DEVELOPMENT OF A WEB-BASED LEARNING RESOURCE PLATFORM FOR TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES-MANILA

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**Chapter 1**

**THE PROBLEM AND ITS SETTING**

**Introduction**

Learning resources are fundamental for every institution that offers quality education and it aims to provide educational materials that can be used by every student that needs those resources for their studies. There are so many learning and teaching resources available in our respective schools that can help our fellow students to improve their skills in researching and getting necessary information about their own topic.

Learning becomes meaningful when all the learners are framed to their familiar learning materials and environment. Educational resources are one of the most important building block of the institution provided by different departments and even students that are being offered to be used by everyone.

**Background of the Study**

A resource center that can be accessed by everyone is definitely useful specially for all the students that are currently studying. A web portal to check available learning resources that are open for getting necessary information about the certain topic and also materials that can be used for presentations in school premises. These resources are important for references for researches being conducted by students of the institution.

According to a research conducted by Learning Resource Management & Development System (LRMDS) on 2008, access to quality learning teaching resources by divisions and schools are a pinnacle for learning for all the students and teachers alike. A major objective of the system is to provide a technical basis for assessing, acquiring, adapting, developing, producing and distributing quality learning and teaching resource materials for students and instructional support materials for teachers.

As for the current system, College of Science displays all past thesis of the students for everyone to use as a guide and reference, books readily available for everyone to read if its regarding to their topic and resources that can be used inside the classroom and for presentation such as projector. Everyone can access these resources and it’s both a good thing and a bad thing, it’s a good thing because everyone inside the school can access these resources whenever they want and they can take it back whenever they want and it’s a bad thing because there is no way of tracking borrowed thesis/books what goes where and who have which. Resources are nowhere to be found when needed and have no slightest idea who have it. Looking by the title does not give all the information needed regarding to what is being looked for so the person must open it and spread its pages one by one to know if that is the thing that is being looking for. Availability is a struggle because one day it is there and the other day it is not and might find it unavailable on the day that it is needed the most.

A platform that can show the availability of the most essential information regarding the resources, organize the resources according to their tier, an archive the theses readily available for access. A web-based resource center for the students to access and dynamic searching for related literature and studies that can be used based on the search created. To help create a comfortable way to access these resources whenever needed and it’s compiled into one platform that can be accessed by everyone in the institution. A way to never lose the resources when you need it the most as you can find it in a secure place and in the same place that you found it. A platform friendly website that can be accessed using different devices for it is responsive.

The researchers decided to develop a Learning Resource Platform. The developed system purpose was to ease the circulations of the resources and providing the essential information easily accessible by everyone that wants to use them.

**Objectives of the Study**

### The general objective of the study is to develop a learning resource system.

### Specifically, the study aims to

1. Design a System with the following features:
   1. Mobile-Responsive Webpage
   2. Learning Resource Organizer
   3. Thesis Archiving
   4. Dynamic search capability
2. Create the system using (enumerate the development tools)

a. PHP

b. Bootstrap

c. JavaScript

d. Adobe Applications (Photoshop, Illustrator)

e. MySQL

f. Ajax/jQuery

g. CodeIgniter 3

1. Test and improve the system in terms of:

a. Efficiency

b. Maintainability

c. Accuracy

4. Determine the level of acceptability of the developed application using Software Evaluation (ISO 9126) instrument

**Scope and Limitations of the Study**

The Learning Resource System is a software that allows the students to search for available learning resources that can be used for their specific purposes. It also helps the instructors to track and manage available equipment for teaching and be wary of the learning materials that the students are fond of.

The scope of the system includes the following properties like a mobile-responsive webpage that allows the users to access the system in whatever gadget they have connected to the internet. To keep track of the learning resources, it records all the transactions that have been used using a hardware called scanner that scans the barcodes attached in the learning materials. \

**Significance of the Study**

The system aims to provide convenience for all the students and anyone who wants to use the educational resources for their studies. To create a comfortable studying and researching medium that can provide all the necessary information to further improve and develop a proper research to comply with the requirements of the subject. To develop a centralized system that will grant convenience to both the instructors and the students.

The study will serve as a reference and guide for the students in researching and getting necessary information about their own topic. It will also help students and instructors to have a deeper understanding about learning resources platform. The proposed study provides technical basis for assessing, acquiring, producing and distributing quality learning resource materials for student and instructional support materials for the teachers.

**Chapter 2**

**CONCEPTUAL FRAMEWORK**

­ This chapter includes the review of related literature and studies, conceptual model of the study, evaluation system, and operational definition of terms.

**Review of Related Literature**

In this section, the following information explains about the related technologies, theoretical and conceptual framework that helped the researchers to fully understand the research in the conceptualization of the study.

**Web Development**

***Overview of Web Development***

Web developers have been around ever since the introduction of internet to the whole wide world for people all over the globe to use. To further spread the popularity and usability of the internet, they created website for hosting ranging from simple or plain text pages to complicated web structures that’s being used commercially.

Web development includes different tasks and processes associated in it these are web designing, web engineering, content creation, client or server-side scripting, security, network compatibility and specially the coding or programming that brings up the design into reality.

***Brief History of Web Development***

The rise of the internet requires a medium or a proper graphical interface for the attention of general population and notice the overwhelming potential of internet. In the year 1980s websites gained attention for the use of businesses for their commercial potential and recognizing its use for future generations to come.

The first platform ever created for better development of websites was founded by Tim Berners-Lee in collaboration with the researchers from all over the world and is widely used up until today is the HTML or the Hyper-Text Markup Language serves as the foundation or the fundamental building block of web development.

**Development Tools**

***HTML***

HTML or Hyper-Text Markup Language founded by Tim Berners-Lee serves as the foundation and the fundamental building block of creating a website and up until today remains at the core of coding and infrastructure and enabled the coders to create and organize layouts that can be interacted and understood over different networks.

It is made up of elements, tags that can give texts different meaning whenever applied. HTML describes the web page structure and originally included signals or cues for the appearance of documents.

***CSS***

CSS or Cascading Style Sheets are used for how the elements of HTML are to be displayed on paper, screen, or other media. CSS is used to style and lay out web pages including font, color, spacing and size of the content of your webpage. CSS is also used for animations and other decorative features to bring up the best for your webpage.

CSS is designed primarily for the separation of presentation and the content, layout, colors, and fonts. It serves flexibility and control for the specification of presentation characteristics.

***Web Server***

There are many kinds of server that the industry use for their everyday work and jobs and we’ll be focusing only on one kind which is the web server. A web server is a computer system that processes requests and distribute it over the World Wide Web. Its primary function is to store, process, and deliver web pages to clients all over the world.

Web servers can be referred to as a software or a hardware and even both of them working together. As a hardware, it works as a storage that stores website’s components such as HTML documents, Cascaded-Style Sheets, images, and JavaScript files that delivers them to the end-users. As a software, it controls the users’ access to hosted files.

***OpenID***

OpenID is a decentralized authentication protocol. It allows users to use their existing account in a particular website as login credentials to a different one. OpenID made it easier for users as they do not need to remember numerous accounts with different login IDs and passwords.

***CodeIgniter 3***

CodeIgniter is an Application Development Framework or a toolkit that helps PHP programmers to fully commit their attentions to their projects by minimizing lines of code that are being used in the program.

Debugging the program will be easier with the help of CodeIgniter.

***MySQL***

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**Review of Related Studies**

A study was conducted for STI College Malolos (2016) concerning the creation of library system equipped with Barcode Technology. The library only has one librarian maintaining and recording 6000 books with a wide array of topics/subject. In the librarian perspective, managing databases, creating reports, monitoring overviews takes a lot of effort especially if you’re working alone facing thousands of books and transactions. The study focuses on improvement and efficiency of the school’s library transactions by adding barcode on the books and scanner for scanning purposes. To reduce the time and effort of both student and librarian because of the automation.

The system will generate reports such as borrowed books, new books, damaged books, delinquent borrowers, and summary reports at the end of the month. Database to secure data and will accommodate all incoming transactions inside the library. Barcode technology is used for the students’ ID as reference and also for the books to keep track of them in and go very similar to the planned system that we have in mind.

A similar study was conducted by a group of students from University of Cebu Lapu-Lapu and Mandaue (2017). The project was entitled “University of Cebu Lapu-Lapu and Mandaue Library System with Electronic Access for Reservation and Notification”, a web-based library system with SMS notification, book reservation, book search and inquiry of book availability as its feature. They also utilized a barcode scanner in their project for easier tracking of the transactions. It also generates accurate reports.

The local library system of the university will be replaced with the web-based system they created. Users are required to create their online account to have access to the library system. The system’s main goal is to provide hassle-free transactions that will benefit both the students and library staff.

The study conducted by Mr. Pau (2015) focused on upgrading and innovating their library system in their school for the convenience of the librarian, students and teachers alike. Automation of recording of transactions made by the librarians that can sometimes cause inconsistency of data, Barcode scanner for the students borrowing books and recording their information into the database together with their books borrowed, Web-based library where they can check the availability of the books and their basic information so that the students won’t go empty handed and their effort to waste because it can be easily seen in the site. Broadband access is already provided in their school so accessing the site won’t be a problem for the students and if you want to access it from your home is also easy because the server is well established. A book review in the site so that the student can know others opinion about the book that can help them improve their study.

**Conceptual Model of the Study**

**INPUT**

**Knowledge Requirements:**

* Web programming
* Database
* ISO 9126
* Selenium

**Software Requirements**

* Website Development Tools
* Adobe (Photoshop and Illustrator)

**Hardware Requirements**

* Android Mobile with OS from Jelly Bean and Higher

**Processes**

**Project Design**

**Project Development**

**Project Testing and  
Evaluation  
Procedure**

**OUTPUT**

**LEARNING RESOURCE PLATFORM**

**EVALUATION**

11 IN

­­**Input**

The input serves as the foundation of the study. The required inputs to conduct the study are grouped according to knowledge, software and hardware requirements. Under Knowledge requirements are Programming Languages for Web Development, Database management for files and fields, Python language for the programming of the hardware to be used and evaluated using ISO 9126. Under software requirements are website development tools like HTML, CSS, JavaScript, XML, etc. Finally, under the Hardware Requirements are any desktops. Smartphones or tablets that can browse through the internet with an Android OS with a version of Jellybean and Higher.

**Process**  
 Under this component are methods that were carried out to develop the software “COS Learning Resource System”. The method includes the Project design and System Creation.

**Output**

The output gives the result of the processes conducted. Given the required inputs and by following the process components are needed to come up with the fully-functional and acceptable desired output “COS Learning Resource System”.

**Operational Definition of Terms**

To better understand the study, the following terms are operationally defined.

**Web** refers to the system that operates through the internet.

**Webpage** refers to the document that is being display through the website.

**Website** refers to collection of related web pages that can be accessed through internet.

**Internet** refers to Interconnected network that a person can use.

**Mobile-Responsive Webpage** refers to a webpage that can be properly seen in any medium such as Mobiles, Tablets and other gadgets that can access the internet.

**Android** refers to the Operating System being used by most mobile phones.

**Database** refers to the storage and collection of information or data.

**Chapter 3**

**RESULTS AND DISCUSSION**

This chapter presents the review of results and discussion of the study. It includes the project design, project development, operation and testing procedure and evaluation procedure.

**I. Project Design**

CONTEXT LEVEL DIAGRAM

Student

Admin

Search (Thesis)

Add or Delete Data

Borrow (Thesis)

Return (Thesis)

Issue (Thesis)

Resources (Thesis/Books)

0

Development of COS Learning Resource Center System

ENTITY RELATIONSHIP DIAGRAM

Return

Resources

Student

Borrow

Keeps Track

Admin

Maintain

USE-CASE DIAGRAM

LEARNING RESOURCE SYSTEM

STUDENT

ADMIN

**II. Project Development**

The proposed COS Learning Resource Center System is a web-based system which will include a search engine similar to patent search sites. Its search results will show the related studies that are currently in the Learning Resource Center based on the term or phrase that the user will use for searching. The system will utilize a barcode scanner for easier and faster process upon borrowing and returning of learning resources. It will be easier to produce reports as the system will also handle the records that would be used to generate those reports. Availability of the resources will also be reflected on the site, for the users’ reference. Users of the system, specifically the students, will be required to log-in their ERS account to access the site and use its features. On the other hand, professors will use a local account that would be assigned to each one of them.

The system will be facilitated by an administrator which will be responsible for adding, editing, or removing learning resources records. The scanning of barcode before lending the resources to users and after they return it is also part of his job.

**III. Operation and Testing Procedure**

In this stage, the implementation of the system was extensively analyzed to ensure its functionality, usability, reliability, maintainability and accuracy to determine if the system can be considered a quality-based website.

***Alpha Testing***

Through the use of this testing method, the researchers assess the whole system themselves. This method determines the requirements that have been met throughout the development cycle. This include checking of data entry wherein different instances of inputs were entered to see if the system generates correct output.

***Beta Testing***

The system was tested by people outside the software development team to expose the system to different instances usage. In this stage, this allows the researchers to detect the unusual errors and bugs that were not found during the alpha testing.

***Regression Testing***

The purpose of this testing method was to see if the changes that were made during the previous testing phases affected other parts of the system. This includes rerunning of previous tests and checks if there had been a change in the behavior of the system.

***User Acceptance Testing***

The system was tested by the owner of the S and K themselves to expose the system to actual business operations management. In this stage, this allows the researchers to see if the system is operational, meaning that all functions of the system were executing properly. This determines if the system was acceptable and ready for deployment.

**IV. Evaluation Procedure**

***Evaluation Instrument***

The TUP evaluation instrument model which categorizes software to evaluate the acceptability of the game. It was adopted from ISO 9126.

***ISO Software Quality Indicators***

ISO 9126 is an international standard for the evaluation of software quality. The standard is divided into four parts which addresses the following subjects: quality model, external metrics, internal metrics, and quality in use metrics.

The ISO 9126-1 software quality model identifies six main quality characteristics, namely:

|  |  |
| --- | --- |
| 1. ***Functionality*** | Functionality is the essential purpose of any product or service. It is a set of attributes that bear on the existence of a set of functions and their respective properties. The functions are those that satisfy stated or implied needs.   1. Suitability 2. Accuracy 3. Interoperability 4. Compliance 5. Security |
| 1. ***Reliability*** | It is a set of attributes that bear on the capability of software to maintain its level of performance under stated conditions for a stated period of time.   1. Maturity 2. Recoverability 3. Fault Tolerance |
| 1. ***Usability*** | Usability only exists with regards to functionality and refers to the case of use for a given function. It is a set of attributes that bear on the effort needed for use, and on the individual assessment of such use, by a stated or implied set of users.   1. Understandability 2. Learnability 3. Operability |
| 1. ***Accuracy*** | This characteristic is concerned with the systematic and random errors of the system. It is a set of attributes that bear on the relationship between the level of performance of the software and the amount of resources used, under stated conditions.   1. Precise 2. Accurate |
| 1. ***Maintainability*** | The ability to identify and fix a fault within a software component is what the maintainable characteristic addresses. In other software quality models, this character is referenced as supportability. It is a set of attributes that bear on the effort needed to make specified modification.   1. Analyzability 2. Stability 3. Testability |
| 1. ***Portability*** | This characteristic refers to how well the software can adopt to changes in its environment or with its requirements. It is a set of attributes that bear on the ability of software to be transferred from one environment to another.   1. Installability 2. Replaceable 3. Adaptability |

***Likert Scale***

Likert Scale is a method of describing quantitative value to qualitative data, to make it amenable to statistical analysis. A numerical value is assigned to each potential choice and a mean figure for all the responses is computer at the end of evaluation or survey. Used mainly in training course evaluations and market surveys, Likert scales usually have four interpretation choices namely: Highly Acceptable, Very Acceptable, Moderately Acceptable, and Not Acceptable. The final average score represents the overall level of accomplishment or attitude towards the subject matter.

The measurement tool that was used in this study is a 4-point Likert Scale wherein 1 is the lowest and 4 is the highest.

Table 1 presents the rating scale and the corresponding descriptive rating.

**Table 1.**

Rating Scale for The Evaluation System

|  |  |
| --- | --- |
| **Numerical Rating** | **Interpretation** |
| 4 | Highly Acceptable |
| 3 | Very Acceptable |
| 2 | Moderately Acceptable |
| 1 | Not Acceptable |

A value of 1 in the numerical rating corresponds to a grade of “Not Acceptable” in the interpretation. 2 correspond to “Moderately Acceptable”, 3 means a grade of “Very Acceptable”, and 4 is equivalent to a rating of “Highly Acceptable”**.**

Table 2 presents the scale range and its qualitative interpretation.

**Table 2.**

*Scale Range and its Qualitative Interpretation*

|  |  |
| --- | --- |
| **Range** | **Qualitative Interpretation** |
| 76 – 100 | Highly Acceptable |
| 51 – 75 | Very Acceptable |
| 26 – 50 | Moderately Acceptable |
| 1 – 25 | Not Acceptable |

The range where the frequency average falls concluded the evaluation of the system. 1 to 25 means “Not Applicable”, 26 to 50 means “Moderately Acceptable”, 51 to 75 means “Very Acceptable” and 76 to 100 means “Highly Acceptable”.

Weighted mean was used to measure the general response of the survey samples, whether they agree to a given statement or not.

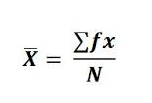
The formula in computing the mean is as follows:

**Where:**

**x̄ -** Mean

**f –** Weight given to each respondent

**x –** Number of respondents

 **n –** Total number of respondents

***Respondents***

Evaluators were composed of 30 people who are computer science, information technology and information system students, and, professionals. They were purposively chosen to evaluate the developed system.