ISSN 2278-3091
Volume 8, No.1.5, 2019
International Journal of Advanced Trends in Computer Science and Engineering
Available Online at http://www.warse.org/IJATCSE/static/pdf/file/ijatcse1081.52019.pdf
https://doi.org/10.30534/ijatcse/2019/1081.52019

E-Read Club System (ERCS) with Implementation of Personalization Theories

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ABSTRACT

As the world becomes more technologically advanced, many people tend to prefer to read electronic books rather than the traditional physical books as it is easier to access and downloadable, especially eBooks. Consequently, this project intended to facilitate people to keep an share their eBooks with other people using the system developed, in which it can also be a good repository for the users. Library of UiTM in Campus of Kuala Terengganu (UiTMCTKKT) has been chosen for this project because the users of the library always faced problems with difficulties of searching and getting electronic reading materials such as an eBooks. By using the system development life cycle (SDLC) methodology which is the adapted waterfall model, as well as, with the implementation of personalization theories, the E-Read Club system (ERCS) is being developed to overcome the problem. This ERCS has been evaluated by two experts and users through few criteria that are divided into seven (7) sections which include the content, efficiency, usability, ease of use, satisfaction, user interface and personalization of the website. Hence, the experts are satisfied with the overall usability of the system. Apart from that, the evaluation that is carried out among 30 respondents shows that the highest construct is the usability of the system with the highest mean of 4.448 (StDev = 0.506) in which the result indicated that the users agree that the system is easy to be used. To sum up, this system is expected to help users to easily get and share the eBooks while making it as their eBooks repository where they can manage and organize their eBooks easily. By implementing the personalization theories, the users will be able to get recommendations based on their behavior on the site and it will help to attract more attention of the users towards the system.

Key words : eBooks, E-Read Club system (ERCS), Digital Library, Personalization.

1. INTRODUCTION

In this tech-savvy world, the usages of electronic book (eBook) are getting more preferable compared to the usage of the traditional physical book. The eBook is a product of information technologies which it is simply a non-editable and reflowable book in an electronic version which can be easily read and viewed using any compatible computer or mobile devices. Thanks to the easy access of the Internet nowadays, the concept and applications of information technologies have widely been used by many people, especially students, resulting in getting easier to access any reading materials through the internet. Among the technological changes that are rapidly seen and used are reading the newspapers on the internet, publishing of journal and research papers online, as well as, sharing and spreading of knowledge through the web or internet by using a personal computer [1].

Eventually, library UiTMCTKKT has acknowledged the evolution of technologies, and therefore, intended to have an online reading club due to its limited space for the storage of physical books, as well as, space for the users to sit and read the books. In order to realize the intention, E-Read Club system (ERCS) that manage the sharing and downloading of eBooks are being developed. In addition, a personalization theory is being used in developing this system to attract user's attention towards the website, where it is usually used by an e-commerce website to attract customers towards certain products. Web personalization also included in this development and it consists of customizing the website experience based on the requirements, needs or interest of each specific user by taking into consideration of the benefits of the knowledge that are acquired through the analysis of the user's navigational behavior. By implementing this web personalization, it can be one of the elements that will attract people to the system in an effective way and also will help to achieve the library's goal.

1.1 Problems & Business Process

Based on history, library UiTMCTKKT is originally a library for Terengganu Foundation College (KYT) until 2008 where it has been changed to become a part of UiTMCTKKT. This library has a small capacity and very limited space either for books or for people. Due to that situation, only limited numbers of books can keep in the library. Based on the

interview with the head librarian, Mr Khairuddin, the estimated number of books in the library is about 10,000 of books, compared to the library in the UiTM Campus of Dungun (UiTMCTKD), which the estimated number of books is about 100,000 books. Currently, the students of UiTMCTKKT are advised to use the PTAR system, which is the official e-Library for all UiTM campus. Based on the survey done among the students of UiTMCKKT that had used the PTAR system, it shows that students rarely used the system because of the difficulties in getting the desired eBooks, unfamiliarity with the system and did not know the best way to search the eBooks. Figure 1 below illustrates the current business process of getting eBooks using the PTAR system.

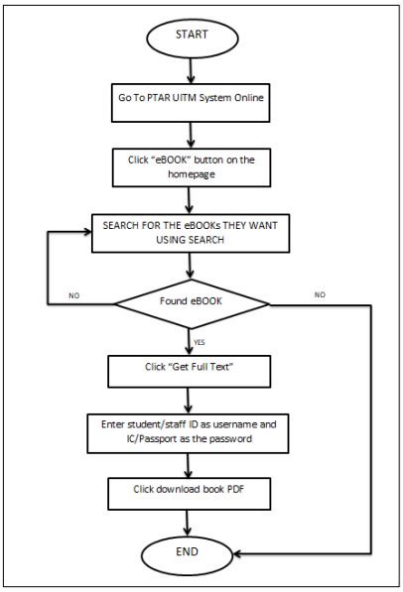

Figure 1: Current Business Process of Using the PTAR System

1.2 Project Objectives

This study is conducted to achieve the following objectives:

1. To identify the business process and requirements for an e-Library system.
2. To design and develop E-Read Club system (ERCS) that implement personalization theory for Library UiTMCTKKT.
3. To evaluate the functionality and usability of the proposed system.

1.3 Target Users

There will be four main target users of the system which are the members, who are the students of the UiTMCTKKT, system administrators, who are the librarian administrators, executive staffs, who are the executive level of the library such as the head of the library, and general staffs, who are the librarians and other staffs. The members will be the system's front-end users, where they will be the primary users of the system. System administrators are responsible for maintaining, monitoring the system activities, and managing the system flows. Next, the executive staffs will be responsible for managing the system processing process and the general staffs will be responsible for managing the system activities.

2. RELATED WORK

A literature review consists of a censorious analysis and the comprehensive summary of previous research on this topic, as well as an evaluation of any gaps found in the literature and potentials for the future research [2]. Every study or research needs to have its own studies on the literature reviews because it is essential to show the connections between previous studies or theories with the current one, to find other researches that are related with this research field and also to provide a context for this research.

2.1 Information Retrieval

Before the technology has turned humans into its slave, the library used in-house information retrieval systems in the activities [11], such as cataloguing, abstracting, indexing, classification, bibliography, and others that only a few people can engage in it, such as the librarians and information personnel, professional searchers and researchers, paralegals, as well as, students. However, the world has changed nowadays and almost every human being is interacting with the information distributed across a network every day when they use a web search engine or the searchable online versions that is called as "digital libraries"[3].

The main objective of the information retrieval for the library is to transfer any information needed by the users from the sources to the intended devices. Therefore, to serve this purpose, the information retrieval should consist of five (5) main factors that are the types of devices used in storing the information, the storage capacity of the devices, the speed of access and transfer of the information from sources to the storage devices, the number of times the information can be written in the storage devices, as well as, the reliability and effectiveness of interaction between the sources and the storage devices [4]. This information retrieval also needs to satisfy the user's information needs by avoiding retrieving of irrelevant and unpractical records, as well as, retrieving of too many or too few records for the selections of the users.

2.2 Website Personalization

Website Personalization refers to the process of establishing custom-make experiences for the users of a website where instead of providing a unique and broad experience, website personalization enables the owner of the website to provide their visitors with some unique experiences and where it is adjusted according to their needs and desires. In other words, it is a process of delivering tailored and customizes experiences to the visitors based on their distinctive preferences, as well as providing a uniformed experience for all visitors on the site [5]. Besides, website personalization for

the library may seem intimidating at first sight, however, with the right tools, resources and thorough planning, it can enhance the user experience by enabling browsing experiences based on their interest and is less time-consuming for the users [6]. One of the important things to be remembered in the web personalization is the observation of user-system interactions. Therefore, this can be achieved by taking into consideration of the user's task, their background, history, the devices used, the information that is needed, locations, time consumes for specific tasks or activities, as well as, the essential one that is the user's context.

2.3 Personalization Approaches

As mentioned before, website personalization is crucial features for a successful website and it can boost the frequency of site visits. It is also known that personalization can unify all the platforms, embedded in any type of devices relevant to the user's current locations, surrounding environments and activities for the information inflow and outflow [7]. There are two (2) distinct approaches of personalization which are implicit and explicit personalization. The implicit personalization approach is based on the assumption values that are figure out from the user's behavior and its relationships between the products, the context or the content of the website. Implicit personalization depends on the extensive amount of data and metadata in order to create relationships between entities [8]. Some of the popular websites that had used this approach are Amazon and Facebook. Amazon used this approach to suggest any related products to their customers, while Facebook used it in recommending friends based on their massive amount of data that are called as the social graph. The explicit personalization, on the other hand, refers to the information given by the users in which the users directly inform their preferences, requirements, and needs [8]. This information can be collected via several methods that include registration forms, surveys, progressive profiling, and others. For example, Nikon.com used this approach by tracking their users based on geolocation. Their users need to select the geographic region on the website and this preference is then saved in the website database. Hence, it allowed their users to customize their preferences and interest that suited their geographic region so that users can have recommendations based on what they want.

Another approach that would be discussed is the full personalization of recommendation systems or recommender systems as it is a form of personalization. Recommender systems can be defined as a filtering system that offers and recommend the most relevant contents, services or products to a particular user based on the user's past behavior pattern [9]. The recommender systems can be classified into three (3) types that are the content-based filtering, the collaborative filtering, and hybrid recommendation systems [10]. The content-based filtering is the filtering method based on the user's preferred choices and the type of items that they like. Meanwhile, the collaborative filtering is based on the users' past behavior with the assumption that there are similarities of appreciations for an item by the users and the interests or preferences of a user might be the same as many users. Meanwhile, the hybrid recommendation system is the combination of content-based filtering and collaborative filtering method.

In short, there are a few approaches available that can be used on the website when it comes to creating a personalized user experience. Understanding the types of personalization that need to be implemented and how to implement it will then help the website to find the right strategy behind each of the personalization initiatives taken. However, it will also depend on several numbers of factors that need to be taken into consideration.

2.4 Implemented Approach

For the proposed system, that is E-Read Club system (ERCS), the best approach to be implemented would be the content-based filtering recommender system. This filtering is based on analyzing the reading and downloading history of the users. This user's reading and download history obtained can disclose specific patterns or behavior of the users which can influence the future development of the system especially the downloadable contents such as eBook, articles, journals, and others. For example, keeping track of the number of users that read and download an eBook can allow the system to offer the second edition of the eBook or any similarly-related genre of the eBooks. Figure 2 below shows the content-based filtering recommender system process.

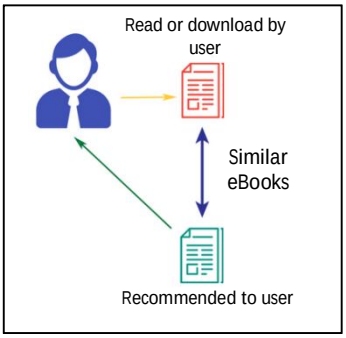

Figure 2: Content-based Filtering Recommender System Process

In addition, the popular eBooks section in the proposed system also based on the reading and downloading history of the users. The implicit personalization is applied in this feature where the users will get recommendations of the most popular eBooks that had been downloaded and read by many users of the system. This personalization is entirely automatic, where the system will count the frequency of the user's reading and downloading activities, and then tailored the recommended eBooks in a personalized way. Besides, the system also implemented explicit personalization, where the searching process of eBooks on the system can be tailored to match the specific needs of the users. Thus, the users

explicitly initiate actions by proving the title of the eBooks, author's name, and other related information of the eBooks they wanted to control the personalization.

3. METHODOLOGY

The methodology that is used to develop this system is based on the Waterfall model. There are five (5) phases of the methodology, which includes problem identification and planning, requirement gathering and analysis, design and implementation, testing, and the last phase is close and evaluates the project. Figure 3 shows the adapted Waterfall model that has been carried out.

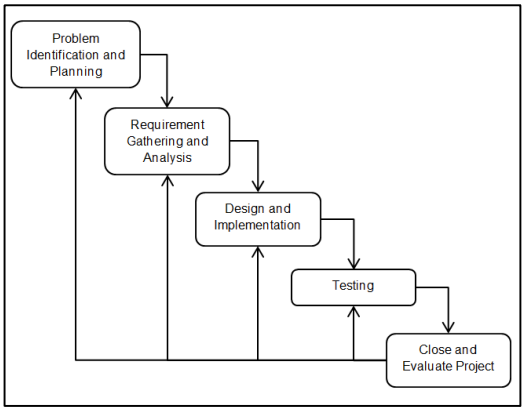

Figure 3: Adapted Waterfall Model

In the first phase, that is the problem identification and planning phase, it consists of the discussion about the title and the idea of the proposed system, identifying the target users, and understanding the current process of Library UiTMCTKKT. In this phase, problems, objectives, scope, and the significance of the project are also being defined in details with the help of literature reviews and other past studies conducted by the researchers. Next, for the second phase, the detail requirements of the proposed system are gathered from the target users, which it is placed into a functional specification and it acts as guidelines for the development of the system. Defining and planning of the system also takes place in this phase, as well as, deadlines are being marked so that the project will run accordingly.

The third phase is the design and implementation of E-Read Club system (ERCS), where the specific hardware and the system's requirements such as programming languages, related diagrams, and others are defined. With the inputs from the system design, the system is then being coded in which typically, it is designed in small programs before integrated as a complete system.

Subsequently, the fourth phase is where the testing of E-Read Club system (ERCS) taken place. In this phase, the system is tested to verify that it is being developed based on the requirements and specifications from the users, as well as, tested for the bugs and report on the issues that need to be resolved. This evaluation also will be done by the experts in the computer system area of study and the target users using a set of questionnaires. The evaluation with the experts is based on the open-ended questionnaires where they need to state their comments and suggestions for the system, while the evaluation with the users is based on the closed-ended questionnaires with the given scale 1 to 5 (Strongly Disagree=1, Disagree=2, Natural=3, Agree=4, and Strongly Agree=5).

Finally, the E-Read Club system (ERCS) is ready for deployment to the library live environment and available to the end-users. Before closing the project, the developer needs to make sure that each of the phases must be completed and executed a quality assurance test before moving to the next phase of development. Final report of the proposed system will be documented to close this project and final presentation and exhibition will be held.

4. RESULT AND DISCUSSION

This section discusses the result of the E-Read Club system (ERCS) which obtained from the component testing and integrated system testing with the experts and the users. The tests are based on the functionality of the graphical user interface (GUI) to ensure that the process flow of each component and sections of the system are deliverable and according to the specification. Additionally, this testing session is classified into seven (7) distinctive criteria which are the ease of use of the system, the efficiency of the system, the satisfaction of the users, the user interface of the system, usability of the system, consistency of the system, and the personalization theory that have been applied to the system.

The result of the test that is being carried out by the experts using an interview method clarify that all of the system's functions are deliverable and are functioning well. Overall, they very satisfied with the overall features that E-Read Club (ERC) system provided for the users and agreed that the system is ease of use, consistent, and efficiency, as well as satisfying their requirements with the deliverable user interface, personalization and its usability. However, they added a comment and suggestion that the system has a good concept and functionality, but can be improved more, especially with the implementation of the personalization theory on the system. Meanwhile, the evaluation of the system with the target users involved the total of 30 respondents, in which 56.7% of the respondents fall into a group of 21-23 years old and the majority of them are the students of Business Computing (CS224) course.

In addition, based on the analysis for all the seven (7) evaluation criteria for the respondents, it is shown that the highest mean for content is 4.379, usability is 4.448, efficiency is 4.413, for the ease of use is 4.414, for the user interface is 4.276, satisfaction is 4.414 and for the personalize element is 4.379. Overall, for the highest mean for all

construct is the usability of the system with the mean is 4.448, where users agree that the system is simple, user-friendly, clearly understandable and easy to be used. Figure 5 below summarizes the analysis result for all of the respondents.

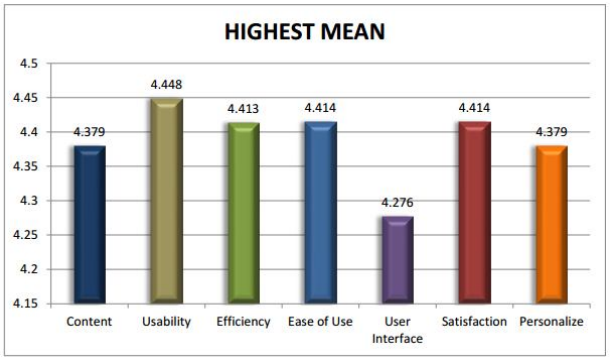

Figure 5: Overall Summarize of the Highest Mean

5. CONCLUSION

ERCS is developed especially to help the implementation of an online system for the library of UiTMCTKKT. This system will help people to search, gather, share, and manage their electronic reading materials, especially eBooks in an organized manner and more securely. This system also provides the feature called my eBook, where users will be able to see all the eBooks that they have saved and uploaded into the system. Thus, it will help them to save more storage of their devices and they will be able to download it again anywhere and anytime with the internet connection. Nevertheless, it can be a very good platform with much more benefits for the usage of librarians, students and others [12].

However, several problems happen during the development of E-Read Club system (ERCS) regarding the functionality and usability of the system. Currently, users can upload the eBooks inside the system, but the system does not provide any features that will notify the users about the status of their eBooks, either it is approved or declined. Therefore, the developer should take into consideration of this feature, which it can be resolved by sending a short notification email or a message box in the system that will notify the users about the status of their uploaded eBooks. Another problem is the privacy issues where there are no privacy policies, notice, and consent of the users if they are registered and shared the personal information in the system, as this system needs to this information in order to receive the most accurate and precise recommendation for the eBooks.

In this paper, content-based filtering recommender systems, as well as implicit and explicit personalization are presented in the proposed system. There are drawbacks of the content-based filtering recommender systems that implemented which are this method need to use a large amount of information from the users, the content does not discriminate the items precisely if the information obtained from the users is inadequate, and it requires a lot of domain knowledge. Thus, in the future, various other personalization attributes, techniques and methods can be developed and evaluated to efficiently implement the personalization theory and the recommender systems.

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