Book Republic: An Online Book Exchange System

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***Abstract*— This paper presents a web application that provides an online community for book enthusiasts to freely trade books over the internet. The system allows users to perform borrow and swap functions as well as socialize with other users. Ratings of the system usability and user experience were examined from 24 participants composed of students and professionals. The result suggests that the novelity of book exchanging of the web application as opposed to the manual counterpart positively impacted the ratings of system usability.**

***Index Terms*— book, swap, crowdsourcing, social, network, online, community**

I. Introduction

A. Background of the Study

Books practically is a commodity for education and also a hobby for the enthusiasts. Social networking sites are filled with booksale advertisements that sell secondhand books for a cheaper price. Book Barter Philippines, a Facebook group, had reach fourteen thousand members since its creation in June 2020. Book bartering is in demand mainly because of its cost-effectiveness and high sustainability.

Various efforts to provide free access is made possible by pop out libraries and organized book donation drives and fairs but it is limited just to the people who were present in the event gathering. The boom of information technology continues to change our way of living with the power to digitize any mundane task in our life. Book swapping becoming digital addresses the limitation on influence of hands-on initiatives. Also it offers convenience with a minimal fee since participants only charge for the delivery fee of the books they mail. Book swapping website however is not yet available in the country since most of these sites are based overseas.

B. Significance of the Study

This paper presents a project called Book Republic, an online community where registered users will have a virtual bookshelf of their own and a place to freely swap, borrow and discover new books from other users. Books that are idle on their physical bookshelves will be mobilized and each of these bookshelves will be part of one massive e-library. With this concept, knowledge resources will be abundant and will be more accessible to people. Moreover, community book sharing will be encouraged motivating people to read for a collective increase in literacy.

This system is made for book enthusiasts yet another major beneficiary of this online community are the students. Many universities abroad are adapting book swapping programs to help students save money on textbooks. Only few colleges are using automated systems and many are still implementing manual book barter. In line with the current affairs, COVID19 pandemic is a global crisis that affected billions of people and that includes the educational system worldwide. Unlike pre-pandemic times, education in the new normal is home-based. This sudden shift has made third-world countries scarce on knowledge resources since students with limited internet connectivity must rely on textbooks and printed modules to be able to keep up with their schooling. Implementation of this online community can be extended for the mobilization of reference books and other reading materials.

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C. Objective of the Study

The Book Republic aims to provide a basic platform for book enthusiasts to freely swap, borrow and discover books on its pilot implementation.This project also aims to provide users the following:

1) A user-friendly interface that will allow users to swap,borrow and discover book with eases;
2) An efficient and reliable book exchange system;
3) A social networking site that will form bonds among book enthusiasts and cultivate culture of sharing;

D. Scope and Limitations

Logistics handling of book transfers and warehousing are beyond the scope of the system. The messaging feature of the system will serve as the primary means of communication and the platform for negotiation between users. Since anyone can just register to the web application, it is expected for users to be dissentful of whom to allow lending and swapping their books to. Hence, trading requests were implemented to control and keep track of the transfer of books from one user to another. With this selection feature, users can handpick a preferred candidate borrower or swapper for their books.

II. Review of Related Literature

The Republic Act No. 7743, otherwise known as An Act Providing for the Establishment of Congressional, City and Municipal Libraries and Barangay Reading Centers Throughout the Philippines Appropriating the Necessary Funds Therefore and for Other Purposes, recognizes the significance of having libraries in the community in promoting moral and intellectual well-being of people. In 2013, Sen. Loren Legarda filed the Senate Bill No. 355 that seeks to amend this two decade old act legislated in 1994 [1]. The purpose of the amendment bill is to upgrade library facilities based on the latest computer and electronic library technology. However the bill has not come to realization yet since its status remains pending up to now. According to Legarda, there is a need to

equip public libraries with the latest computer and electronic library facilities to make sure that Filipino students have access to a wide variety of up-to-date learning materials.

Nevertheless, there are efforts made by non-government organizations in promoting open and free access to books. One initiative is by WTA Architecture and Design Studio that runs the Book Stop Project, a mobile library that promotes reading on the pedestrian [2]. This project is about placing a pop out library in cities with high volume of pedestrian traffic to encourage the passersby to read. Being a company that also promotes sustainability, the library is an open structure built from recycled materials that serves as a reading kiosk and also redistribution point for sharing of old books.

There are schools and cafes that organize informal and unsupervised book exchange programs in which people casually leave their books inside drop boxes for others to pick up later on [3].

In this digital age where people can instantly get information with just a few clicks, searching directly in the internet provides a faster and more convenient way of querying than going to research in the library.Traditional book swapping going digital is motivational especially in this time of rapid technological advancement.

Book exchange sites encourage people to read books in a fun, trendy yet cost-effective way. In 2015, Ng and Pera developed EasyEx, a sophisticated book exchange system that can analyzes users preference on books to give precise book recommendations [4].The system can also accommodate multiple users to create an exchange cycle in oppose to the usual swapping between two users. These two features of EasyEX were implemented using the Recommendation Toolkit from the LensKit.org and OptaPlanner, a constraint satisfaction solver. The Recommendation Toolkit examines every exchange transaction. This refers to all possible combination of a user and the books he/she are interested in. Each candidate exchange transaction is assigned an appeal score called the degree of interest. The degree of interest is computed using multiple linear regression model to get the average ratings obtained from both Personalized Mean and Matrix Factorization of the LenSkit framework. After getting all the degree of appeals, as part of the optimization process, the OptaPlanner will analyze each exchange transaction using sophisticated heuristics and metaheuristics to generate the optimal set of exchanges among users. The developer of EasyEx claimed that they were the first to employ OptaPlanner in a book exchange system in identifying an optimal book recommendation since this application of the algorithm is commonly used in vehicle routing and employee shift rostering.

In environmental perspective, Trupti(2010) conducted a study on how libraries can contribute to the conservation of the environment. He believes that libraries as a social organization must actively disseminate information on environmental sustainability. Accordingly implementation of green technology and practicing green culture in the libraries can act as a key factor in the sustainability movement. He specified ways on how libraries can go green. Among the examples is going digital in every aspect like emailing newsletters and announcements instead of printing hardcopies to reduce paper usage. He also mentioned others way on his study such as the constructing green library building and greening existing facilities and services within the library [5].

III. Methodolody

A. Development Tools

The System will use the following software technology:

1) Codeigniter 3.1.8
2) MySQL
3) PHP 7.1
4) Apache Web Server 2.4.7

B. Functional Requirements

1) All the users (Guest, Bookworm, Administrator) should be able to view all the books in the system.
2) Guest can register an account to be able to use the special features of the system.
3) Registered users should be able to login and logout of the system using their registered email and password.
4) Registered users should be able to perform borrow and swap functions.
5) Registered users should be able to view his/her bookshelf containing all the books he/she added.
6) Registered users should be able to view and track the history of all their borrow and swap transactions.
7) Registered users should be able to manage and send messages to one another.
8) Registered users should be able to view and manage activity logs.
9) The administrator should be able to manage all the user accounts by viewing, editing and deleting
10) The administrator should be able to suspend and reactivate users accounts
11) The administrator should be able to promote a bookworm to an admin.

C. Non-Functional Requirements

1) Provide an interface which is user-friendly, comprehensible and easy to navigate for all the users in the system.
2) Provide appropriate documentation for the whole system.

D. System Modules

There are three(3) user groups in the system: the Bookworm, the Administrator and the Guest.

1) Create, View and Manage Users Account
   This module includes functionalities to manage users account. In order for guests to use the system, he/she must register to create an account. Bookworms can view and edit their account information. Only the administrator can suspend and reactivate accounts.
2) Viewing, Adding and Managing Books
   This module includes view, edit, delete, and add new book in the bookshelf that are accessible to all bookworms.The guest can only view the list of books while

the administrator can oversee all the books in the admin panel but has no privilige modify the books are not .

3) Borrowing of Book
   This module allows both bookworms and administrator to borrow a book. This includes the following features: borrow book, confirm borrow request and reject borrow request, view borrow request and delete borrow request.
4) Swapping of book
   This module allows users to swap- ping books with one another. This includes the following features: swap book, confirm swap request and reject swap request, view swap request and delete swap request. Swapping of books is a two-pass function that can be performed by both bookworms and administrator. This transaction is completed when both users confirmed the swap request from each other.
5) Creating, Sending and Managing Messages
   This mod- ule allows users to send messages with one another. This includes the following functionalities: create message, send message, view message and delete message in the inbox.
6) Viewing and Managing Activity Logs
   This module allows users to manage their activity logs. This includes the following functionalities: view logs and clear logs.
7) User Login and Logout
   Username and password will be required for users to be able to log in and log out of the system.

E. Testing & Assessment of Book Republic

System testing was conducted wherein 24 participants were invited to test the features of Book Republic through accessing its host server at bookrepublic.charmainematienzo.com. The demography of the participants is composed of 15 students and 15 professionals. They were specifically tasked to perform the following major system features- add a book, borrow a book, swap a book, add a friend and send a message. After their hands-on experience, the testers were asked to answer the System Usability Scale(SUS) to determine system usability and user-friendliness.

IV. Results and Discussion

The Book Republic obtained a score of 73.85 in the System Usability Scale. According to SUS standard, scores that falls above 90 were exceptional, between 80 and the latter were good, between 70 and the former were acceptable and anything below 70 had usability issues already [6]. The web application falls under acceptable using Bangor's descriptive scale.

The SUS rating is 73.41% for just students and on the other hand the score obtained from the professionals is 74.23%. Comparing the ratings obtained by separating the two demographic profiles, it can be inferred that the slight difference suggests that profiles do not have significant effect on how users rated the system.

V. Conclusion and Future Work

hile upscaling this to an online community with goal-specific interface along with crowdsourcing approach makes trading even better.

This study upscaled the way people crowdsource for reference book has provided a basic platform where users can freely swap, borrow and discover books such that this project can potentially serve as a prototype web application that will help redesign and determine the specifications and requirements of a more sophisticated book exchange system. With the end-goal of unifying household bookshelves into one big e-library, knowledge resources will be centralized, community book sharing will be encouraged and people will be motivated to read resulting to a collective increase in literacy.

For further improvement of the system, this study recommends to add new system features such as smart recommendation tool based on preferred genre of the user. This study also recommends a future study on its environmental impact like conducting an investigation that will measure how much paper or fuel is being saved for every book swap.

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