

MOBILE-BASED LIBRARY LOAN SERVICE (MBLLS)

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ABSTRACT

Most libraries provide book reservation and renewal services through the library counter as well as online computer. However, through the counter, these services are only available during office hours. Even though through online computer, users are able to access the services anytime, but they must be connected to the Internet which limits their access to these services. Since the need of library users have increased tremendously, an alternative technology is required. Thus, mobile technology has been identified as a potential alternative since it is able to provide the two services anytime and anywhere. This paper discusses a prototype Mobile-Based Library Loan Service (MBLLS), a facility which has been developed for library users to access online library services through mobile devices. MBLLS was developed for book reservation and renewal services. Results of user evaluation on the MBLLS indicate that it has good usability in terms of Usefulness, Ease of Use and Outcome/Future Use. The results also indicate that there is a significant difference between novice and expert users for Usefulness and Ease of Use, while no significant difference for Outcome/Future Use.

Keywords: *Mobile Technology, Library Loan Services, Mobile Loan Service*

1.0 INTRODUCTION

Mobile technologies are rapidly growing, and they have played an important role in the management of relations between people in social, economic and in everyday life [1, 2]. Throughout history, people need to have access to information. Previously, they have to obtain information from scientists, clergy, libraries and universities. However, today people can access information without the need for such efforts [3]. The need remains, but the acquisition ways have changed to suit people's needs. With the rapid growth of the means of communication, the learning and education has adopted technology based systems such as E-learning [4], distance learning (DL) [5] and mobile learning (M-Learning) which is an approach of E-learning [6]. Libraries are considered as the most important tools of education in all stages, whether in high level education or at the school level. Some of library services do not offer electronic loan operations, and others lack complete loan operations. It depends on the library staff to carry out such operations. However, Library systems and e-learning systems actually need to interact in a variety of ways [7].

Consequently, the needs of library users have increased rapidly. And their needs should be available every where and every time rather than anywhere and anytime. Thus, to overcome the lack of loan services and to meet users' needs, this paper proposes Mobile-Based Library Loan Service which utilises mobile technology that allows users to carry out operations every where at all time.

2.0 MOBILE TECHNOLOGY APPLICATIONS

Mobile applications increasingly affect the diffusion of information as well as business activity. They gain broad acceptance due to the increased need in supporting the mobile workforce and the rapid improvement in the devices and wireless technologies for communication. Many mobile applications provide personal services such as sending and viewing email, browsing the world wide web (WWW), viewing traffic and weather reports, watching movies and chatting with others [8]. Mobile services appear to be an obvious choice for travel and tourism as the travellers are on the move, which is the first criterion for mobile services to be relevant. Nevertheless, based on a study conducted by [9] in 2003; few users have expressed their desire to use their mobile phone whenever possible. The travel and tourism industry have been undergoing many dramatic changes during the last decade, due to the possibilities offered by Internet technology.

Based on a study by [10] which focuses on the improvement of organizational infrastructure for campus and student needs, it indicates that there are still many weaknesses in the current version of Wireless Application Protocol

(WAP) that require in-depth investigation, since every new technology arriving on the market has to be investigated of its benefit for daily use. At present, mobile phones have been popular worldwide. Mainly it is ubiquitous and customers can make calls anywhere for transaction. Mobile phone market shares have grown up dramatically. Mobile commerce (m-commerce) attracts various relative companies such as mobile handset manufacturers to develop technologies to generate added values for their mobile sphere [11].

Developments in telecommunication technology provide new facilities and interfaces for students and staff of universities. In order to improve the organizational infrastructure for students and staff, every new technology arriving on the market has to be investigated of its benefit for daily use. In the case of the WAP, the consortium of Mobile Services for Campus and Student needs "Campus Mobil" was founded in order to investigate innovative services based on this technology [10].

Ubiquitous is an important factor in mobile-based which means present everywhere as well as at same time. However, online teaching and learning has been providing great opportunities to increase flexibility in time and location of study, in terms of availability of information and resources, synchronous and asynchronous communication and various types of interaction via the WWW. Moreover, M-Learning is enabled by the use of portable devices, such as notebooks, smart phones, PDAs over wireless networks. A key benefit of M-Learning is its potential for increasing productivity by making learning available anywhere regardless the time [12]. Moreover, mobile-based can be used in many fields of work to manipulate and share data, in libraries [13], clinics [14], museums [15] and home as well as in the classroom [16]. A study [15] designed and implemented a prototype that uses mobile devices to help patrons to museum or zoo to obtain information about places where they viewed. In particular, the system provides services for people with special needs (limited hearing, vision and mobility) and introduce these solutions to help them, each and everyone according to the need and suitable manner: images with high contrast of artefacts allow personal viewing, Audio descriptions with adjustable audio delivered via headphones, Text in bold sans serif font with user adjustable font size. The system identified the place where patron stand and thus determines the artefacts closest to him and introduce historical information and image about this patron.

Mobile learning (M-Learning) can be considered a lifelong activity that can take place in changing communities and mixed with everyday life situations where people repeatedly enhance their knowledge and skills [17]. It is an emerging form of distance learning that offers both teachers and learners the opportunity to interact and gain access to educational material using a wireless handheld device, independent of time and space [18]. Research in M-Learning for higher education is steadily progressing. In a survey of young adults (16 – 24 years) usage of mobile phones in the UK, almost half expressed an interest in using their mobile phone to improve their reading, spelling, and math's or language skills. Although only 50% currently use palmtops, 55% stated that they might use one under other conditions, especially lower prices [19].

3.0 LIBRARY LOAN SERVICE

Many libraries have applications to manage their contents such as bibliographies, electronic list of resources and patrons loan service [20]. Moreover, the loan service comprises of four basic operations which include; borrowing, returning, renewal, and reservation of books or other materials. Moreover, the library is one of the most important fundamental components of the educational process. It is extremely important for the learner to access required books and references. It is also primarily designed to enhance the educational opportunities available in schools and institutions of higher learning [21]. Consequently, almost every organization or library comes to realize, sooner or later, that it needs a system to manage its content by new publication forms like Web, WAP or other forms [20].

One of the publication ways is Web which had dramatically changed the way contents are published [20]. Moreover, the needs of users and a variety of libraries increased with the proliferation of these techniques to be available every where and every time rather than anywhere and any anytime. Consequently, some of the library services do not involve electronic loan operations, and others lack for complete loan operations, or it depends on library staff to make operations. While library systems and e-learning systems actually need to interact in a rich variety of ways [7].

A study conducted by [22] outlines four models of library PDA support that are familiar in library terms. These provide opportunity for libraries to use one or all of these models to enhance their services through mobile-based technology. The models include:

- i) Collection Development Model: This is the process of evaluating, selecting, procuring and managing the licenses for PDA resources.
- ii) Instruction/Advisory Model: This is providing formal training sessions, individualized one-on-one consultations and being an informal advisor of PDA hardware, software and content.
- iii) Technical Support Model: This involves the provision and support of synching cradles and Infrared (IR) beaming stations for clients. This role may or may not overlap with the IT department's role.
- iv) Facilitator/Communication Model: This involves developing web pages with links to PDA content, facilitating face to face PDA User Groups or online PDA mailing list server.

Another study [23] has investigated the ways that enhance the library experience and improve the communications among patrons and researchers in libraries community. This allowed for users to get updated information on their current books charged out to them, search histories, navigate through on-line library catalogue, bookmarks to library and other Web resources. The study evaluated the human computer interaction (HCI) and appropriate method for mobile library systems.

4.0 MOBILE-BASED LIBRARY LOAN SERVICE (MBLLS)

MBLLS provides two main services i.e. Book(s) Reservation and Book(s) Renewal. Fig 1 (a), (b) and (c) show snapshots of the reservation and renewal screens after the transactions had been done.



Fig 1 (a): Snapshots of the search result



Fig 1 (b): Snapshots of the reserve transaction



Fig 1 (c): Snapshots of the borrowed books

Scholars today believe that without system development, research has no use and without research, development has no base [24]. The methodology for this study was adapted from the System Development Research Methodology (SDRM) [25]. The prototype MBLLS was developed with .NET Framework using ASP.NET 2.0 as the Integrated Development Environment (IDE). Microsoft SQL Server 2005 was used as the database to store and retrieve all information. The design of the prototype took into account the status quo to make moderation of a new set of abilities and limitations brought forth by small and lower-fidelity screens, small amounts of memory and storage, slow network connectivity, and alternative forms of input.

5.0 USER EVALUATION OF MBLLS

User evaluation was conducted to determine users' perception on the usability aspect of the MBLLS prototype. The instrument was adapted from [26] and [27]. The instrument covers three dimensions: *Usefulness*, *Ease of Use* and *Outcome/Future Use*.

5.1 Instrument for User Evaluation

For user evaluation, a set of questionnaire which comprises of General Information and User Evaluation sections was used. The General Information section functions as a mechanism to collect users' demographic data and users' experience and knowledge with the mobile applications. The User Evaluation section is intended to collect data on users' opinion regarding the MBLLS prototype usability aspects. A 5-point Likert scale anchored by "Strongly Disagree" (1) and Strongly Agree (5) was used.

5.2 Method of User Evaluation

The MBLLS user evaluation was conducted on thirty respondents. Each of them was given brief explanation regarding the usage and the user interface of the prototype. Each user was allocated ample time to learn and explore the content of the prototype. Once they were done, users were given a questionnaire for user evaluation.

6.0 RESULTS

Descriptive statistics, reliability analysis and t-test were used in this study. SPSS version 13 for Windows was used to analyze the data. Results from the descriptive, reliability, and t-test analyses will be discussed in the following section.

Half of the respondents were males. 17 (56.7%) of them have degree, 12 (40%) have master, and 1 (3.3%) have Ph.D. from various ages. The respondents' experience and knowledge with mobile applications were assessed in order to be grouped as novice or expert. 16 respondents (53.3%) were categorized as novices and 14 (46.7%) as experts. The percentages tell that the respondents' mobile application experience would not change their preference and expectation. A minimum of eight users are required for reliable measures for each variance in the data. Thus, there is sufficient number of participants for each group [28].

Both validity and reliability were addressed for the usability evaluation questionnaire. The validity of a questionnaire is the degree to which the questionnaire is actually measuring or collecting data about what the researcher thinks it should be measuring or collecting data about. One of the most commonly reliability coefficient used is Cronbach Alpha [29]. The reliability of a questionnaire is the ability of the questionnaire to give the same results when filled out by like-minded people in similar circumstances. It is usually expressed on a numerical scale from zero (very unreliable) to one (extremely reliable) [30].

Thus, Cronbach alpha values were calculated using SPSS 13.0 to determine the data inter-item reliability which assesses the degree of internal consistency between multiple measurements of a dimension. Table 1 presents the Cronbach alpha value for each measure. The *Usefulness*, *Ease of Use* and *Outcome/Future Use* measures have Cronbach alpha of greater than 0.7, thus, these measures satisfy the internal reliability criterion.

Table 1: Cronbach Alpha Values for All Dimensions.

Measure	Number of items included	Cronbach Alpha
Usefulness	6	0.710
Ease Of Use	6	0.888
Outcome/Future Use	5	0.763

Usability evaluation from users' perspective is important in obtaining users' opinion towards the usability of the MBLLS. The descriptive statistics for all the measures are presented in Table 2. A one-way Chi-Square test of homogeneity was conducted on the responses for all the items. A significant p-value indicates that the responses are not equally distributed across the items. As shown in Table 2, the results are positive with p-values significant at 0.01 for *Usefulness*, *Outcome and Future Use* and *Ease of Use*.

Table 2: Descriptive Statistics for All Measures

Measure	N	Mean	Std. Deviation	P (Chi-Square)
Usefulness	30	4.0278	0.41542	.000*
Ease of Use	30	4.0556	0.58121	.006*
Outcome / Future Use	30	4.0000	0.49827	.000*

*: Significant at the 0.01 level.

Table 3 shows descriptive statistics for all the items. Nine items with means more than 4 are bolded which indicate that most of the participants agreed on these items and just neutral on the rest of the items that are related to the MBLLS. Overall, the results indicate that the participants agreed that MBLLS has good usability.

Table 3: Descriptive Statistics for All Items

Item	Mean	Std. Deviation
PERCEIVED USEFULNESS		
1. Using MBLLS would enable me to accomplish tasks more quickly.	4.3667	0.71840
2. Using MBLLS would improve my performance.	3.7667	0.50401
3. Using MBLLS would increase my productivity.	3.8667	0.62881
4. Using MBLLS would enhance my effectiveness.	3.9667	0.61495
5. Using MBLLS would make it easier to do my tasks	4.4333	0.62606
6. I would find MBLLS useful in my everyday tasks.	3.7667	0.77385
PERCEIVED EASE OF USE		
7. Learning to operate MBLLS would be easy for me.	3.9000	0.66176
8. I would find it easy to get MBLLS to do what I want it to do.	4.0333	0.80872
9. My interaction with MBLLS would be clear and understandable.	4.1333	0.77608
10. I would find MBLLS to be flexible to interact with.	4.0000	0.78784
11. It would be easy for me to become skillful at using the MBLLS.	4.2000	0.61026
12. I would find MBLLS easy to use.	4.0667	0.69149
OUTCOME / FUTURE USE		
13. I was able to complete the transaction quickly using MBLLS.	4.1667	0.64772
14. I could effectively complete the transaction using MBLLS.	3.9333	0.73968
15. I was able to efficiently complete the transaction using MBLLS.	3.8667	0.77608
16. I believe I could become productive quickly using MBLLS.	3.9333	0.69149
17. From my current experience with using MBLLS, I think I would use it regularly.	4.1000	0.60743

6.1 Comparison between Novice and Expert Groups

Independent samples t-test was used to compare the mean values between novice and expert groups for all the measures in order to signify the differences statistically. Table 4 shows the means, standard deviations and paired t-test for all the measures. Based on the paired t-test, as the significance values are less than 0.05 [29], there was significant difference between novice and expert groups for *Usefulness* and *Ease of Use*. However, there was no significant difference between novice and expert groups for *Outcome and Future Use*.

Table 4: Mean, Standard Deviation and Paired t-test for all measures

Measure	Group	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig.
Usefulness	novice	16	4.1200	.35445	.04350	2.039	28.606	.001
	expert	14	3.9720	.44077	.06020	1.992	25.9114	
Ease of Use	novice	16	4.2500	.61032	.07490	3.484	28.606	.002
	expert	14	3.9148	.39066	.05336	3.645	29.1867	
Outcome/ Future Use	novice	16	4.2120	.48397	.05939	4.121	28.606	.609
	expert	14	3.8716	.40333	.05509	4.202	30.5580	

7.0 CONCLUSION

Mobile Based Library Loan Service prototype was developed to help library users to reserve and renew their books via mobile devices. The prototype was evaluated and the results confirm that it is useful for users and it is capable to help them to make their transactions easily, directly and successfully regardless of location and time. It is hoped that the findings of this study will encourage librarians to incorporate MBLLS into the existing library services in order to improve and enhance the library services so that it is available to users at any place and any time.

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