

USABILITY OF LIBRARY MANAGEMENT SOFTWARE: AN EVALUATION OF THE EFFECTIVENESS OF CATALOGUING MODULE USED IN NIGERIAN UNIVERSITY LIBRARIES

BY

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Abstract

The study was carried out to determine the effectiveness of cataloguing module of Library Management Software (LMS) in service delivery in Federal University Libraries in Nigeria. A combination of quasi experiment and survey design were adopted for the study. The population of the study was 385 library staff consisting of professional and para-professional librarians. Purposive sampling technique was adopted to select 70 participating users for the study. Usability testing was conducted and observation and interview were used to collect data from the participants. Result indicated that Alexandria (56.67 %), SLAM (66.67 %) and NewGenLib (53.33 %) cataloguing module's effectiveness were at acceptable level, however, Koha (26.67 %) cataloguing module's effectiveness was not at acceptable level and due to the absence of MARC or z39.50 feature, SLAM was not recommended for use. Therefore, the study recommended that the software under study should be improved when developing newer version to enhance the effectiveness of service delivery.

Keywords: Usability, Evaluation, Effectiveness, Library management software and cataloguing module

Introduction

Computer and related technologies have brought tremendous change and impact on all types of library services. The use of these technologies has altered the way library operations are performed with the aim of providing effective service to users by making library materials visible, giving access to library materials and also gaining access to catalogues of other libraries around the world. The adoption of technologies such as Library Management Software (LMS) in library housekeeping operations have continued on a steady transformation from manually practiced operations to automated operations. Library operations and services include acquisition, cataloguing and classification, circulation, serial and Online Public Access Catalogue (OPAC).

LMS is an integrated system that consists of relational database in which the files are interlinked so that deletion, additions and other changes in one file automatically activate changes in related files. Usually, LMS has two interfaces, one for staff and the second for library patrons (Sarma, 2016). The staff can store bibliographic record of library materials, place order for books and track circulation materials with patrons while the patron can search, view books which are available in the library and place book on hold through OPAC interface. In an attempt to support learning, teaching and research activities in Nigeria, university libraries have taken advantage of the technology to improve their operations and facilitate the dissemination of information (Onoriode, 2016). Today, many university libraries in Nigeria have adopted the use of LMS with considerable progress. Notable among the LMS used in Nigerian university libraries are Koha, Alexandria, Strategic Library Automation Management Software (SLAM) and NewGenLib.

LMS are also web-based applications, designed and developed to meet the needs of libraries. They are customizable solution software that is based on the user requirement which runs on a network or server (Giri, 2012). Similarly, Hazarika (2017) opined that LMS are built with library standards and protocols that ensure inter-operability among similar systems. Consequently, LMS supports acquisition, technical processing such as cataloguing and classification, serials management, circulation, administration, report and OPAC functionality (Sarma, 2016). The cataloguing module covers MARC, bibliographic record management, item management, authority management, Z39.50 copy cataloguing. The MARC built-in feature therefore, enables cataloguers to obtain MARC references from various sources such as Library of Congress and the item management window helps in locating and importing complete standard MARC records of different resources including e-resources to search the Z39.50 servers, or specifying other sources (Madhusudhan and Singh, 2016). Data imported are edited, bearing a customized barcode label before they are saved into the library catalogue.

Utilization is the extent to which modern technologies are used in university libraries to provide and meet the information needs of users. Utilization of LMS in libraries has therefore, aimed at reducing the process of repetitive tasks, improving the level of efficiency and enhancing effectiveness of cataloguing function. In addition to that, Orbih and Aina (2014) stated that the use of LMS in cataloguing has made processing of library materials easy, accurate and interesting as libraries share bibliographic data with one another. Bibliographic data imported and edited are saved for use. At this juncture, it is worth noting that despite the advantages accruing from the use of LMS, there are also disadvantages. That is why Ezechukwu and Odeshi (2018) posited that attempts to use LMS to fully automate library functions in many libraries in Nigeria have not yielded much desired result. The authors further revealed that the gradual and sluggish utilization of LMS in Nigerian university libraries have contributed to the continued manual practices in library operations. The reasons behind the slow pace of this process include insufficient funds and inadequate skills to maintain the LMS, poor internet connection, low internet bandwidth, poor feasibility study, poor ICT skills among librarians and attitude of library staff towards the use of LMS (Otunla, 2016 and Emasealu, 2019). The difficulty and dissatisfaction of the use of LMS may have contributed to the attitudes towards its use.

It is important to note that not all LMS are easy to use in the provision of library services, Londhe (2015) concur with this view when the author noted that from the vast majority of LMS available, very few of them are useful and easy to use, since usability issues have a great impact on the success of interactive applications such as LMS. Iftikhar (2018) posited that majority of software have interaction issues which result to frustration and inability to users to successfully operate and achieve desired goal. Hence, it is paramount to evaluate the effectiveness of LMS in relation to usability from user's perspective. The purpose is to determine whether the LMS used are effective or not. In relation to this, Komninos (2019) explained that effectiveness is a characteristic that defines whether users can complete their goals with a high degree of accuracy. In this regard, the accuracy and completeness with which users perform and achieve specific objectives with no errors cannot be over emphasized. Thus, properties and style of interface, dialogue structure and the nature of the functionality contribute to software effectiveness (Bevan, Kirakowski and Maissel, 1991). Despite the potential benefits of LMS application in cataloguing function of Federal University Libraries, there are challenges that are related to usability of LMS which leads to errors, reduced acceptance and affect user productivity.

Literature Review

Usability considers the ability of the user to use software to carry out library task successfully. Dumas and Redish (1999) explained usability as ability of people to easily use a specific

software to accomplish desired tasks. Similarly, International Standard Organization (ISO) 9241-11 (1998) defined usability as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use”. This means that usability is a multi-dimensional attribute that can be used to measure the quality of a user’s interaction with software.

According to ISO 9126 (2001), effectiveness is defined as the capability of the software to enable users to achieve specified goals with completeness and accuracy. This definition indicates whether the software is able to support the user in an effective way and whether the user can carry out their operations with few steps. Effectiveness emphasizes completeness and accuracy with which users can achieve desired goals. Therefore, users focus on completing desired task using a particular software. In this regard, effectiveness is the ability of a user to complete a task in a specified context. Consequently, Rachel *et al* (2013) explained that effectiveness is measured by evaluating whether or not participants can complete predefined tasks. Thus, usability evaluation is critical to the success and improvement of software system.

Hence, Chanlin and Hung (2016) suggested that evaluators can use combination of usability testing and questionnaire evaluation methods to examine the usability of software system. Silva and Wijayaratne (2015) examined Colombo library website using usability testing technique and post-test questionnaire, the study discovered that the effectiveness of the library website was 86.69% and efficiency was 1.35 minute per task with fairly overall users’ satisfaction. A similar evaluative study was conducted on Indian institutes of management library websites by Verma and Shukla (2018). The study assessed the usability of Indian institutes of management library websites with the aim of finding out the efficiency and effectiveness of the library websites. 14 library websites were selected for the study and a combination of online survey and automated tools methods were used to assess the usability of the library websites. The study revealed that IIMs libraries have useful websites but usability features were ignored as users committed errors and spent much time searching for information. The study further suggested improvement upon the usability features of IIMs library websites

Another usability of library website was evaluated with different end users by Kous, Pusnik, Hericko and Polancic (2018). The objective of the study was to investigate the interaction with library website in terms of effectiveness, efficiency and satisfaction with different end users. Formal usability testing and think-aloud protocol was performed with 31 participants, consisting of representative of pupils, students, community members and researchers. Data was collected through observation and questionnaire. The study revealed that different groups of end users achieve different levels of effectiveness, efficiency and satisfaction. The study also found out that there was no significant difference among groups in satisfaction level and the inexperienced did not achieve the threshold for usable website. Thus, the study suggested the improvement of the website’s usefulness.

Khatun and Ahmed (2018) conducted a usability test of Koha LMS to examine the usability of OPAC from end users’ perspective. Twenty four (24) students from different departments comprising of experienced and novice volunteers participated in the usability test. A number of usability tests were performed on Koha interface and data was collected through computer screen recording software. The test result indicated that there was significant difference between experienced and novice users in terms of success score and errors made. The study concluded that Koha LMS was not easy for new users, therefore suggested that Koha OPAC interface should be improved.

Objective of the Study

The study evaluates the usability of LMS cataloguing module in relation to effectiveness in service delivery in selected Federal University Libraries in Nigeria from users’ point of view.

Specifically, the study seeks to determine the effectiveness of LMS in service delivery in Federal University Libraries.

Research Methodology

The research design used for this study is quasi experimental design. In the view of Cohen et al (2011), a quasi-experiment is conducted outside the laboratory and the subjects used in the experimental and control groups are not randomly assigned. In this case, experimental and control groups were used to conduct usability evaluation of the cataloguing module of LMS. The study was carried out in Federal Universities of Technology, Akure, Owerri and Universities of Benin and Jos in Nigeria. The population for this study was 385 library staff consisting of professional and para-professional staff. Purposive sampling technique was adopted to select 70 participating users for the study. The participants consisted of equal number of 35 experienced and inexperienced users. 20 participants each were selected from three of the participating libraries and 10 participants from one of the university libraries because of the limited number of cataloguing staff. The criteria for the selection of participants included, familiarity with LMS cataloguing module, computer skills and no working experience with the LMS cataloguing module. Observation and interview were adopted as the instruments used to collect data for the study.

Usability testing method was employed to perform cataloguing tasks. Usability testing is a user-based usability evaluation method where users performed their tasks using LMS and the evaluator recorded the time on task and task success on the “participants’ observation and recording form”. Since the inexperienced group has no required experience, they were given some time to explore Alexandria, SLAM, Koha and NewGenLib LMS cataloguing module to allow for familiarization. However, the exploration was not needed for the experienced participants. Three cataloguing tasks were performed by experienced and inexperienced participants and performance metrics based on time on task and task success was used to measure effectiveness of LMS cataloguing module. The data collected were computed and results presented in Tables and graphical form.

Effectiveness was calculated in term of number of tasks participants successfully completed.

Thus, Effectiveness = **Percent of Completion** = $\frac{A}{N} \times 100$ (ISO, 1998, Mifsud, 2015)

A = Number of tasks completed

N = Total number of tasks taken

The classification of System Usability Scale (SUS) modified by Farrahi *et al.* (2019) was adapted for acceptable region for software effectiveness. Therefore, the benchmark percent scores are, 0-25 is considered worst, 25.5 – 52 percent is poor, 53-67 percent is considered ok, 67.5-74.5 percent is good, 75- 85 percent is excellent and 85.5 -100 percent is best. Therefore, from 53 – 100 percent score is an acceptable region.

Results

Table 1: Participants time on task (in seconds) for effectiveness of cataloguing module of LMS for experienced participants

LMS	SLAM			Alexandria			NewGenLib			Koha		
	5			10			10			10		
Task: Description of items	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
Time on task completed without help	877.00	907.00	936.00	2619.00	2564.00	2614.00	3362.00	3296.00	3238.00	8824.00	8682.00	8747.00
Ave time on task compl. without help	175.40	181.14	187.20	261.90	256.40	261.40	336.20	329.60	323.80	882.40	868.20	874.70

Table 1 shows that all experienced participants completed the cataloguing task. SLAM participants had the lowest mean time for the task performed, followed by Alexandria participants and the least completion time was Koha participants. The result in Table 1 also reveals that Koha participants had the highest mean time of 882.40 (task 1), 868.20 (task 2) and 874.70 seconds (task 3). This is followed by NewGenLib participants with mean time of 336.20 (task 1), 329.60 (task 2) and 323.80 seconds (task 3). Also revealed in Table 1 is SLAM participants with the lowest mean time of 175.40 (task 1), 181.14 (task 2) and 187.20 seconds (task 3) indicating a major difference in time used to complete cataloguing tasks. Interview with SLAM, Alexandria, NewGenLib and Koha participants revealed that all the LMS were used to describe library materials, however, SLAM participant expressed displeasure toward the non-web based of the software (SLAM) and hence, did not recommend the software to any academic library.

Table 2: Distribution of participants' success on tasks for effectiveness of cataloguing module of LMS for inexperienced users

LMS	SLAM			Alexandria			NewGenLib			Koha		
Number of Participants	5			10			10			10		
Task: Description of items	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
No. of participants who compl. task without help	2	1	2	2	2	2	2	3	2	-	1	1
No. of participants who completed task with help	1	2	2	3	3	5	2	3	4	2	2	2
No. of participants who could not complete task	2	2	1	5	5	3	6	4	4	8	7	7

Tables 2 revealed the result of inexperienced participants. The result shows that, not all participants completed cataloguing tasks given to them. Of the 105 tasks performed by 35 participants, only 20 tasks were completed without help. From Table 2, 5 inexperienced participants completed tasks 1, 2 and 3 with SLAM, 6 participants completed tasks 1, 2 and 3 with Alexandria, 7 participants completed tasks 1, 2 and 3 with NewGenLib and 2 participants completed tasks 2 and 3 with Koha without help. It can be seen from Table 2 that there was no inexperienced participant that completed task 1 without help with Koha. The Table also revealed that many inexperienced participants completed the tasks with help across the LMS under study and 45 tasks could not be completed.

Table 3: Participants time on task (in seconds) for effectiveness of cataloguing module of LMS for inexperienced users

LMS	SLAM			Alexandria			NewGenLib			Koha		
	5			10			10			10		
Task: Description of library items	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
Time on task completed without help	723.00	361.00	718.00	1195.00	1171.00	1178.00	1184.00	1887.00	1162.00	-	1681.00	1697.00
Ave time on task compl. without help	361.50	361.00	359.00	597.50	590.50	589.00	592.00	629.00	581.00	-	1681.00	1697.00
Time on task compl. with help	421.00	687.00	735.00	1742.00	1752.00	2834.00	240.00	1856.00	2474.00	3335.00	3289.00	3251.00
Ave time on task compl. with help	421.00	343.50	367.50	580.67	584.00	566.80	620.00	618.67	618.50	1667.50	1644.50	1625.50
Time on task not completed	719.00	736.00	324.00	2648.00	3228.00	1572.00	4072.00	2698.00	2715.00	12460.00	10708.00	11066.00
Ave time on task not completed	359.50	368.00	324.00	529.60	538.00	524.00	678.67	674.50	678.75	1557.50	1529.71	1580.86
Total time on task	1863.00	1784.00	777.00	5585.00	5556.00	584.00	496.00	6440.00	6351.00	15795.00	5679.00	16014.00
Average total time on task	372.60	356.80	355.40	558.50	555.60	558.40	649.60	644.00	635.10	1579.50	1567.90	1601.40

The result in Table 3 reveals the mean time of inexperienced participants on cataloguing library materials. Table 3 indicated that SLAM inexperienced participants completed cataloguing task without help with the lowest average time of 361.50, 361.00 and 359.00 seconds for tasks 1, 2 and 3. Alexandria inexperienced participants that completed cataloguing task without help spent an average time of 597.50, 590.50 and 589.00 seconds in completing cataloguing tasks 1, 2 and 3 and the highest average time spent on tasks completion was 1681.00 and 1697.00 seconds for task 2 and 3 with Koha. Inexperienced participants who committed errors while cataloguing library items tend to spent longer time to complete a task while some could not complete the task likely due to information overload on the interface and clarity of the content.

Furthermore, the Table also reveals the mean time of inexperienced participants who completed task with help. Koha inexperienced participants who completed cataloguing task with help spent a mean time of 1667.50, 1644.50 and 1655.50 seconds for tasks 1, 2 and 3. The least time spent to describe library items with help were performed with SLAM and the mean time for tasks 1, 2 and 3 were 421.00, 343.50 and 367.50 seconds. The difference in the mean time among LMS cataloguing module could be attributed to the features which includes the templates, extraneous information in the cataloguing interface and steps involved in describing library material with the LMS. Closed observation revealed that some of the participants were confused and could not complete the tasks.

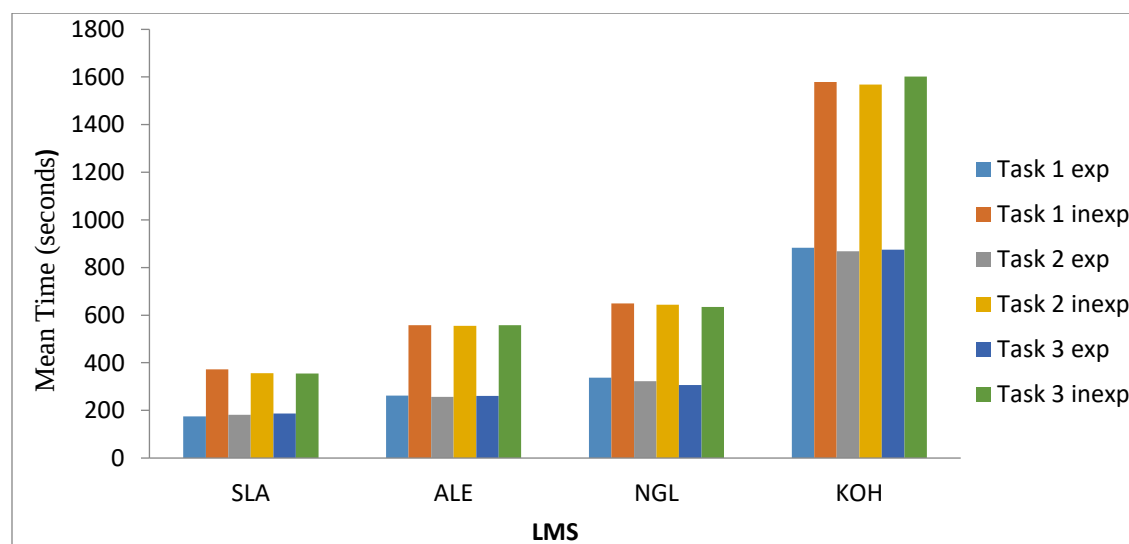


Figure 1: Comparison of mean time of experienced and inexperienced participants for effectiveness of cataloguing module
Key: LMS= Library management software; SLA=SLAM; ALE= Alexandria; NGL= NewGenLib; KOH= Koha; Exp = Experienced; Inexp =Inexperienced

Result in Figure 1 compares the total mean time of the tasks performed between the experienced and inexperienced participants. The result in the Figure revealed that experienced participants spent a total mean time of 175.40, 181.14 and 187.20 seconds on tasks 1, 2 and 3, while the

inexperienced participants spent a total mean time of 372.60, 356.80 and 355.40 on tasks 1, 2 and 3 for SLAM. In the same vein, Alexandria experienced participants spent mean time of 261.90, 256.40 and 261.40 seconds on tasks 1, 2 and 3, while the inexperienced participants spent mean time of 558.50, 555.60 and 558.40 seconds on tasks 1, 2 and 3 respectively. Using the NewGenLib to perform task 1, 2 and 3, the experienced participants spent a total mean time of 337.00, 322.10 and 306.90 seconds, while the inexperienced participants spent a total mean time of 649.60, 644.10 and 635.10 seconds.

Similarly, Koha experienced participants spent a total mean time of 882.40, 868.20 and 874.50 seconds, while the inexperienced participants spent a total mean time of 1579.50, 1567.90 and 1601.40 seconds on task 1, 2 and 3, indicating that the inexperienced participants spent as much as twice the time it took the experienced participants to performed a task across all the LMS. From these results, it can be deduced that Koha LMS cataloguing module is detail in its description data. Hence, Koha contained excessive information on the templates which made the module complicated for inexperienced participants to be confused and subsequently asked for help, made mistakes and some abandoned the task. This implies that information that is not used for cataloguing are embedded, as such new cataloguers can easily be confused, frustrated and abandoned the use of LMS for manual operation.

Furthermore, comparing the number of tasks completed, the experienced participants completed all the cataloguing tasks, while Koha inexperienced participants completed 8 tasks with and without help while 22 tasks were not completed as against 30 tasks that were completed by the experienced participants. Similarly, NewGenLib inexperienced participants completed 16 tasks with and without help while 14 tasks were not completed as against 30 tasks that were completed by the experienced participants. Furthermore, 17 cataloguing tasks were completed with and without help by Alexandria inexperienced participants as against 30 tasks that were completed by the experienced participants. SLAM had the highest result with 10 cataloging tasks completed with and without help as against 15 tasks that were completed by SLAM experienced participants. From the results, it can also be observed that, there is difference in the number of completed cataloguing tasks between the experienced participants and inexperienced participants indicating that some inexperienced were confused, frustrated and abandoned the process due to navigation issues such as lock and unlock in the case of Alexandria, click each cell before you can input data in the case of Koha, NewGenLib and Alexandria, as well as steps and data entry points required for input data.

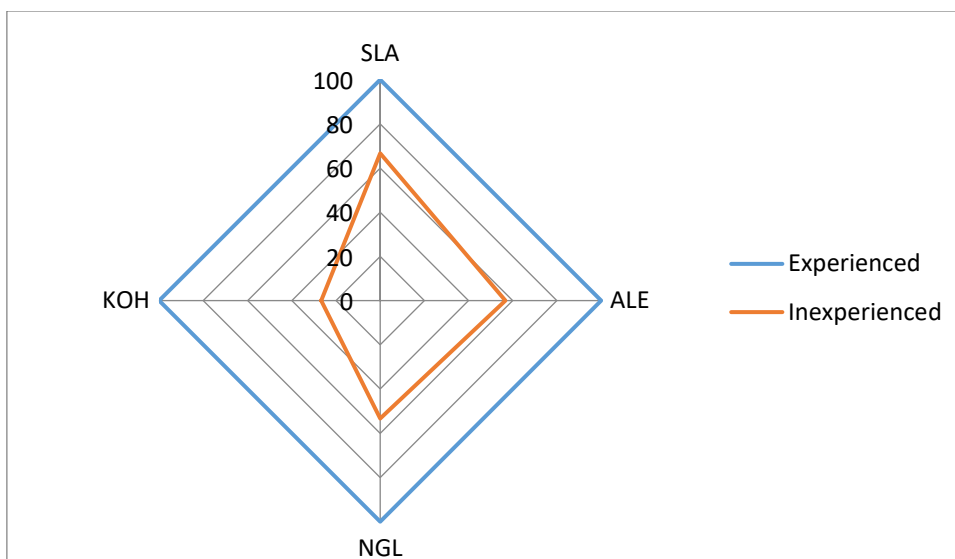


Figure 2: Percent effectiveness for cataloguing module
SLA=SLAM; ALE= Alexandria; NGL= NewGenLib; KOH= Koha

The percent of effectiveness depicts that all experienced participants completed cataloguing tasks without help. Hence, they all attained 100 percent learnability. The graph shows that not all inexperienced participants completed cataloguing tasks without help. Most of the inexperienced participants could not complete the cataloguing tasks, few of them completed the tasks with help and fewer participants completed without help as indicated in the low percent effectiveness in Figure 2. The Figure shows that the percent effectiveness for SLAM is 66.67 %, Alexandria is 56.67 %, NewGenLib is 53.33 % and Koha is 26.67 %.

Discussion

The results of effectiveness of cataloguing module presented, indicated that all experienced participants completed the cataloguing tasks. SLAM participants had the lowest mean time for the task performed and the highest mean time was obtained for Koha experienced participants indicating a major difference in time used to complete cataloguing tasks. Interview with SLAM, Alexandria, NewGenLib and Koha participants revealed that all the LMS were used to describe library materials, however, SLAM participants expressed their displeasure toward the non-web-based form of the software (SLAM). This implies that cataloguers cannot have access to catalogued and classified materials of other libraries through the use of z39.50. The result also revealed that not all inexperienced participants completed cataloguing tasks. Of the 105 tasks performed by the inexperienced users, only 35 tasks were completed without help with SLAM participants having the highest number of tasks completion and lowest time while Koha participants had the least number of tasks completed with the highest time for cataloguing. Inexperienced participants who committed errors while cataloguing library items spent more time in completing a task; others could not complete the task due to information overload on the interface and lack of clarity of the content. Information that may not be used for cataloguing are embedded in cataloguing module, as such new cataloguers find the use of the module difficult and frustrating and abandoned the use of LMS for manual operation.

The percent of effectiveness revealed that all experienced participants completed cataloguing tasks. Hence, they all attained 100 percent effectiveness. However, most of the inexperienced participants could not complete the cataloguing tasks. The percent effectiveness were, SLAM - 66.67 %, Alexandria - 56.67 %, NewGenLib - 53.33 % and Koha - 26.67 %. From the classification of System Usability Scale (SUS) modified by Farrahi *et al.* (2019) and adapted for effectiveness, SLAM, Alexandria and NewGenLib cataloguing modules are acceptable. Interview with participants revealed that the cumbersomeness and multiplicity of information required for cataloguing when Koha was used, contributed to the low effective value obtained for Koha inexperienced participants. Thus, less than 70 % of cataloguing tasks were completed with SLAM, less than 60 % cataloguing tasks were completed with Alexandria and NewGenLib inexperienced participants which are within the acceptable region. However, less than 30 % cataloguing tasks were completed with Koha inexperienced participants, hence, not within the acceptable region.

Conclusion and Recommendation

In view of the LMS cataloguing module evaluated, all the LMS have usability issues which affected the effectiveness of cataloguing module of LMS but at different levels of interaction in term of user interfaces of cataloguing module. Alexandria, SLAM and NewGenLib cataloguing module effectiveness were at acceptable level, however, Koha cataloguing module's effectiveness was not at acceptable level. Due to the absence of MARC or Z39.50 feature in SLAM interface, it concluded that SLAM was not recommended for use. The study recommends that the software under study should be improved upon, when developing newer version of the LMS in order to enhance the effectiveness of the LMS.

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