

Effects of electronic information resources skills training for lecturers on pedagogical practices and research productivity

**Crispen Bhukuvhani, Blessing Chiparausha and Dorcas Zuvalinyenga
Bindura University of Science Education, Zimbabwe**

ABSTRACT

Lecturers use various electronic resources at different frequencies. The university library's information literacy skills workshops and seminars are the main sources of knowledge of accessing electronic resources. The use of electronic resources can be said to have positively affected lecturers' pedagogical practices and their work in general. The aim of this study was to reference an investigation of 30 lecturers' use of electronic resources in an effort to uncover correlations between library information literacy training and increased use of web based resources (for example, library journal databases, web search engines, open access journals, and so on), increased use of web resources and improved pedagogy as well as increased use of web resources and higher publication rates. Results indicated lecturers attended the Electronic Information Resources Skills Training and that they (86.7%) used at least one or more electronic information resources to find information for use for their teaching and/or research. 13.3% lecturers indicated non-usage of electronic information sources. Most of the lecturers (53.3%) indicated that they learnt about electronic resources through the workshops and seminars. The majority of the lecturers were motivated (motivate=86.7%; 66.7%=very motivated and 20%=somewhat motivated) to learn how to use electronic resources. Lecturers mostly got information for their research papers through the Internet (83.3%) and 10% through electronic resources. The use of electronic information resources by lecturers proved to have positively affected their work as evidenced by the results. However, there is need to mount more and frequent electronic information resources training workshops.

Keywords: *electronic information resources, information literacy, pedagogical practices, research productivity*

INTRODUCTION

According to Research Information Network (2011; 2009), Kyrilldon (2001), Borgman (2000), and Carswell, Thomas, Petre, Price and Richards (1999) universities invest substantially for providing scholars with the digital literature they need for their work, with the idea that improved access to electronic resources will lead to increased scholarly productivity. The number and variety of different sorts of databases ranging from journal, reference to fact databases are increasingly accessible from scholars' desktops. Therefore, Vakkari (2008) rightly notes that the easier and better access to the literature they need facilitates scholars' work in several ways. This is because the transformation of the physical library to the virtual library probably saves time, since one can access publications from one's desktop. In addition, the extent of publications available combined with easier access may improve scholars' ability to keep abreast in their fields, and perhaps inspire new ideas and eventually enhance the quality of their work (Vakkari, 2008).

Also, some studies have revealed that accessing published research information in the form of journals has been hampered by many challenges that include budgetary constraints facing their parent institutions. However, information and communication technology (ICT) advancements and

the use of electronic resources, especially the Internet promises to improve the flow of information to research and academic communities (Manda, 2005).

It is evident from literature that access to electronic information resources can immensely improve academics' research productivity and their pedagogical practises. However, the nagging challenges such as limited access, lack of knowledge and lagging behind in technological advancements can be noted; thus, the need for Electronic Information Resources Skills Training for lecturers.

LITERATURE REVIEW

There is evidence from information systems research that frequent Internet use for information retrieval and communication is associated with the increase in publication production by scientists with respect to both quality and quantity (Barjak, 2006; Nawe, 2005; Ergart, 2002; Kyrrillidon, 2001; Lin, 2001; Zhang, 2001; Shela and Greshan, 2000) or has improved scholarly work in other ways (Brown, Found, and McConnell, 2007; Rowlands and Olivieri, 2006; Research Information Network, 2011; 2009). However, the lecturers' understanding of the influence of improved access to digital information resources in general is limited, to say nothing of the mechanisms that mediate between the increased provision of digital material and its use to scholarly work.

Prior research results have shown that in scholars' opinion, the use of electronic information resources has improved their work considerably in several ways. Two dimensions of this influence can be differentiated (Shela and Gresham, 2000; Chodorow, 1996). The first dimension is connected more to the improved access to, and availability of literature, whereas the second is more directly related to the content of scholarly work. It has also been shown that the first dimension, perceived improved access to literature, was positively associated with the number of international publications scholars produce. This improved access has differential effects on publication productivity. Younger scholars, especially doctoral students, seem to benefit more from the use of electronic literature in terms of the number of international publications.

However, some studies, for example, Kinengyere (2007), found out that available information is not necessarily accessed and used by users. The study shows that the availability of information does not necessarily mean actual use because the users may not be aware of the availability of such resources, they do not know how to access these resources, or do not know what the resources offer. To add, Ray and Day (1998) cite limited time and lack of effective information retrieval skills as factors affecting users' access to electronic information. Therefore, a perceived lack of various resources, such as time, equipment, funding, training and insufficient information on software coupled with lack of knowledge and skills of staff, insufficient technical support and the risks associated with implementing innovations in teaching, particularly those using technologies, were cited as the most prohibiting barriers to academic staff's use of electronic information resources in their teaching (Johnstoon and McCormark, 1996 in Manda and Nawe, 2008).

Zeroing in on the aim of this study, researchers have demonstrated varying effects of Internet applications on the publication productivity of scientists. In the following discussion, attention is on correlations between library information literacy training and increased use of web based resources and improved pedagogy as well as increased use of web based resources and higher publication rates. Most studies have shown a positive association between publication rate and use of various information sources on the Internet. Mondschein (1988) studied the effect of Selective Dissemination of Information (SDI) services on the productivity of scientists who were doing basic research in industry. Scientists who used SDI frequently were more productive

compared to colleagues who used SDI infrequently. Bonzi (1992) also found that access to databases and computer support were facilitators to research productivity.

Again, a study on the use of SCIENCEnet, a computer network for oceanographers showed a positive relationship between use and productivity (Hesse, Sproull, Kiesler, and Walsh, 1993). The use of SCIENCEnet had a somewhat differential effect on the number of papers produced, to the benefit of peripheral scientists including junior scientists. Moreover, Walsh, Kucker, and Maloney (2000) also found a positive association for e-mail use and papers published in refereed journals for a sample of 333 US scientists from four disciplines. Another survey of nearly 1400 scientists from seven European countries representing five disciplines showed a positive relationship between Internet use for information retrieval and communication and research productivity (Barjak, 2006). It was also found that the use of Internet sites of libraries and archives correlated positively with the number of refereed journal articles published. Also, information retrieval from electronic journals and full-text databases correlated positively with the number of journal articles, conference presentations, and reports published. To say the least, searching on peers' web sites was associated with the number of working papers and conference presentations published. Thus, it can be argued that those scientists who used e-sources published more journal articles and other reports than their peers who did not use Internet-based tools as much (Barjak, 2006; Neuroth, 2009; Research Information Network, 2011; 2009). Neuroth (2009) also reports on an increase of PhD awards and research grants. Nawe and Kiondo (2005) reveal that the quality of teaching and learning improved significantly as a result of information and communication technology (ICT) application in library operations.

To concur, Chiparausha and Sithole (2008) highlight that electronic information services have a lot of benefits. Firstly, E-journal articles and books can be well up to date. This is particularly interesting when an online version of a print equivalent is made available earlier whilst the print version is still 'in press'. This is an advantage to researchers who seek after current information. Secondly, electronic information is also associated with quite a number of search facilities making it relatively easier for one to search for the specific information s/he wants. As an example, an ordinary Microsoft Word document or a document in portable document format (pdf) has got a facility to search through making it quite easy to skip from one section to another in search of relevant information in that document. Thirdly, the option to make a print out of the soft copy makes electronic information quite useful to those who are interested in having hard copies. Fourthly, electronic information is highly portable. Fifthly, depending on the host, networking infrastructure and user access licensing, electronic information may be accessed by multiple users simultaneously. Many journal publishers such as Emerald, Oxford University and Sage allow multiple users from one institution to log on to their databases simultaneously. Sixthly, some of the electronic information is available free of charge. Such information is said to be on 'Open Access'. What one simply needs to have is an Internet connection. A typical example is the database known as the Directory of Open to Journals (DOAJ). Ended here

Further, many libraries are getting access to the resources through special arrangements that make it relatively cheaper to subscribe; for instance, the Zimbabwe University Libraries Consortium (ZULC) pays for e-resources collectively for its members at negotiated rates through the International Network for the Availability of Scientific Publications' (INASP) Programme for the Enhancement of Research Information (PERI). PERI is one example of an initiative that aims at increasing access to electronic resources in Africa (Manda and Nawe, 2008). Through PERI, online access is provided for full-text journal resources, databases and backup support for document delivery since 2000. PERI project also includes a training component on electronic journal and electronic library resources management (Manda and Nawe, 2008).

Moreover, Chiparausha and Sithole (2008) rightly argue that academic libraries are forming consortia to provide common access to electronic resources across the Internet, and they are forming these consortia on a state-wide basis. Most successful consortia provide three basic functions. These include sharing physical resources, providing connections to the Internet and the worldwide web, and providing access to electronic resources. This last function may be achieved in a number of ways. The consortium may act as a collective purchasing agent to obtain the best quantity price for electronic products that can then be selected by individual libraries at will as long as the minimum quantity is purchased. Another popular approach is for the consortium to purchase an electronic product for the group, mount it on a local server, and provide dial-up or Internet access to the entire member base. The third, and increasingly popular method, is for the consortium to license the product for the entire member base and provide a gateway to the third party product or member access directly to the product's Web site (Potter, 1997:429). Kluegel (1998:23) expressed thus, "the role of consortia in acquiring electronic resources for reference has diluted the influence of reference librarians in shaping the reference collection, but it has increased the variety of resources available".

CONTEXT OF THE STUDY

Bindura University of Science Education (BUSE) is located ninety kilometres to the north-east of Zimbabwe's capital Harare. The University offers a wide variety of degree programmes in three faculties, namely, the Faculty of Science Education, the Faculty of Agriculture and Environmental Sciences and the Faculty of Commerce. The University was established through an act of parliament in 2000 even though it had started operating as an affiliate college of the University of Zimbabwe since 1996. The University's library provides access to information resources in various formats include print and electronic. Through annual subscriptions, the library facilitates access to electronic resources to its patrons. Among the patrons are lecturers who were taken through electronic information resources skills training workshops by library staff as a way of promoting electronic resources usage.

This study examines some factors that correlate with lecturers' usage of the library's electronic information resources in changing pedagogical practices and research productivity just as Heine, Winkworth, & Ray (2000 : 233) put it:

The ways in which users choose and move between information services to meet their information needs are expressions of their views about the best information strategy given those information needs. Each user's strategy is formed on the basis of such factors as his or her perceptions of the value of the products delivered by each service, the likelihood of success in using each service, knowledge that the services exists, and the logical dependencies between one service and the other.

In the context of this study, research productivity is the extent to which lecturers engage in their own research and publish scientific articles in refereed journals (Vakkari, 2008; Kusure, Mutanda, Mawere and Dhiwayo, 2006). According to Massy and Wilger (1995) and Sharobeam and Howard (2002) as cited in Kusure *et. al.* (2006) the number of publications has often been used by administration in institutions to judge faculty productivity. Thus, in this sense research productivity and electronic information resources usage can be said to have an effect on the pedagogical practices of lecturers as Chodorow (1996) concurs. To add, informed library users know that libraries have resources that are more comprehensive and scholarly than most Web sites provide (Waldman, 2003). Libraries provide access to scholarly literature that, as a rule, is not necessarily freely available on the Web, or may not be online at all. Often, it is in college that users become aware of libraries' resources, usually while having to write research papers (Piccoli, Ahmad and Ives, 2001). At the Bindura University of Science Education, Zimbabwe the library subscribes to a number of electronic resources databases and these databases are not

necessarily accessible free of charge to any Internet user save for a selected few articles that would be on open access, on trial or some sort of promotion.

In light of the above assertions, Bindura University of Science Education Library carried out the Electronic Information Resources Skills Training (EIRST) workshop for lecturers. This workshop was necessitated by reasons such as, despite subscribing to electronic resources annually, the level of usage as indicated by publishers' usage statistics was very low, the university library deliberately stopped subscribing print journals as a cost-cutting measure and as a way of attempting to promote improved usage of electronic resources, and in the middle of the year 2009, the International Network for the Availability of Scientific Publications gave Zimbabwean University libraries some grants to conduct EIRST.

Purpose of the study

The study was aimed at addressing the following research questions:

1. How has the EIRST influenced lecturers' use of electronic information resources?
2. How has the EIRST influenced lecturers' pedagogical practices?
3. How has the EIRST influenced lecturers' research productivity?

Content and Rationale of the Electronic Information Resources Skills Training (EIRST)

The EIRST for lecturers covered a number of aspects as outlined by the Research Information Network (2011). Initially, it focused on the importance of journal literature, printed as well as online, in research, teaching and learning and administration. Then, it also touched on the interplay between e-journals and other scholarly works, and the context in which e-journals are used. Moreover, routes to access to e-journals, for example, gateway services, keyword searching, alert services, browsing, and so on were also looked into. The training sessions were conducted in a computer laboratory; it was more practical with each aspect being demonstrated by the library staff conducting the training on PowerPoint and going online live. After the library staff had explained and demonstrated participants would be given time to 'try out' what had been demonstrated. In short, the training was done using a 'step-by-step hands-on' approach (Manda, 2005).

It was against the background provided above and the following factors that training was carried out. The International Network for the Availability of Scientific Publications (INASP) availed a grant to the University Library to conduct the EIRST to lecturers. INASP is the same organization that lobbies for the use of electronic resources and acts as an intermediary between libraries and publishers in coming up with annual subscriptions for access to electronic resources. Resultantly, the Library has been training its patrons on the use of electronic resources and much emphasis had been on students who were getting the EIRST as a component of information literacy skills (ILS) training. In view of this, there seemed to be a gap between students and lecturers with regards to knowledge and the use of electronic resources, thus, the need for EIRST for lecturers. To achieve this, the EIRST covered a wide array of aspects. As an introduction, issues relating to information literacy were introduced with emphasis on the importance of having information literate individuals. The American Library Association (ALA) defined information literacy as "an understanding and a set of abilities enabling individuals to recognize when information is needed and have the capacity to locate, evaluate and use effectively the needed information" (ALA, 1989). It was pointed out that these skills were critical for the better usage of electronic resources. Therefore, to enable the participants to effectively navigate through the electronic resources databases and to retrieve the most accurate information over the shortest time, the training also

covered orientation on the use of various search strategies. Much emphasis was on the use of keyword searching, truncation and the use of Boolean operators.

Having covered the above aspects, the EIRST then narrowed down to individual electronic databases. The databases comprised of those for electronic journals, electronic books, bibliographic databases and document delivery databases. The databases varied from those that are fee-based (whose access is monetary subscription based) and those on open access. Access also differed in two ways; some databases enabled access by Internet Protocol (IP) recognition, that is, the institution's IP address was registered with the publisher such that once an individual logs on to the publisher's site s/he is identified by way of that IP. Other databases were password-based and these required a user to enter the log in details so as to be identified and have full text access to articles available from the publisher.

Overall, it can be noted from the above discussion that electronic information resources skills training for lecturers can impact on the lecturers' pedagogical practices and research productivity. This is so as the training counters challenges such as limited access to scientific knowledge on the World Wide Web because the lecturers might be lacking the know-how and lagging behind in technological advancements. Therefore, the workshop throws in a life-line to the said challenges.

RESEARCH METHODOLOGY

The research design integrated qualitative and quantitative methodologies. Descriptive statistical analysis was complemented by in-depth descriptions from open-ended questionnaire questions and interviews. Thirty (30) lecturers from the three faculties (science education, commerce and agriculture and environmental science) were purposively sampled for the study on their pedagogical practices and research productivity from a total population of $N=98$ Bindura University of Science Education lecturers who attended the EIRST workshops. Convenience sampling was used to select the respondents for the study. By gender distribution, 80% ($f=26$) of all the respondents were male and 20 % ($f=4$) female. The University Library Department had run a series of Electronic Information Resources Skills Training (EIRST) sessions to all academic members of staff prior to this research.

The questionnaire was the main data collection instrument for the survey. Some questionnaire items (1 to 6) were self-constructed, with question items 7 to 19 adopted from Waldman (2003) whilst question 20 was adopted from Vakkari (2008). The questionnaire was pilot tested before it was administered. This was done to increase the validity and reliability of the research instrument. The questionnaire was distributed electronically to all lecturers by both e-mail and then personally by hard copy. Follow-up interviews were also conducted with these lecturers to validate questionnaire data as way of triangulating the instruments.

The sample distribution according to faculties and disciplines was as follows:

In the Faculty of Science Education 21 members responded to the survey, distributed as; Department of Education=6, Department of Biological Sciences=1, Department of Chemistry=2, Department of Geography=2, Department of Physics and Mathematics=3 and Department of Social Sciences=6. Only 4 members from the Department of Agriculture in the Faculty of Agriculture and Environmental Science responded. In the Faculty of Commerce 2 lecturers and 1 from the Departments of Banking and Finance and Marketing respectively took part in the study.

Online searches observations and statistical datasets with respect to abstracts and full-article downloads were used to find lecturers' use of Electronic Information Resources (EIR). Peer and student evaluations were also used in this research to find out lecturers' pedagogical practices.

Ethical considerations

The researchers revealed to the subjects the purpose of the research and preservation of their identity by coding them L1 to L30. Subjects' consent to participate in the research was also sought; this was clearly stated in the cover letter accompanying the questionnaire. The anonymity usually increases the response rate and more sincere responses are given. It was also made clear why they were chosen to participate as well as their right to accept, deny or even withdraw from participating in the research. All participants agreed that their peer and students' evaluations for their courses be used for the purpose of the research.

RESULTS AND DISCUSSION

Lecturers' use of Electronic Information Resources

Twenty-six lecturers (86.7%) indicated that they used at least one or more electronic information resources to find information for use for their teaching and/or research. This is revealed by varied use as in Table 1. Only 4 (13.3%) lecturers indicated non-usage of electronic information sources. Of the lecturers who participated in this study, 20 (66.67%) indicated that they had attended the EIRST workshops provided by the University library whilst 10 (33.33%) did not attend.

Table 1: Electronic Information Resource Use

Electronic Information Resource	n _i	Electronic Information Resource	n _i
Dow Jones Interactive	3	IEEE	1
EBSCO Host	2	Journal of Sustainable Dev. Africa	10
JSTOR	6	Oxford University Press	4
AGORA	12	Sage	5
Business Source Premier	3	Symposium Journals	1
HINARI	13	Springer Link	8
OARE	5	World Bank Publications	3
American Institute of Physics	1	JETEMS	1
Annual Reviews	1	Emerald	1
Beech Tree	1	AJOL	1
DOAJ	2	Google	1
Geological Society	1	Wiley Inter-science	1

The use in terms of articles downloaded for Bindura University of Science Education for journals in Emerald is indicated in Table 2.

Table 2: Emerald use by Articles Downloaded for Bindura University of Science Education

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2005	-	-	-	-	8	1	-	8	8	1	2	7	35
2006	8	22	39	9	49	7	29	29	27	16	14	1	250
2007	1	17	101	85	134	89	52	106	255	266	84	2	1192
2008	-	11	7	12	8	-	2	28	59	18	3	2	154
2009	16	13	13	-	-	-	15	10	68	127	-	-	288
2010	-	-	-	-	-	4	233	59	530	429	-	-	1255

Electronic journals use statistics provided by Emerald Insight, revealed a fashion similar to what Scopus provided. Table 2 above shows the trends in Emerald Insight electronic journal articles use since 2005. Statistics from Scopus are shown in the later part of the discussion (see Table 5).

Zimbabwe's use of electronic resources (in AJOL, American Institute of Physics, American Society of Agricultural and Biological Engineers, Beech Tree Publishing, British Library, BPS, Cambridge University Press, EBSCO, Emerald, Gale, IEEE, JSTOR, NPG, OECD, Oxford Journals, Palgrave MacMillan Journals, Policy Press, Royal College of Physicians, Royal Society for Chemists, Springer, University of California Press, University of Chicago Journals, Willey-Blackwell Interscience, Wiley-Blackwell Synergy and World Bank) is displayed in Table 3.

Table 3: Zimbabwe Electronic Resources usage- Abstracts and Article Downloads

2006	2007	2008	2009	2010
18279	99849	48999	37385	82104

The trend prevailing on ZULC statistics provided by PERI for the years 2006 to 2010 as shown in Table 3 shows a similar trend to that of Emerald journals use statistics in Table 2.

Most of the lecturers (53.3%) indicated that they learnt about electronic resources through the workshops and seminars. Manda (2005) also found that the dominant source of information was library workshops and from colleagues. Apart from the workshops conducted for lecturers the library also market electronic resources through the library webpage on the university website as was echoed by one lecturer in the Department of Education:

On the library webpage there are many hyperlinks to electronic resources such as AGORA, HINARI, EBSCO, JSDA and others (L3).

The majority of the lecturers were motivated (motivate=86.7%; 66.7%=very motivated and 20%=somewhat motivated) to learn how to use electronic resources. Half of the lecturers used mainly Internet on campus and 43.3% of these use electronic journals to found information for research; those using printed books were the least users at 10%. Lecturers mostly got information for their research papers through the Internet (83.3%) and 10% through electronic resources. On the other hand, 6.7% did not indicate where they got their information. 66.67% felt that there was a difference between what they found through the Internet and library electronic resources. Almost all lecturers (f=28, 93.3%) sometimes found information they were searching for through library's electronic resources. One respondent indicated that s/he *always got what s/he was searching for* in the library's electronic resources but 1 for *never got what s/he was searching for*. The findings concur with the findings by the Research Information Network (2011) and Manda (2005).

Some lecturers provided details or steps when conducting research using free Internet and electronic resources, for example:

Write key words, select relevant articles, write notes, draft article, final draft, and send article for review (L23).

Get username and password from library personnel, log on, for example, to HINARI or AGORA using the username and password, search by content or journal, browse journal issues and get full-text articles(L14).

This showed that the lecturers comprehended the concepts they got during EIRST workshops and were quite confident to share the knowledge and skills with others.

Lecturers' Pedagogical Practices

For each dimension of lecturers' work in Table 4; frequencies for *considerably* and *to some extent* were merged to mean electronic resources had affected whilst *not at all* and *don't know* meant that had not affected the particular work dimension. The use of electronic information resources by lecturers proved to have positively affected their work (mean %= 87.9%) as evidenced by the results in Table 4 on various dimensions of lecturers' work. The findings are consistent with observations by Chodorow (1996) and Shela and Gresham (2000).

Table 4: Effect of Electronic Resources on Lecturers' work

Dimension of work	Considerably	To some extent	Not at all	Don't know
	f(%)	f(%)	f(%)	f(%)
Easier to find material	8 (26.7)	20 (66.7)	1 (3.33)	1 (3.33)
Easier to get hold of material	8 (26.7)	18 (60.0)	2 (0.67)	2 (6.67)
Extended the range of material	8 (26.7)	17 (56.7)	2 (6.67)	3 (10.0)
Easier to keep up to date	8 (26.7)	20 (66.7)	0 (0.00)	2 (6.67)
Improved the quality of work	7 (23.3)	19 (63.3)	2 (6.67)	2 (6.67)
Inspired new ideas	8 (26.7)	21 (70.0)	0 (0.00)	1 (3.33)
Saved working time	6 (20.0)	18 (60.0)	3 (10.0)	3 (10.0)
Reduced browsing in libraries	6 (20.0)	19 (63.3)	3 (10.0)	2 (6.67)

Follow up open-ended interviews with some library staff were conducted. They revealed that some lecturers referred students to the library for consultations on how to access electronic information resources on various course materials and for research.

We have been attending and helping at least 10 students per week to on how to access electronic resources including online journals, who would have been referred to us by lecturers. This is apart from the information literacy induction given to students during the orientation week for all new students (Assistant Librarian 1)

Students' evaluations of their lecturers showed that the lecturers cited most recent sources and research-based problem solving teaching approaches during their lectures. This in turn, improved the quality of students' work and instilled a research culture among students and lecturers alike. In some cases the lecturers referred their students to their own published works that were also available on electronic journals and some found through some subscribed and Open Access research databases and gateways where full-text articles could be accessed.

I have published much on Ecology and Sustainable Development, so I refer my students to such works and these can be accessed online for free on Journal of Sustainable Development in Africa (JSDA) (L11).

Studies by Barjak (2006) and Hesse, Sproull, Kiesle and Walsh (1993) revealed a similar trend. It can also be noted from Table 4 that the use of electronic information resources has resulted in a notable reduction (83.3%= considerably 20% and to some extent 60.3%) of book browsing in libraries.

Lecturers' Research Productivity

The results from the sample indicate that up to 2010, 30 research articles (mean =1 article per lecturer) were published in referred journal locally, regionally and internationally. By the end of May 2011 when data collection for this research ended, 4 articles had been published whilst 32 research papers (mean= 1.067 papers per lecturer) had been accepted for publication and in press with refereed journals showing positive connection between EIRST and research productivity.

Scopus document search results as at 31 May 2011 for Bindura University of Science Education revealed research publications as indicated in Table 5.

Table 5: Research publications for Bindura University of Science Education in the Scopus database

2007	2008	2009	2010	*2011 (as at 31 May)
17	14	7	8	5

The statistics also reveal some trends over the years particularly the effects of the economic crunch as witnessed by the fall in statistics in 2009. There is a possibility that the high number of publications that came out in 2008 had been submitted to publishers in 2007 only to be published in 2008. Statistics for 2011 reveal that even though less than half the year had passed by, the research output in terms of publications available on Scopus were at 62.5% of the previous year indicating a high possibility of surpassing 2010. Trends portrayed in Table 2 and Table 3 relate positively with Table 5 in terms of growth vis-a-vis EIRST.

CONCLUSIONS

The research has shown that lecturers are using various electronic resources at BUSE despite notable differences in the frequencies of use. Most lecturers might have got the knowledge of accessing electronic resources through the University library's information literacy skills workshops and seminars. There is also a hyperlinked list of electronic resources on the University library webpage that can be used by the lecturers.

There has been a noticeable increase in the number of abstracts and articles downloaded from various electronic resources. The research study has also revealed that there has been relatively proportional increment in the number of articles published in refereed journals. It has also been revealed that there are a lot of research papers that have been sent for review with scientific journals. Lecturers are also referring their students to recent scientific articles in their own fields, including their own work in some cases. The use of electronic resources could be seen to have positively affected lecturers' pedagogical practices and their work in general.

The authors recommend that more frequent training be provided to lecturers; a similar training may also be conducted to students and other categories of library users. In view of the fact that research productivity contributes towards image building for universities and colleges as well as ranking, it becomes highly necessary for universities to invest more on access to electronic resources. Finally, authors recommend that a comparative study be carried out on this same subject between universities.

REFERENCES

- American Library Association (1989). *Presidential Committee on Information Literacy: final report*. Chicago, American Library Association. Retrieved from <http://www.ala.org/acrl/nili/ililit1st.html> [Accessed 17 March 2011]
- Barjak, F. (2006). Research productivity in the Internet era. *Scientometrics*, Vol. 68, No.3, pp. 343–360.
- Bonzi, S. (1992). *Senior faculty perception of research productivity*. In *Proceedings of the ASIS Annual Meeting*. Vol. 29 (206–211). Washington, DC: Knowledge Industry Publications Inc.
- Borgman, C.L. (2000). *From Gutenberg to the global information infrastructure*. Cambridge, MA:MIT Press.
- Brown, B., Found, C., and McConnell, M. (2007). Federal science eLibrary pilot. *The Electronic Library*, Vol. 25, No.1, pp. 8–17.
- Carswell, L., Thomas, P., Petre, M., Price, B. and Richards, M (1999) Understanding the 'Electronic' Student: Analysis of Functional Requirements for Distributed Education, *JALN*. Vol. 3, No. 1. pp. 7-18.
- Chiparousha, B. and Sithole N. (2008). *University Libraries in a Changing Environment: Experiences and the Way Forward in the New E-Learning Environment*. Presentation at the Inaugural Africa University National e- Learning Symposium. Africa University- Mutare, Zimbabwe (February 2008).
- Chodorow, S. (1996) *Educators must take the Electronic Revolution Seriously*. *Academic Medicine Journal* Vol. 71 No. 3 pp. 221-226.
- Ergart, R. (2002) *An Explanation of the importance of electronic resources in undergraduate research*. *Feliciter*. Vol.48 No.4. pp. 181-185
- Heine, M., Winkworth, I., & Ray, K. (2000). "Modeling service-seeking behavior in an academic library: a methodology and its application." *Journal of Academic Librarianship*, Vol. 26 No.4, 233-247.
- Hesse, B, Sproull, L., Kiesler, S., and Walsh, J. (1993). Returns to science: Computer networks in oceanography. *Communications of the ACM*, Vol. 36, No.8, pp. 90–101.
- Kinengyere, A.A. (2007) The effect of Information Literacy on the utilization of Electronic Resources in Selected Academic Research Institutions in Uganda. *The Electronic Library*, Vol. 25 No. 3. Pp. 328-341.

- Kyrillidon, M. (2001) Research Library Spending on Electronic Scholarly Information on the rise. *Journal of Library Administration*, Vol. 35, No. 4. Pp. 89-97.
- Kluegel, K. (1998). Reflections on reference. In K. M. Kluegel and R. Richards (Eds.), *Towards a new vision of reference: Kaleidoscopic collections and real librarians* (RUSA Occasional Papers, 23) (pp. 22-27). Chicago: American Library Association, Reference and User Services Association.
- Kusure, L.P., Mutanda, L., Mawere, D. and Dhliwayo, L. (2006) Factors influencing Research Productivity among Lecturers in Teachers' Colleges in Zimbabwe. *Southern African Journal of Education Science and Technology*, Vol. 1, No. 2 pp 118-124.
- Lin, Y. (2001) *Collaborative Efforts in Cross-Country Studies Information Sharing Infrastructure between China and USA: Research Report*.
- Manda, P.A. (2005). Electronic Resource Usage in Academic and Research Institutions in Tanzania. *Information Development*, Vol. 21, No. 4.
- Manda, P. and Nawe, J. (2008) The Impact of electronic information resource use on research output: Experiences from Universities in Tanzania. University of Dar es Salaam *Library Journal*, Vol 10, No 1 and 2.
- Mondschein, L. (1988). RandD productivity: *Relationship to selective dissemination of information (SDI) in the corporate environment*. Unpublished doctoral dissertation, Rutgers University.
- Neuroth, M. (2009). *The value of (electronic) content for research productivity*. Elsevier.
- Piccoli, G., Ahmad, R. and Ives, B. (2001) Web-Based Virtual Learning Environments: A Research Framework And A Preliminary Assessment Of Effectiveness In Basic It Skills Training. *MIS Quarterly*, Vol. 25, No. 4 pp. 401-426
- Potter, G.W. (1997). Recent Trends in Statewide Academic Library Consortia. *Library Trends*. Vol. 45, No. 3. pp. 416-43.
- Research Information Network (2011) E-Journal: their use, value and impact: A Research Information Network Report. Retrieved from www.rin.ac.uk/use-journals [Accessed 9 March 2011]
- Research Information Network (2009) E-Journal: A Research Information Network Report Retrieved from www.rin.ac.uk/use-journals [Accessed 9 March 2011]
- Rowlands, I., and Olivieri, R. (2006). Journals and scientific productivity: A case study in immunology and microbiology. Publishing Research Consortium Summary Papers Retrieved May 15, 2007, from http://www.publishing.ucl.ac.uk/papers/2006Rowlands_etal.pdf
- Shela, Z. and Gresham, K. (2000) When Technology transforms research methodology. *Reference Service Review* 28 (4) pp 360-368.
- Vakkari, P. (2008) *Perceived Influence of the Use of Electronic Information Resources on Scholarly Work and Publication Productivity*. *Journal of the American Society for Information Science and Technology*, Vol. 59 Issue No. 4 pp 602-612.

Waldman, Micaela (2003) *Freshmen's use of library electronic resources and self-efficacy*" Information Research, **8**(2), paper no. 150 [Available at: <http://informationr.net/ir/8-2/paper150.html>] [Accessed 9 February 2011]

Walsh, J., Kucker, S., and Maloney, N. (2000). Connecting minds: Computermediated communication and scientific work. *Journal of the American Society for Information Science*, 51(14), 1295–1305

Copyright for articles published in this journal is retained by the authors, with first publication rights granted to the journal. By virtue of their appearance in this open access journal, articles are free to use, with proper attribution, in educational and other non-commercial settings.

Original article at: <http://ijedict.dec.uwi.edu/viewarticle.php?id=1383>