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Factors affecting utilisation of electronic health information resources in universities in Uganda

Kinengyere Annet Alison[a], George William Kiyingi[b] and Bernard Bamuhiiga Baziraake[c]

[a]Library and Information Scientist, Albert Cook Medical Library, Makerere University College of Health Sciences, P.O Box 7072, Kampala, Uganda, Email: kinengyere2001@yahoo.com

[b]Lecturer, Department of Information Science, Makerere University College of Computing and Information Sciences, P.O Box 7062, Kampala, Uganda, Email: wkiyingi@easlis.mak.ac.ug

[c]University Librarian, Kyambogo University, P.O Box 1, Kampala, Uganda, Email: bamuhiiga@yahoo.co.uk

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This article reports on a study done on electronic health information resources (e-resources) usage in three universities offering medical education in Uganda. One of the objectives of the study was to investigate factors influencing utilisation of e-resources, which this paper set out to examine. Data was gathered through interviews, questionnaires and citation analysis. Graduate students, teaching staff/ researchers, heads of departments and librarians participated. The ATLAS.ti and Excel programs were used to analyse the qualitative and quantitative data respectively. The study revealed that utilisation of e-resources was influenced by human and institutional factors. While usage was low, there was a significant relationship between usage and information literacy. Addressing factors that affect utilisation of e-resources improves study, research, and ultimately patient care. While healthcare providers will make informed clinical decisions, quality of research and student grades will improve. It will guide curriculum development and/or revision in those fields and guide policy formulation in setting up minimum standards for libraries in universities. E-resources are important in medical education because they support study and research. Addressing their utilisation therefore improves library services, study, research and ultimately, healthcare.

Keywords: Electronic health information; information resources; information utilisation; academic libraries; Universities; Uganda

Introduction

Electronic information resources (e-resources), especially journal literature are an important component of academic institutions because they support the core functions of higher institutions of learning: learning, teaching and research. For academic institutions offering medical education, e-resources further support evidence based practice which in turn improves the quality of patient care. In the past decade, e-resources have become a significant component of library collections worldwide. Every year, large investments, (in form of money, human resources and time) are made in order to develop and manage e-resources in academic institutions. These investments are meant to improve information and communication technology (ICT) infrastructure, pay journal subscriptions and build capacity of both librarians and library users. During the past decade, most libraries witnessed a gradual but steady transition from predominantly using print to using both print and e-resources[1]. Scholarly journal publication is shifting rapidly toward electronic formats, especially in the health sciences. This transition, caused by the advent of ICTs has changed the way information is searched, processed, packaged, stored and disseminated to meet the ever-increasing demands of library users[2]. The dynamism of information, as a result of ICTs has affected the way information is managed in all sectors. Apart from ICTs, other developments have contributed to increased research in developing countries, hence increased use of e-resources. Most research is available in electronic format and therefore accessible with the help of ICTs. The e-resources available to institutions under study include: Access Medicine, AIDSLine, Centre for Disease Control, Cochrane Library, E-Medicine, EBSCO, Free Medical Journals, Google Scholar, HINARI, MD Consult, Medline, Ovid, Popline, Up-To-Date, WHO Library and Wiley InterScience.

Most of the databases were common to all institutions. Only a few were accessible by individual institutions. Whereas the three institutions registered individually to use HINARI, other common databases like Wiley InterScience, Oxford University Press, Cochrane Library, Cambridge Journals Online and GALE were accessible via the PERii programme

supported by the International Network for the Availability of Scientific Publications (INASP). EBSCO and Emerald databases were subscribed to by the Consortium of Uganda University Libraries (CUUL).

The three institutions have paid subscriptions and registered to use e-resources. They also use the open access resources such as Pub Med (Medline), free medical journals and books, and the World Health Organisation (WHO) Library. Furthermore, libraries organise information literacy training sessions for users to enable them to use these resources. However, the vendor/publisher usage statistics still indicate low usage as Figure 1 shows.

The steep increase in usage in 2007 could have been a result of the fact that universities in Uganda started embracing e-resources in 2006, and by 2007, there was a lot of training going on for librarians and users. This training could have resulted in more usage which led to the increase in statistics.

While different studies such as one by Manda[1] have reported low usage of e-resources, despite the efforts made to improve the uptake, libraries are not able to set limits between high and low usage. An increase in usage per year is a good sign[3].

Literature review

A few studies related to e-resources usage have been carried out by Makerere University staff[4]. These studies were carried out as part of master's degree work[5-6]. Other studies were informal. The informal studies/reports include feedback from users by e-mail, suggestion box, user statistics and reports compiled from evaluation of information literacy sessions. These have been included in articles published by Makerere University library staff such as those done by Musoke[4] and Kinengyere[7] and annual project progress reports to development partners[4]. These articles emphasise information literacy skills to enable users to access and use the e-resources more. However, none of these studies focused on health information. These studies focused on usage, not the factors influencing usage. Hence, a need for this study.

Elsewhere outside Uganda, a study was done on access to electronic library resources and services in academic and research institutions in Tanzania, to examine the factors that influenced use of the resources[1]. The study found out that although most institutions had access to e-resources, access was still limited by lack of skills, lack of awareness of available resources or lack of interest, time and commitment to use the resources. The study recommended development of policies and standards to support access to electronic information. The study was not specific to health information.

The literature further identified some of the factors affecting utilisation of resources as lack of competence of the e-resources users, lack of knowledge, negative attitudes and poor practices[8], and inadequate and limited infrastructure[1].

Objective of the study

- To investigate factors influencing utilisation of electronic health information resources in universities offering medical education in Uganda.

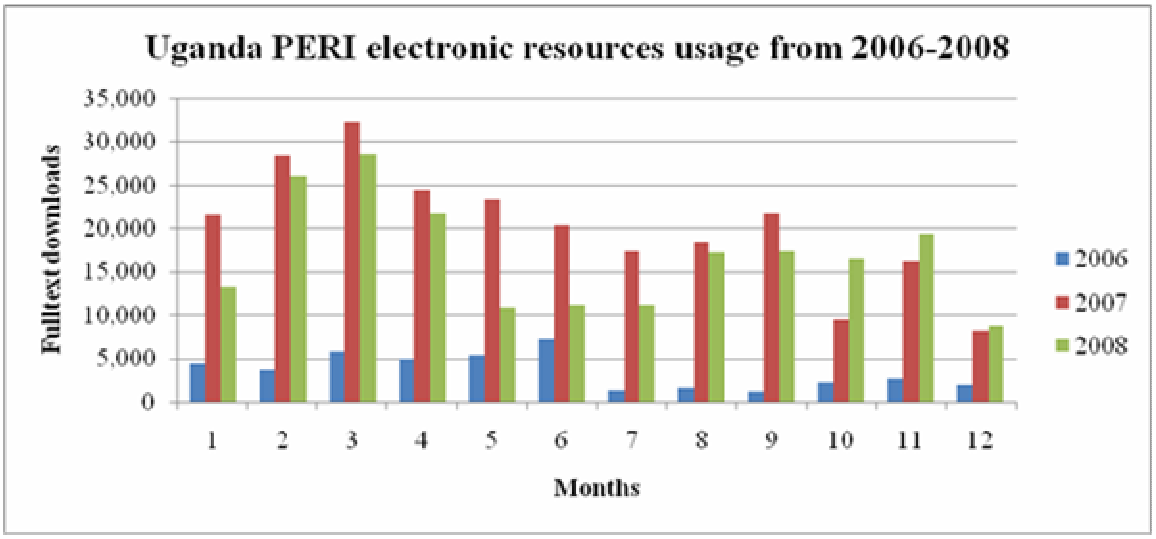

Fig. 1— Usage of PERI Resources at Country Level: 2006-2008. (Source: INASP)

Methodology

Data were collected using in-depth face-to-face interviews, semi-structured questionnaires and citation analysis. The interviews targeted the heads of departments (HODs), while the questionnaires were filled by graduate students and academic staff/researchers. Undergraduate students were excluded from the study because earlier studies such as one by Tenopir found out that undergraduates were poor users of e-resources as compared to graduate students[9]. The manual citation analysis of graduate students' theses and dissertations was done to enable the researchers to find out how many students cited e-resources. Two research assistants and the principal investigator conducted the survey and interviews, and also analysed the data. Data collection started in November 2009 and went on up to March 2010.

Fifty nine graduate students, 37 teaching staff, nine heads of departments and six librarians from three institutions participated in the study, making a total of 111 respondents and informants, as Table 1 shows.

There was a response rate of 100%. Furthermore, 133 theses/dissertations were analysed. Librarians were interviewed to capture information on usage and monitoring and evaluation of usage. Some tables excluded the librarians, making the total number of respondents/interviewees 105 rather than 111.

The institutions that participated were Makerere University (MUK or MakCHS for Makerere University College of Health Sciences), Mbarara University of Science and Technology (MUST), and Uganda Martyrs University Nkozi (UMU). By 2006 when the main study started, 22 universities were registered with the National Council for Higher Education (NCHE). Only three of these universities were offering health-related programmes at graduate level. The fourth university, Gulu University had no graduate programmes in the Faculty of Medicine by 2006 when this study began.

Table 1—Study population and response rate

Category	Population	Sample targeted	Sample met	Response rate (%)
Students	332	59	59	100
Staff/researchers (includes HODs)	213	46	46	100
Librarians	13	6	6	100
Total	558	111	111	100

Lists of departments, graduate students and teaching staff and researchers were requested from the respective institutions to enable the researchers to determine the sample size. Using the Kish[10] formula for sample size determination,

$$n=\frac{z^2 pq}{e^2}$$

where n is the required sample size and

z is the tabulated value at 95% level of confidence; z=1.96

p is the proportion of the population who use e-resources. This proportion is unknown; 50% was used, which gives the maximum sample size

q = (100-p)%

e is the level of precision. The level of precision was taken as at 10%. Substituting into the formulae, we get

n= (1.96 x 1.96 x 50/100 x (100-50)/100)/(10/100 x 10/100) =96

Assuming a response rate of 95%, n will increase to

96 x 100/95 =91

This implies that the minimum sample size required was 91. The total number of graduate students was 332, and of academic staff and researchers 169. Since these numbers are small, a systematic random sample was used to select respondents, in order to give each member of the population an equal chance of being selected. This was achieved by randomly selecting a respondent, and then choosing additional respondents at evenly spaced intervals, until the desired number of respondents was obtained. The sample consisted of 59 graduate students, 37 academic staff and researchers, nine HODs and six librarians. The sample size for the heads of departments was determined as follows: In order to give all nine HODs a chance of being selected, a formula of K=N/n was used, where N=Number of departments, n=sample size and K=selection interval. For MUST, the number of departments was 23 and the interval was four. Therefore the sample size was five. For MUK, the number of departments (in the School of Medicine) was 14. The sampled departments were therefore 3. However, UMU had one department; hence it was selected without sampling. All the health-related programs offered at UMU are under one department, the Department of Health Services Management,

which has just been turned into a faculty. Therefore, total number of departments selected was nine.

The same formula[10] was used to select documents for citation analysis. This made it possible to include dissertations and theses for all the four years since the documents on the shelves were arranged chronologically by date. The citation analysis was done to obtain data on how many students cited e-resources in their theses and dissertations. (In Uganda, undergraduate medical students do not write dissertations. However, graduate students do research by thesis or by papers which are compiled into monographs). The same formula, $n=\frac{z^2 pq}{e^2}$ was used to determine the number of citations of the documents to analyse. n=1.96 x50/100x50/100/10/100 =96. In anticipation that some students might have not cited electronic literature, it was assumed that for every 100 dissertations /theses, 10 did not. Therefore, to be sure to get the required number, a response error of 90% was used and the figure corrected as n=96x100/90=106.667 which is approximately 107. However, a total of 108 dissertations was selected from Makerere University, out of 433. This was a selection of one in four. Using this proportion, 108 out of 433, nine out of 37 in MUST and 16 out of 64 in UMU were selected. A total sample of 133 theses and dissertations was therefore analysed. A manual method was used to look at references of print theses and dissertations in the three libraries because by 2007, most of the documents were available in print format only. The researchers physically looked at references of each document to select those which cited electronic information. In order to avoid bias that could occur during selection of research works to be included in the study, a systematic way of selection was used. The following criteria were adopted:

Time frame

Only studies done between 2006 and 2009 were included. Ugandan universities fully embraced use of electronic information resources for learning, teaching and research around 2006. The period 2006-2009 was therefore ideal for this study because that was the time when researchers and students had started using and therefore citing e-resources.

Inclusion and exclusion criteria

Only those studies done locally were considered. This ensured that the selected scholarly works had the same geographical setting. For instance, MUK and MUST are in collaboration with the Swedish universities and institutes which enable the students to do sandwich programs in Makerere or MUST, and in Sweden. These students do most of their research in Sweden, where ICT infrastructure is more developed to allow easier and faster access to e-resources. Furthermore, the Swedish universities and institutes have a wider range of e-resources to choose from and therefore, students under this program have more access than those who study from Uganda. Those studies done collaboratively by Makerere and Swedish universities or institutes were excluded because the research is done outside the local Ugandan setting.

For the MUK, only those theses and dissertations done in the School of Medicine were included. In UMU, only works done in the Faculty of Health Services Management were included, while in MUST, the Faculty of Medicine research works were included. The included documents were then counted and separated to identify those that cited e-resources and those that did not.

However, for some few documents with references that did not include URLs, it was difficult to tell whether the citations were from electronic sources or not. Such documents were categorised as those that did not cite e-resources.

After determining the sample sizes, the principal researcher and research assistants went to the selected departments to interview the HODs, since the number was small and specific. The same was done to the librarians who were found in their offices. The librarians were purposively selected. Only two librarians (one head librarian and a librarian in charge of electronic resources and information literacy were selected to give information from the providers' perspective). The graduate students were picked from the libraries, food canteens and the wards. No incentives were given, but we were able to get 100% response rate. While all the six librarians were willing to participate, some HODs were busy and therefore requested their deputies to take the interviews. As for the teaching staff and researchers, and graduate students, the first respondent was randomly selected, and then additional respondents were chosen at evenly spaced intervals, until the desired number of respondents was obtained. If one was not able to participate in the survey, the next one would be contacted and requested to participate. This enabled us to have good response rate.

Analysis

It was found out that use of e-resources to support learning, teaching and research in Uganda is still low. Table 2 shows that 54 (41%) out of 133 documents that were analysed cited e-resources.

Factors affecting e-resources access

Access is a composite word. It could be as a result of few computers that limit users' access to the resources; it could be lack of awareness, or even slow Internet speed. It could also be due to lack of skills to make productive searches. The study also found out that the factors shown in Table 3 negatively affected e-resources access and usage in academic institutions offering medical education.

This finding corroborates an earlier study[11] which found out that there were various factors that influenced e-resources usages. The majority, 43 (41%) of the respondents cited poor Internet connectivity as the main factor affecting access to and use of e-resources. This was a common challenge across the three institutions studied. The study found out that library users had no control over how many Internet access points the libraries could have. Ideally, they should be as many as the number of users but this was not the case in the institutions studied. With limited bandwidth and lack of Internet in some offices, it becomes difficult for staff to readily access Internet, leading to poor usage of the resources.

The number of computers was limited, compared to the number of admitted students during 2006/7 and 2009/10 academic years. This factor was mentioned by 15 respondents (14%) across the three institutions. This challenge is typical of most institutions in limited resource settings, as observed by Harle[14]. During the academic year 2009/10, Makerere University College of Health Sciences admitted 800 graduate students but the computer laboratory had only 16 computers. While the Library has a wireless Internet connection, there are few students who have personal laptops. Hence, limited numbers of computers available for use, especially by students has an influence on usage of the e-resources.

A small number of respondents (4%) were dissatisfied with the passwords which were sometimes long and complex. This means that users have to write passwords for each database each time they do literature searching. While this may not have a notable influence on usage of the databases, it frustrated the users. For instance, the HINARI database (which is the most comprehensively used across the institutions) has a complex password which includes lower and upper case letters, and digits, which may be difficult to learn by heart. Hence, users may not use a certain database at a particular time when they have forgotten the password.

While some members of staff mentioned busy schedules which left them with limited time to search for information, students indicated that the little time they had was not enough, given the fact that the Internet was very slow and therefore searching for electronic information took longer. Six percent (6%) of the respondents mentioned limited time as one of the factors affecting usage of e-resources.

A small percentage of the students (4%) indicated lack of awareness of available resources, while all the academic staff and heads of departments indicated that they were aware of the resources available for

Table 2—E-resources cited in theses and dissertations

	MUK	MUST	UMU	Total	%
Documents analysed	108	9	16	133	100
E-resources cited	39	5	10	54	41
N=133					

Table 3—Factors negatively affecting access to and use of e-resources

Factor	HODs	Staff	Students	Total
Poor Internet connectivity	5	16	22	43
Limited number of computers	2	3	10	15
Passwords	1	3	0	4
Limited access to PC labs	0	0	5	5
Limited time	1	3	2	6
Lack of awareness	0	0	4	4
Irrelevant responses	0	1	5	6
Library staff don't help users	0	0	3	3
Inaccessibility to e-resources	0	2	1	3
Congestion in computer labs	0	4	3	3
Resources not easily available	0	1	1	2
Unreliable electricity	0	3	0	3
Non response	0	1	3	4
Total	9	37	59	105

use. Respondents mentioned HINARI, Pub Med and Google. This view was common among all categories of users in the three institutions. It seems that they were not aware of other resources available to them. The respondents further revealed that users do not differentiate between Google and scholarly database searches. Majority indicated that they used Google for most of their information needs. They were not aware of the importance of evaluating sources of information before using it.

Another factor mentioned was lack of subscriptions to some databases. This was mentioned by two respondents, indicating that it was not a major factor that affected usage. Probably subscription to more resources would not improve usage, since even the comprehensive databases such as HINARI were minimally utilised.

Although unreliable power supply was mentioned by a small percentage (3%), it has been a major setback for e-resources usage in Uganda. None of the three institutions studied had any alternative source of power in the event that power went off. The users had to wait until power was on again, which interrupted their study and research activities. They ended up failing to meet study deadlines.

Computer skills and trainings

The study sought to find out what skills respondents had regarding use of the computer: if they used the computer and for what purpose. 35 out of 96 respondents were expert users, 52 were above average, while nine were average users.

Regarding training in the use of e-resources across the three institutions, the majority had not attained any training, as shown in Table 4.

Table 4—Respondents' training in use of e-resources (N=111)

	HODs	Staff	Students	Librarians
Trained	8	19	20	5
Not trained	1	18	37	1
Non response	0	0	2	0
Total	9	37	59	6

Table 5—Relationship between E-resources Usage and Training (N=111)

	Yes (%)	No (%)	
Trained and used	94.23	5.77	100
Not trained but used	81.67	18.33	100
Total users	87.5	12.5	100

Pearson chi2(1) = 4.0205 Pr = 0.045

Overall results showed that 52 (47%) respondents had attained training, 57 (51%) respondents had not attained training (in e-resources) and 2 (2%) respondents did not indicate if they had attained any training. The study found out that there was a significant relationship between usage of e-resources and information literacy, as Table 5 shows.

Overall results showed that 87.5% of the respondents used e-resources. However, the analysis showed that among people who had ever undergone e-resources training, 94.2% used the e-resources compared to 81.7% who had not been trained. This difference was statistically significant ($p<0.045$), implying that there was a relationship between e-resources usage and training. Hence, use of e-resources depends on individual skills to search for information, if productive searches are to be effected, and if the resources are to be optimally utilised.

Discussion

The findings of the study, and the available literature indicated that contextual and environmental factors greatly influenced utilization of e-resources. Less than 50% citing e-resources was an indication that, students' use of e-resources was still low, given the fact that many authors now publish electronically, and that ICT infrastructure improves every year in the institutions studied. This could be attributed to several factors such as: lack of skills to search for electronic information, limited bandwidth which slows down the Internet speed and therefore discourages users, and users' negative attitudes towards e-resources.

That most of the students and researchers were average, above average and expert in the use of the computer, and yet usage levels were still low, means that there were other factors, rather than computer skills that influenced usage of e-resources. Furthermore, the majority of the students and researchers were computer literate, but they could be using the computer for other purposes, rather than finding and using electronic information. The high computer literacy levels could imply that computer lessons were conducted at undergraduate level in universities in Uganda. Hence, by the time the students embarked on their post graduate studies, they already had basic computer skills.

Preference of certain databases over others affected usage because users tended to use certain databases and ignored others that could be providing related information. HINARI, being the most popular database across institutions substantiates reports by

Oduwole and Ajuwon who noted that HINARI was the much used biomedical database[12-13]. Popularity of the database could be attributed to the fact that it was comprehensive and accessed at no cost to the user in developing countries.

Conclusion

As this study found out, and as earlier studies indicated, contextual and environmental factors have an influence on e-resources usage. Factors such as students' and faculty's personal characteristics influenced their use of the Internet. However, there were other factors that affect usage of e-resources, such as poor searching skills and limited number of resources available to users. Slowness of access to Internet information, mainly caused by low bandwidth was one of the main causes of poor use of Internet resources. It was interesting to explore how these and other factors influenced usage in the Ugandan setting. Mere acquisition of these resources is not an end in itself. There is more to it that enables the environment for optimal usage of e-resources. The factors that affect e-resources usage may be beyond the users', or even the institutions' control. The study found out that lack awareness of available resources, limited number of facilities not matching the number of users and lack of skills to make productive searches affect usage.

Although there were factors that supported access to and use of e-resources such as availability of the computers, Internet and e-resources, usage was still low. The universities had both common and unique problems that affected e-resources usage.

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