts and the user should be able to perform all operations by using keyboard.
- Check if the dropdown data is not truncated due to the field size.

5.2.2 Functional Testing

Testing the features and operational behavior of a product to ensure they correspond to its specifications. Testing that ignores the internal mechanism of a system or component and focuses only on the outputs generated in response to selected inputs and execution conditions. The goal of Functional testing is to verify whether your product meets the intended functional specifications mentioned in your development documentation.

Functional Test Scenarios:

- Test the timeout functionality.
- Test the functionality of the buttons available
- Test if any functionality fails the user gets redirected to the custom error page.
- Test all the uploaded documents are opened properly.

- Test the java script is properly working in different browsers (IE, Firefox, Chrome, safari and Opera).
- Test to see what happens if a user deletes cookies while in the site.
- Test to see what happens if a user deletes cookies after visiting a site.
- Test all the data inside combo/list box is arranged in chronological order.

5.2.3 Compatibility Testing

Compatibility testing is used to determine if your software is compatible with other elements of a system with which it should operate, e.g. Browsers, Operating Systems, or hardware. The purpose of Compatibility testing is to evaluate how well software performs in a particular browser, Operating Systems, hardware or software.

Compatibility Test Scenarios:

- Test the website in different browsers (IE, Firefox, Chrome, Safari and Opera) and ensure the website is displaying properly.
- Test the HTML version being used is compatible with appropriate browser versions.
- Test the images display correctly in different browsers.
- Test the fonts are usable in different browsers.
- Test the java script code is usable in different browsers.
- Test the Animated GIF's across different browsers.

Tool for Compatibility Testing:

turbo.net is use to test the compatibility of the application on different browsers on one single machine. [7]

5.2.4 Security Testing

Security Testing involves the test to identify any flaws and gaps from a security point of view. Since the website don't have important security information like passwords, credit card numbers etc. like other systems, security was not consider much. But following acceptant are considered.

- Verify the user roles and their rights. For Example the requestor should not be able to access the admin page.
- Verify the SQL injection attacks

5.2.5 Performance Testing

Performance testing is conducted to evaluate the compliance of a system or component with specified performance requirements.

General Test scenarios:

- To determine the performance, stability and scalability of an application under different load conditions.
- To determine if the current architecture can support the application at peak user levels.
- To determine which configuration sizing provides the best performance level.
- To identify application and infrastructure bottlenecks.
- To determine if the new version of the software adversely had an impact on response time.
- To evaluate product and/or hardware to determine if it can handle projected load volumes.

5.3 Evaluation

The process of evaluating and revising a multimedia application project is dynamic and constant. It involves both internal and external evaluation.

5.3.1 Internal Evaluation

Internal evaluation happens within the multimedia development group, through internal discussions for evaluating the aspects of the application, the prime responsibility of this function lies with the production manager and can be most effective if the team members are open to positive criticism of their peers.

5.3.2 External Evaluation

External evaluation has several components:

- **Alpha Testing**

Alpha testing takes place when the project is considered a working model that it is not finished but it is functional. The purpose of Alpha testing is to determine if the general direction and structure are adequate and what changes are necessary. Members of the Alpha-testing group should include a balance of friends and critiques.

Alpha testing is carried out in the Information Technology Training Cell of Sri Lanka Navy with group consisted of Developer itself and few IT Sailors of Sri Lanka Navy.

- **Focus Group Testing**

After revising the application based on the feedback of the Alpha test, another possible strategy is to present the application to a focus group. These groups are composed of individuals who represent the expected audience of the project. Standardized forms should be used for requesting comments and suggestions from the Focus Group.

This test was carried out at the SLNS Nipuna Advance Naval training center at Bossaa, Galle where Advance Seamanship Coursers are followed. The website was evaluated by the experts on the subject and the instructors of the Advance Naval training center.

- **Beta Testing**

When the project is in a final draft form, access should be available to a group of potential users called a beta-testing group. Here again, standardized questionnaires should be used for collating feedback.

Beta testing was carried out at the Advance Naval training center, SLNS Nipuna Bossa, Galle with selected group of trainees who are following the Advance Seamanship Coursers at the base.

5.4 Chapter Summery

One of the most important aspects of a project is testing process, this chapter describes how the testing process was carried out and what measures and how the tests were concluded. Various testing techniques were used to successfully test every aspects of the project.

CHAPTER 6

CONCLUSION AND FUTURE WORK

CHAPTER 6 CONCLUSION AND FUTURE WORK

This chapter will conclude the dissertation with a critical evaluation of the system and suggestions for any future work. The evaluation should include a critical discussion and assessment of results of project.

6.1 Lessons Learnt

Developing an eLearning website to Sri Lanka Navy is not an easy task we have to consider many things beforehand. First challenge I face when developing the website is collecting the correct subject content there are so many power point presentations and royal navy books about the subject but screening the sufficient materials took long time. Then with the military background adapting to a web based system is very hard with all rules and traditions in class room maintained for long time. Foremost lesson I have learnt throughout this development is how to convert theoretical knowledge that I have gained, into practical knowledge. Because the project only had the concept and to set goals and to understand exactly what is required was challenging. When come to filming, photographing and editing those were critical to this project and to succeed those aspects I had to study about new technologies by referring various sources which helped me to gained vast knowledge about this field. Also I have study lot about modeling using 3ds max software. It is needed to put a great attention to manage the time schedule in project management. Failing to manage the time might result in failing the entire project. It happens to me during the project with some crucial official commitments with performing my duties of Sri Lanka Navy which made me difficult to follow the time schedule.

6.2 Further Improvements

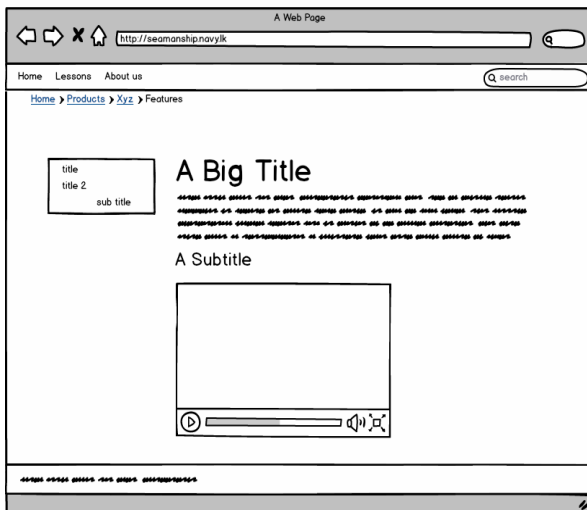
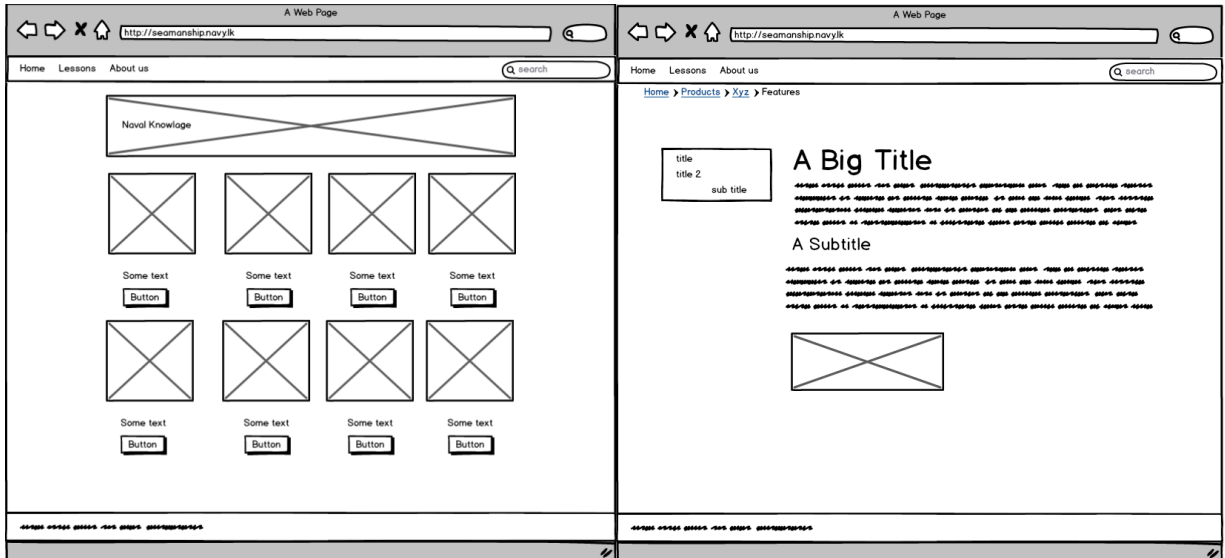
There could be lot of improvements to the website with adding security features and maintain in authorization levels. Improvement of performance of the website is necessary with the time. Based on this eLearning website they can develop eLearning system for other subjects too and join all into one centralized eLearning system .Furthermore in order to serve more it can be upgrade to a virtual learning management system with involvement of instructors and other related stakeholders.

References

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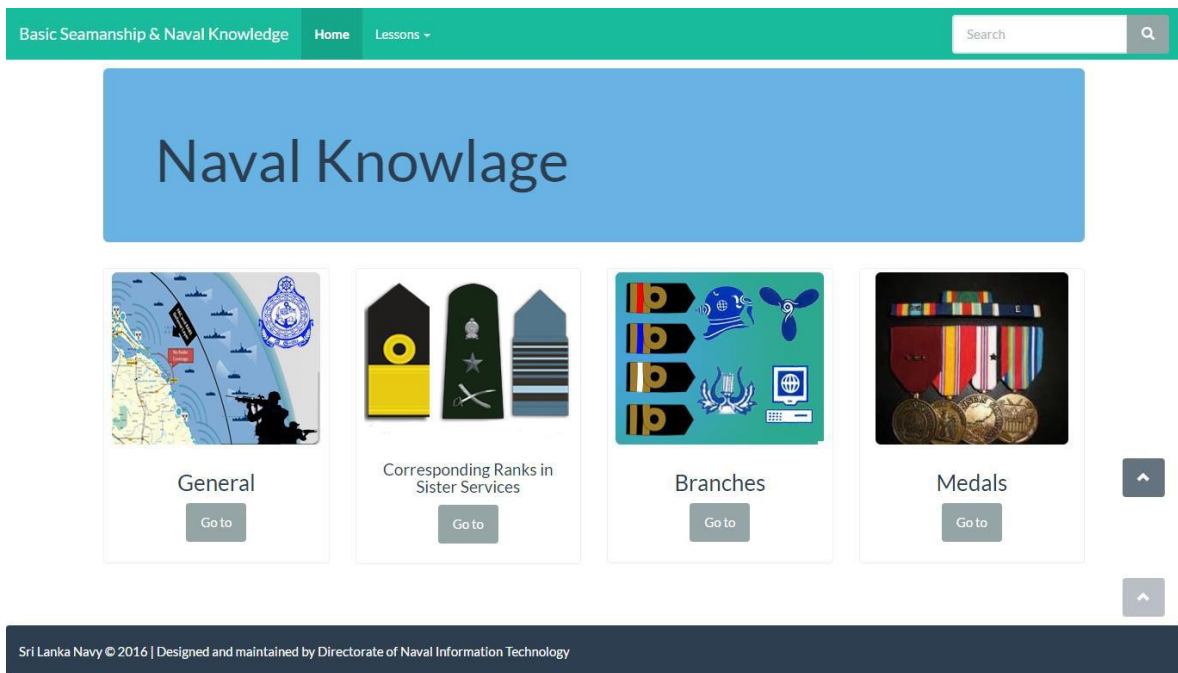
Appendices

A- Wireframes of the system

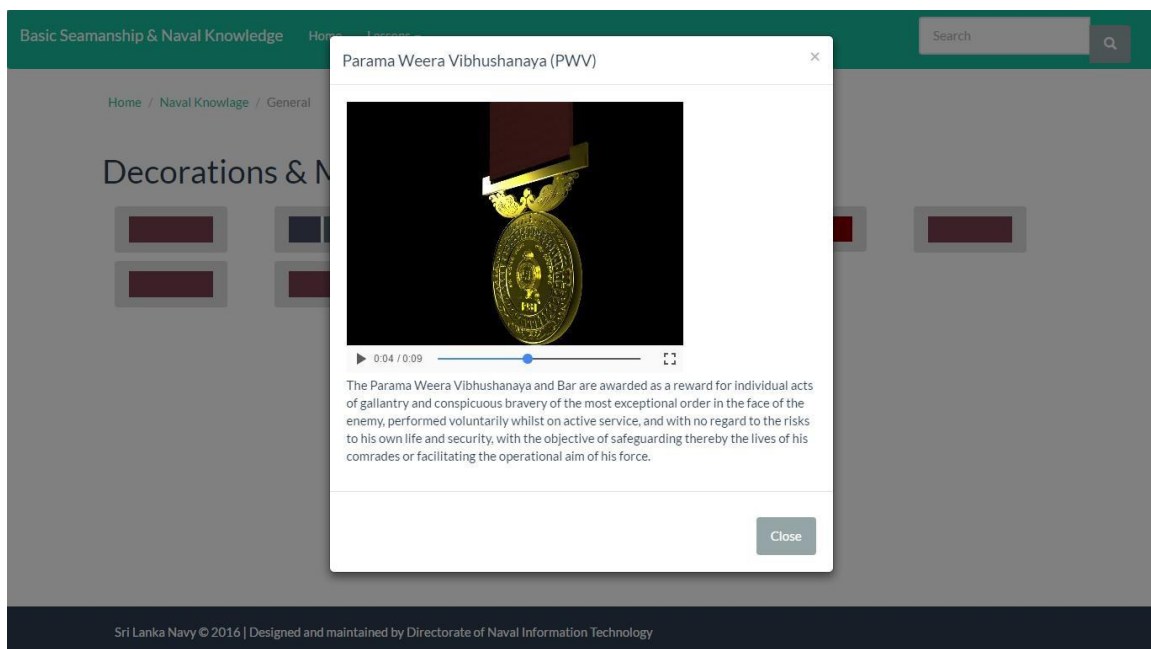


B- User Interfaces

B-1 Main lessons section page



B-2 Lessons page content video



B-3 Lesson page with sidebar

Basic Seamanship & Naval Knowledge Home Lessons ▾ Search

Home / Naval Knowledge / General

General

Brief History

Major Task of the Navy

Sea Boundaries


General

The Sri Lanka Navy is a well-balanced and cohesive force, capable of operating in waters around Sri Lanka effectively safeguarding our national interests. Navy's operational capability on land too was improved tremendously during the recent past, due to the requirement of giving assistance to Sri Lanka Army and Police to maintain law and order during operational requirements and other emergencies on land.

Vision

To develop in to a Naval Force capable of handling Coastal, Brown water and Blue water challenges with a force structure to meet national interests.

Mission



MISSION

To conduct prompt and sustainable combat operations at sea in accordance with the national policies.

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B-4 Lesson page

Basic Seamanship & Naval Knowledge Home Lessons ▾ Search

DRESS AND OCCASIONS ON WHICH THEY ARE WORN

Male Officers Lady Officers Senior Sailor senior women sailor junior sailor women sailor

Dress No:01




OCCASIONS FOR WEAR:

1. Guard of Honour
2. Formal receiving calling, attending arrival and departure of
 1. Heads of State
 2. Prime Minister
 3. Accredited Diplomats
3. formal state Functions
4. Courts Martial
5. Ceremonial parade
6. Service Functions
7. As ordered by Commander of the Navy /Directors /Area Commanders/ Senior Naval Officers/ Commanding Officers.

Dress No:02

Same as No 1 dress negative Sword and scabbard with belt Name Tally.



OCCASIONS FOR WEAR:

1. Guard of Honour
2. Formal receiving calling, attending arrival and departure of
 1. Heads of State
 2. Prime Minister
 3. Accredited Diplomats
3. formal state Functions
4. Courts Martial
5. Ceremonial parade
6. Service Functions
7. As ordered by Commander of the Navy /Directors /Area Commanders/ Senior Naval Officers/ Commanding Officers.

Note: All officers below the rank of Commodore and all Sailors shall wear the Name Tally 2 inch above the right breast.

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C- Test Cases

Tools Used	Area Of tested /Purpose	Out Put Summary
turbo.net	<ul style="list-style-type: none"> • Test the website in different browsers 	<ul style="list-style-type: none"> • Browsers compatibility Errors corrected manually
Link Checker	<ul style="list-style-type: none"> • Check whether links work correctly and to identify broken links. 	<ul style="list-style-type: none"> • Broken links which found has been inspected manually and fix those
CSS Validator	<ul style="list-style-type: none"> • To checks CSS style sheets 	<ul style="list-style-type: none"> • Errors occurred was corrected manually
Markup Validator	<ul style="list-style-type: none"> • Check the HTML Documents 	<ul style="list-style-type: none"> • Showed the places where HTML is not formatted properly and corrected those places
loadimpact.com	<ul style="list-style-type: none"> • To determine the performance, stability and scalability of an application under different load conditions 	<ul style="list-style-type: none"> • Showed the average loads speed of home page is 2.08sec.
Webpage Spell-Check (google chrome extension)	<ul style="list-style-type: none"> • To determine the spelling or grammatical errors 	<ul style="list-style-type: none"> • Errors occurred was corrected manually

D- User Acceptance Testing Form

Name :

1. The user interface designs of website?
 Very Poor Poor Good Very Good Excellent
2. Search and filtering used in the website?
 Very Poor Poor Good Very Good Excellent
3. User friendliness of website?
 Very Poor Poor Good Very Good Excellent
4. Content management features of the website?
 Very Poor Poor Good Very Good Excellent
5. Performance of the website?
 Very Poor Poor Good Very Good Excellent
6. Understand ability of the error messages?
 Very Poor Poor Good Very Good Excellent
7. Any other comments

Signature