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Acceptance and Usage of Open Access Scholarly Communication by Postgraduate Students at the Sokoine University of Agriculture and the University of Dar es Salaam, Tanzania

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Abstract

This study assessed the awareness and usage of Open Access (OA) for scholarly communication by postgraduate students at the Sokoine University of Agriculture (SUA) and the University of Dar es Salaam (UDSM). A semi-structured self-administered questionnaire survey was undertaken using a convenience sample of 230 postgraduate students of whom 128 (55.6%) participated in the study. The open access concept was familiar to 58.6% of the respondents; however, although 60.9% of them acknowledged having accessed OA content, only 10.9% of them had disseminated research findings through OA. The respondents' perceptions toward OA were generally positive. Low awareness of the OA concept, inadequate online scholarly communication skills, and the slow Internet connectivity were possible factors affecting the exploitation of OA in the study area. The review and formalisation of the existing postgraduate information literacy training modules at the two universities is recommended in order to improve the adoption of OA and exploitation of the online resources in general.

Introduction

Scholarly communication involves creating new knowledge, filtering quality knowledge through the peer review process and disseminating that knowledge to intended audiences (Mann *et al*, 2008; Whitworth and Friedman, 2009). Open access (OA) is an alternative form of scholarly communication that has emerged from the traditional business mode of scholarly publishing. The basic concept of open access is the online accessibility to scientific literature for readers at no charge and without any technical barriers (Mann *et al*, 2008). Developments in information and communication technologies (ICTs) have been cited as among the key factors that have catalysed the emergence of open access (Ng'etich, 2004; Adogbeji and Akporhonor, 2005; Moller, 2006).

It is currently estimated that only 15% of the annual research output is immediately made freely available through open access (Brody *et al*, 2007; Bjork *et al*, 2009). This means that a greater portion of the research output is still published using the conventional system. It is acknowledged that it will take sometime for OA mode of scholarly communication to gain substantial adoption due to the fact that open access is disrupting the already well established system (Johnson, 2002; Fullard,

2007). This has necessitated the interventions by proponents of open access to promote its adoption. Accordingly, various initiatives, statements and declarations have been made at national and international levels to speed up the spread of OA. One of these is self-archiving of scholarly publications by institutions and individual researchers and the creation of institutional repositories. The creation of new open access journals and the conversion of subscription-based journals into open access so that they are freely available to the scholarly community are other means to foster the development of OA (Harnad, 2005; Suber, 2006). Also important are interventions by different scholars to investigate the factors that promote open access adoption in the research community, with the ultimate goal of devising means to improve the uptake of this means of scholarly communication.

There is evidence of several international and national large scale surveys that investigated the researchers' awareness and usage of open access and the facilitating and inhibiting factors of open access adoption (See for example, Rowlands *et al*, 2004; Picton, 2005; Schroter *et al*, 2005; Swan and Brown, 2005; Moller, 2006; Kim, 2006, Lwoga *et al*, 2006; Fullard, 2007, Deoghuria and Roy, 2007; Mann *et al*, 2008; SARUA, 2008; Dulle, 2010). These studies are important as they provide the findings that contribute ideas to the implementation of appropriate strategies for enhancing open access uptake. However, most of the studies failed to recognise postgraduate students as important stakeholders in the scholarly communication process. Postgraduate students are important because they are being trained to become future researchers. Also, in the process of preparing and writing their theses and dissertations, postgraduate students need access to scholarly, accurate and timely information. Furthermore, the theses and dissertations produced by postgraduate students form an important output for open access repositories. Postgraduate students are therefore among the key beneficiaries of open access opportunities. Open access is of particular importance to postgraduate students in developing countries like Tanzania since access to scientific literature using the conventional commercial scholarly communication system is constrained by inadequate subscriptions to information resources due to the poor economies of such countries (Dulle, *et al*, 2001; Moller, 2006; Harle, 2009).

This study, therefore, sought to find out the extent to which postgraduate students from the two universities (SUA and UDSM) in Tanzania have been benefiting from open access opportunities. The two universities were selected for the study because they have had many years of postgraduate training experience, and also attract the largest number of postgraduate students among the higher learning institutions in Tanzania (SARUA, 2009).

The study focused on the following three research questions:

- What is the level of open access awareness among the postgraduate students?
- What are the perceptions by the students towards open access?
- What is the level of usage of OA by the students?

Methodology

The study targeted postgraduate students who were registered for Master's and PhD degrees, and had progressed to the writing of their theses and dissertations at the main campuses of the Sokoine University of Agriculture (SUA) and the University of Dar es Salaam (UDSM) in Tanzania. Postgraduate students who were still undertaking their coursework were excluded from the study. A semi-structured, self administered questionnaire was distributed to a conveniently selected sample of 230 postgraduate students - 83 at SUA and 147 at UDSM. The convenient sample selection approach was used because it was difficult to establish the sampling frame for students actually in residence and available on campus at the time of the study.

Some of the students were completing their research from home or their places of full time employment, or were doing their field work. Such students are not compelled to stay in the university campuses when undertaking the research part of their studies. The researcher assigned research assistants to distribute the questionnaire to eligible and available postgraduate students who where found in the libraries or departments at the two universities. This approach minimised the potential biases of the convenient sampling approach as pointed out by Neuman (2007). Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS), Version 16.

Results and Discussion

This section presents and discusses the research findings. The profile of the respondents is highlighted before the presentation and discussion of their awareness and usage of open access. The remaining part is postgraduate students' perceptions of open access and constraints they face while using this form of scholarly communication.

Profile of the Respondents

Of the distributed 230 copies of the questionnaire, 128 (55.6%) were returned completed. Among the completed copies of the questionnaire, 45 (35.2%) and 83 (64.8%) of the respondents were from SUA and UDSM respectively. Among the 128 respondents, more than three-quarters 98 (76.6%) were males. Of these respondents, 94 (73.4%) were registered for master's degrees while 34 (26.6%) were pursuing doctorate degrees. The distribution of the respondents by institution and age is summarised in Table 1. It can be noted from Table 1 that majority (63.3%) of the respondents were aged between 30-40 years, followed by those belonging to the 41-50 age group (20.3%). This kind of the distribution of the respondents was expected for individuals registered for higher degrees.

Awareness and Usage of Open Access Scholarly Communication

The study sought to find out whether or not the respondents were aware of the open access concept before investigating their usage of this form of scholarly communication. It was found that 75 (58.6%) of the respondents were aware of the open access concept. A similar study by Picton (2005) also established that 55.9% of research graduate students were awareness of open access. Similarly, Dulle (2010) indicates that majority (72.1%) of the academic researchers in Tanzanian public universities were not aware of open access concept. Other studies that targeted researchers in the Southern Africa region also show more awareness of open access by the respondents than that of postgraduate students in the current study (Moller, 2006; SARUA, 2008). Contrary to the above observations, Christian (2008) found that academicians and graduate students in Nigeria had

Table 1: Distribution of the Respondents by Age [N=128]

Institution	Age Profile				Total
	20-30 yrs	31-40 yrs	41-50 yrs	51-60 yrs	
SUA	5 (3.9%)	22 (17.2%)	16 (12.5%)	2 (1.6%)	45 (35.2%)
UDSM	14 (10.3%)	59 (46.1%)	10 (7.8%)	0 (0)	83 (64.8%)
Total	19 (14.8%)	81 (63.3%)	26 (20.3%)	2 (1.6%)	128 (100%)

the lowest level of open access, as only 3% of the 66 respondents knew about this form of scholarly communication. With the level of open access awareness slightly above half in the current study, there is a need for more efforts to raise the postgraduate students' understanding of this concept in the study area.

Among all 128 respondents, 60.9% of them reported to have used open access outlets in accessing scholarly content and the rest (32%) indicated the contrary. The opposite was true with respect to dissemination of scholarly content through open access means by the respondents. It was revealed that only 14 (10.9%) of 128 respondents acknowledged to have published in open access media.

The study was also interested to find out whether there were differences regarding open access usage among the respondents from different research disciplines. Table 2 presents the results with respect to open access usage by the respondents based on their research disciplines. It should be noted that eight respondents did not indicate their research disciplines and hence were not included in the analysis. Research disciplines were broadly classified into natural sciences and social sciences. The former comprised biological sciences that included agricultural sciences, aquatic sciences, animal sciences, biology and forestry sciences. Biomedical sciences including human medicine and veterinary medicine, as well as other applied sciences: physics, mathematics, engineering, computer science, chemistry, geography and environmental sciences were also part of natural sciences group. The sub-disciplines in social sciences included economics, sociology, languages, library and information science, education, management and all other subjects not belonging to the natural sciences identified above.

As shown in Table 2, 59.2% of the respondents indicated to have accessed open access scholarly content, while only a minority (10.8%) disseminated their research findings in similar avenues. Among the respondents who claimed to have used open access content, 30.8% were from the social sciences as compared to 28.3% from natural sciences. In other words, respondents from the social sciences were only slightly more involved in accessing open access content than those from natural sciences. However, in respect of using OA to publish content the relative proportions are reversed, with 6.6% of the respondents from natural sciences having published in open access outlets

Table 2: Usage of open access scholarly communication by discipline (N = 128)

Research discipline	Open access usage			
	Scholarly content access (N = 120)		Scholarly content dissemination (N= 120)	
	Yes	No	Yes	No
Biological sciences	17 (**14.2%**)	11 (**9.2%**)	3 (**2.5%**)	24 (**20%**)
Biomedical sciences	4 (**3.3%**)	1 (**0.8%**)	1 (**0.8%**)	4 (**3.3%**)
Other applied sciences	13 (**10.8%**)	8 (**6.7%**)	4 (**3.3%**)	14 (**11.7%**)
Social sciences	37 (**30.8%**)	28 (**23.3%**)	5 (**4.2%**)	59 (**49.2%**)
Total	71 (**59.2%**)	49 (**40.8%**)	13 (**10.8%**)	91 (**75.8%**)

compared to 4.2% from social sciences. However, the differences between these proportions are not significant, which is contrary to the findings of a similar study of researchers from the six Tanzanian public universities where significant differences were found between different research disciplines (Dulle, 2010). Conflicting results regarding higher usage of open access by researchers in the natural sciences than those in social sciences, and vice versa, have also been reported in several other studies (Macfie, 2006; Zuber, 2008; Melero et al, 2009). For example, Melero et al (2009) found out that researchers in the humanities and social sciences were more involved in publishing in open access outlets followed by those in engineering, life sciences, natural sciences and fine arts and performing arts. Based on these findings, it can be argued that as open access scholarly communication becomes widespread, it would not be surprising for researchers in the social sciences (research disciplines which were previously lagging behind in open access adoption] become more highly involved in using this kind of scholarly communication.

The findings of this study that the respondents were more involved in accessing than disseminating scholarly information in open access outlets are consistent with those of previous studies (Deoghuria and Roy, 2007, Mann et al, 2008, Dulle, 2010). This is probably due to the fact that less effort, is involved in accessing than in publishing open access content. For example, while it is possible for one to use open access content by chance through a simple search on the Internet, publishing on, through the channel is more involving, as one must have something to publish and possess adequate online publishing skills.

Perceptions of Open Access

The final research question of this study concerned finding out about the perceptions by respondents on the OA form of scholarly communication. This kind of assessment is important because positive perception about an innovation is one of the key determinants of its eventual adoption and use (Rogers, 2003). The respondents' perception about open access was determined using three criteria: their perceptions of the (a) quality of open access publications, (b) perceived usefulness of open access, and (c) value of institutional repositories at their respective institutions. The following subsections present and discuss the findings with respect to the respondents' perceptions of open access.

Table 3: Postgraduate Students' Assessment on the Usefulness of Open Access (N = 128)

Statement	Ratings (Number & Percentage)				
	Strongly agree	***Agree***	***Disagree***	***Strongly disagree***	***Don't Know***
Open access outlets enable scholars to publish more quickly	36 (28.3)	55 (43.3)	12 (9.4)	1 (0.8)	23 (18.1)
Open access outlets increase research impact by such works being highly used and cited	53 (42.1)	55 (43.7)	10 (7.9)	2 (1.6)	6 (4.8)
Open access outlets improve accessibility to scholarly literature because it is free	53 (41.4)	50 (39.1)	15 (11.7)	4 (3.1)	6 (4.7)
Open access enables researchers from developing countries to access literature more easily	49 (38.3)	64 (50)	5 (3.9)	4 (3.1)	6 (4.7)
Publishing in open access outlets exposes scholarly work to a large potential readership	51 (39.8)	57 (44.5)	4 (3.1)	5 (3.9)	11 (8.6)

Quality of Open Access Publications

The respondents who acknowledged to have used open access content were requested to provide the general evaluation of the documents they accessed. It was revealed that among the respondents who answered this question, 48 (73.8%) said that such publications represented adequate standards of high quality and had scientific merit, 34 (50.7%) said open access documents were original and of high quality, and 12 (18.2%) considered open access publications as mediocre or of little scientific merit. These findings conform those of a similar study targeted to researchers from the two institutions (SUA and UDSM) (Dulle, 2010). In that study, open access publications were evaluated positively along the pattern reported above. The findings from this study support the view that open access publications are being subjected to some form of quality control processes, contrary to what is claimed by some of the opponents of open access movements (Prosser, 2005; Sale, 2006). Opponents of OA movements claim that open access publications are inferior due lack of vigour peer review as compared to traditional publications.

Value of Open Access in Scholarly Communication

The respondents were also requested to provide their views on whether they considered open access useful or not in supporting the scholarly communication process. Table 3 summarises the data on the usefulness of open access.

Table 3 shows open access was considered very useful in facilitating accessibility to and the dissemination of scholarly content. With exception to the first statement, which was supported (strongly agreed/agree) by 71.6%, the other four statements were supported by more than three quarters of the respondents. A similar trend was reported by Dulle (2010). Other studies have also reported strong support of open access as an alternative to the business mode of scholarly publishing because of the potential of OA to facilitate wider dissemination of scholarly content (Swan and Brown, 2005; Schroter and Tite, 2006; Warlick and Voughan, 2006).

Respondents' Views on the Need for Institutional Repositories

In order to establish whether or not the respondents placed high value on the building of institutional repositories at their universities as a strategy to improve the dissemination of local content, they were first required to comment on their levels of accessibility to research content generated from their universities and other research institutions in the country. Most of the respondents acknowledged that it was extremely difficult to find and access local content relevant for their research.

Among the 128 respondents, nearly all (97.6%) supported the statement that the low visibility of local content was attributed to the fact that a major portion of such content is documented as grey literature in print formats that are not accessible through the global information infrastructure. The challenge for low visibility and accessibility of such local content can partly be solved by the establishment of institutional repositories for documenting and improving access to local research output (Chan *et al.,* 2005). The establishment of institutional repositories was also supported by almost all the respondents (97.6%) as a solution to increase the visibility and accessibility of local content. Other studies have also reported that their respondents mostly supported open access institutional repositories as means for facilitating wider dissemination of locally generated content (Christian, 2008; Dulle, 2010).

The respondents in this study (postgraduate students) recommended the following documents (in decreasing order of priority) for the institutional repositories when established: theses and dissertations (81%), peer reviewed articles

published in journals (75.4%), conference/ workshop papers (73.8%), teaching materials (58.7%), and non-peer-reviewed articles (32.5%). However, other studies among the researchers and policy makers in the two universities focused upon in this study preferred for the institutional repositories, conference papers, peer-reviewed articles published in journals, theses and dissertations and teaching materials, in decreasing order of priority (Dulle, 2009; 2010). These findings suggest that accessibility to earlier theses and dissertations was most important to the postgraduate students in the current study than other types of documents.

From the findings of the study reported above, it can be concluded safely that the research community at the two universities generally support open access scholarly communication. This is due to the fact that all the three categories of universities' research stakeholders (policy makers, postgraduate students and researchers-academics) had similar positive views about open access. What needs to be done next is for the various stakeholders in the institutions to put open access into effective practice by implementing appropriate measures to popularise the use of the OA innovation in the institutions.

Constraints to Open Access Usage

Several constraints were revealed as affecting postgraduate students in their scholarly communication activities. The most prevalent constraints include: inadequate online scholarly communication skills, lack of awareness of open access, and poor Internet connectivity. These constraints are highlighted and discussed in the following subsections.

Inadequate Online Scholarly Communication Skills

The rapid changing online information environment requires users to acquire new information search and publishing skills in order to benefit from the technological developments (Eger, 2008; Harle, 2009). In the current study, among the 128 postgraduate students, 88.3% rated themselves able to search information on the Internet, 43.2% able to design personal websites, and 42% able to publish on the Internet without assistance. These statistics reveal that most of these students had no problem with respect to accessing information online. Moreover, 29.4% of the respondents in this study cited lack of knowledge on open access publishing as among the reasons for them not publishing using such means. In practice, despite of high self-rankings, many Internet users realise to have inadequate knowledge upon attendance of specific training on effective usage of the online environment in scholarly communication (Dulle, 2010). As it can be noted from Table 4, few of these respondents had learnt the usage of the Internet using formal means such as the university computing centres or libraries. This suggests that these respondents are likely to be lacking important knowledge in terms of their effective usage of the online information environment in scholarly communication.

Table 4: Respondents' Training Means on Internet Usage (N = 128)

Training means	Number of of respondents	%
Self-learning	96	75.6
The university computing centre	54	42.5
The university library	44	34.6

Lack of formal training programmes targeted at the postgraduate students in the respective universities is likely to contribute to less effective usage of the online information environment in scholarly communication. As a result of insufficient skills, they most often find themselves spending much of the productive time in trying to get relevant information from the Internet than it could have been the case if equipped with the necessary knowledge (Eger, 2008). It should also be noted that most of the trainings offered especially by university libraries are done informally by inviting interested students to attend and in most cases address the information literacy part without taking into account the dissemination aspect (Chilimo, 2008). It is thus necessary to re-design such training to make them more formal and take aboard the dissemination aspect as well.

Lack of Open Access Awareness

Awareness is critical for individuals to adopt or use any kind of a service or technology (Rogers, 2003; Suber, 2004). In this study, 40.5% of the respondents acknowledged that they had not heard about open access before this survey. This was also cited by the respondents as among the reasons for their non-usage of open access in their scholarly communication undertakings. As noted previously in the section about the awareness and usage of open access, lack of open access awareness was found to be more predominant to the postgraduate students when compared to researchers from same institutions. Training designed to enhance postgraduate online communication skills as recommended above should also be used in raising the awareness of open access to this category of the respondents. This can be achieved by trainers to use specific open access sources as examples for possible sources of scholarly content to postgraduate student.

Slow Internet Connectivity

Slow Internet connectivity was also a major constraint cited by the respondents as contributing to their ineffective usage of this media in scholarly communication. Close to one- third (27.8%) of all the respondents cited the problem of slow Internet as an impediment to them while accessing scholarly content from the Internet. This problem was also reported as a major constraint by the researchers in a similar study (Dulle, 2010). Slow Internet connectivity is a challenge for the adoption online scholarly communication and open access in particular to most of the developing countries as a result of their dependence on the most expensive satellite connectivity (Christian, 2008). It should be noted however that the ongoing efforts of getting connected by the universities involved in this study to the Eastern African Submarine Fibre Optic Cable connecting Tanzania to the rest of the world is likely to end this problem of slow Internet connectivity.

Conclusions and Recommendations

This study attempted to understand open access awareness, usage and perceptions of postgraduate students at SUA and UDSM. The findings indicate that more than half of the postgraduate students were aware of open access. The students however support the open access scholarly communication and used it to access scholarly content than disseminating research findings. Low awareness of open access, inadequate online scholarly communication skills, and slow Internet connectivity were identified as key constraints for postgraduate students to exploit open access opportunities and the online information environment in general. The fact that a similar study that was targeted to researchers found same constraints suggests the need for the responsible institutions to seriously address these hurdles in order to improve scholarly communication at their respective institutions.

It is recommended that the existing modules of information literacy targeted to these students at the two universities be revised and formalised. In their current state, such modules pay more attention to improve students' skills in terms of online information access while leaving the dissemination

aspect which is equally important. Postgraduate students should also be trained to be disseminators rather than net consumers of information alone as they form the future of the scholarly community. There is also a need to formalise the revised curriculum so that all the postgraduate students participate in these important trainings. Since the current training modules are offered informally , it makes some of the postgraduate students miss such trainings as a result of considering themselves competent in such skills while in the real sense they are not. A scholarly communication module encompassing both the access and the dissemination of information in an online environment should be undertaken by all postgraduate students. Such a module can be part of the research methodology course. Among other aspects of information literacy, this module should also introduce open access as an alternative to the business mode of scholarly communication. In this way, the targeted students will be made aware of both open access and the traditional model of scholarly communication so that they make informed decisions on various sources for information access and dissemination avenues for their research findings.

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