This paper presents the experience with open access (OA) publishing by researchers in an academic research institution (The University of the West Indies (UWI) St. Augustine Campus) in a developing country — Trinidad and Tobago. It describes the two parallel but complimentary paths for authors to enable open access, *i.e.* of publishing in open access journals and/or self–archiving. The benefits to researchers of free access to information, increased research impact and possible solution to the "serials crisis" are highlighted. It suggests that advocates of OA should consider all possible difficulties that researchers may have with OA, so that these could be ameliorated. To this end, it considers the UWI researchers' knowledge of OA, their access to the scholarly literature, open access archives/repositories at the UWI and related issues of research and library funding, Information and Communication Technologies (ICT), and infrastructure/Internet connectivity.

It concludes that there are indeed obvious and well–documented benefits for developing country researchers. There are though some disincentives that make it difficult for researchers in developing countries to fully participate in the OA movement. Apart from author–side or "page" charges, the limited number of open access journals in many fields of study and inadequate and unreliable ICT infrastructure and Internet connectivity often limit access and publication in OA journals. Thus, because of technical, financial, human and infrastructural limitations, OA via self–archiving is sometimes difficult for developing country researchers. It concludes that much more should be done to ensure full participation in the open access knowledge community by developing country researchers, including direct technical assistance in implementing institutional repositories (IRs) and more financial assistance and support from international agencies to build the necessary human resource capabilities.

Contents

Introduction

Open access (OA) publishing has been defined in several ways but it is generally known to involve the free availability of the results of research mainly in the form of scholarly articles. Access is usually to an electronic form of an article via the Internet. For authors, OA can be achieved by two primary methods:

- by publishing articles in open access journals (OAJ); and/or,
- depositing copies of articles in open access archives (OAA) or repositories, often referred to as self–archiving.

These two parallel but complementary paths for achieving OA are sometimes referred to as the "Gold" (publish in an OAJ) and "Green Roads" to open access (publish in a non–OAJ but archive in an OAA) (Harnad, *et al.*, 2004).

Several studies have been carried out on OA which highlight the benefits as:

- Free access to information;
- Increased research impact (measured by citations/downloads) of open access articles versus non–open access articles (Lawrence, 2001; Antelman, 2004; Harnad and

Brody, 2004; Harnad, *et al.*, 2004; Kurtz, 2004; Hajjem, *et al.*, 2005)
- Possible solution to the so–called "serials crisis" or "journal affordability problem" (Harnad, *et al.*, 2004) where the high cost of subscriptions to serials — particularly in the sciences — has caused many libraries to reduce the number of serials in their collection (Mobley, 1998; Parks, 2002).

There may however be difficulties that a researcher in a developing country experiences which do not allow him/her to fully reap all these benefits. The only way that measures can be taken to alleviate such difficulties is by bringing them to the fore.

This study contributes to that process by presenting the experience of researchers with OA publishing at an institution in the developing country of Trinidad and Tobago, The University of the West Indies St. Augustine Campus.

Background

Open access via the "gold road" (publishing in open access journals)

For a number of researchers worldwide, publishing articles in OA journals is increasingly seen as an alternative to publishing in the traditional journals. In traditional journals, the costs associated with publication and peer review are paid for by the readers of those journals either through personal or institutional subscriptions [1]. This traditional mode of funding the dissemination of research results has often been referred to as the "subscriber pays" model. But access to articles in these journals is *restricted* to those who can afford the costs of subscriptions, or the costs of acquiring copies of the articles by other means such as using interlibrary loan or document delivery facilities.

Alternatively, an OA journal allows all those who have Internet access to freely read, download, copy, distribute, and print articles and other materials [2]. Of course, "free" availability on the Internet is only possible if "someone" pays for the cost of production and dissemination. OA publishers sometimes meet these costs by charging the authors ("author pays" a charge commonly referred to as a page charge). In other cases, open access journals are operated by researchers and/or volunteers and the publishing costs are absorbed by their employers/institutions and/or sponsors [3].

It is important to note that open access journals are not the only ones that impose page– or author–side charges. There are traditional or "subscriber pays" journals that levy page charges to offset the cost of publication. Thus, the "author pays" model of using page charges to either cover the entire cost of publication or to subsidize the full cost and so supposedly reduce subscriptions is not a "creation" of OA journal publishers. The "author pays" model has been used since the early 1960's by professional associations and other not–for–profit publishers (Kligfield, 2005). Indeed, one study has shown that as early as the 1970s, half of all science articles written by U.S. authors required some form of author payment and in some research fields nearly all the articles involved author payment (King, *et al.*, 1981).

Furthermore, a recent study dispels the commonly held view that most open access journals invoke page charges. The Kaufman–Wills (2005) study, commissioned by the Association of Learned and Professional Society Publishers (ALPSP), states in its introduction that they were surprised to find:

> ... how few of the open access journals raise any author–side charges at all; in fact, *author charges are considerably more common (in the form of page charges, colour charges, reprint charges, etc.) among subscription journals.*

Yet, despite a business model which some question as being unsustainable (Solomon, 2006), the number of OA journals is increasing. *Ulrich's* periodicals directory lists 1,364 refereed academic and scholarly open access journals out of a total of 24,627 refereed academic and scholarly journals (*i.e.* ~5 percent as of April, 2006). The *Directory of Open Access Journals* (http://www.doaj.org/) now lists 2,209 such journals. Of the 8,700 selected journals covered by the *Web of Science* (Science Citation Index Expanded online), 239 are reported to be open access journals (Thomson Scientific, 2005). Yet, when analyzed by subject, the number of OA journals in particular fields is still very small (see Table 1). One exception to this is in the field of medical and health sciences. However this is not surprising since much effort has been dedicated to promote open access to medical research (Lees, 2005; Suber, 2006).

Table 1: Number of open access journals in selected disciplines.
Source: *Ulrich's Periodical Directory Online* and *Directory of Open Access Journals*, as of 29 April 2006.

Subjects	Number of open access journals	Number of open access journals

	(*Ulrich's*, total = 1,364)	(*Directory of Open Access Journals*, total = 2209)
Engineering	26	172
Chemistry	30	55
Physics	30	58 (includes astronomy)
Mathematics	64	105 (includes statistics)
Medicine	381	562 (includes biology & life sciences and health sciences)

There are not many options for researchers in certain subjects (*e.g.* those shown in Table 1) who are looking for an open access journal that does not impose author–side charges in which to publish.

Open access via the "green road" (self–archiving)

Some individual researchers make available the full text of their publications on their personal Web sites (or personal archives). There are also an increasing number of universities or research institutes that collect, preserve and provide access to their research output in institutional repositories (IRs) (Crow, 2002; Anscombe, 2005). The visibility of institutions with IRs is increasing and access to their research output is expanded thus greatly increasing the impact of the institution's research (Lawrence, 2001; Crow, 2002; Harnad, 2003). Open source software for setting up IRs is readily available (Open Society Institute, 2004). The most well–known of these are DSpace developed at MIT (http://www.dspace.org/) in the U.S. and EPrints from the University of Southampton in the U.K. (http://www.eprints.org/).

Most archives use a common metadata protocol to describe the details of each article in the archive thus encouraging the sharing of the contents of these repositories and making them interoperable (see the Open Archives Initiative at http://www.openarchives.org/). Some search engines harvest information in these repositories and make their contents searchable and freely accessible via the Internet. Some of the specialized search engines which enhance access to the content in these archives and repositories include:

- Google Scholar (http://scholar.google.com/)
- OAIster (http://oaister.umdl.umich.edu/)
- PerX (http://www.engineering.ac.uk/)
- Windows Live Academic (http://academic.live.com/)
- The science search engine Scirus (http://www.scirus.com/).

Apart from personal archives/repositories and IRs, subject archives have been widely used for several years in areas such as physics, computer science and library and information science (arXiv.org at http://www.arxiv.org/; Cogprints at http://cogprints.org/; and, E–LIS at http://eprints.rclis.org/). Like open access journals, the number of archives or digital repositories of all types is reported to be increasing (Open Citation Project, 2003). Thus, if an author is unable or chooses not to publish in an OA journal (the "gold road"), he/she can still facilitate open access to some version of the article if it is deposited in a freely and easily searchable and accessible digital archive or repository (Chan, 2004; Chan, *et al.*, 2005).

The success of open access archiving in expanding access to articles depends significantly on the author's knowledge of open access, and the ready availability and accessibility of archives to authors. If authors are unaware of the existence and benefits of archives then they cannot self–archive. Additionally, just like open access journals, there is a cost attached to setting up and maintaining an archive [4]. This "cost" is reported to range from US$6,980 to US$2.5 million with ongoing costs ranging from US$39,500 to US$285,000 (Swan, 2004; Barton and Walker, 2003). Costs are said to be on the lower end of the scale for large institutions that already have a cadre of highly trained staff, abundant equipment and good infrastructure. But for smaller institutions, which are already struggling with inadequate staffing and IT equipment, costs are at the higher end (Crow, 2002). For developing country institutions "costs" are always a matter of concern even if such costs are deemed small by those from more developed countries.

If authors are unaware of the existence and benefits of archives then they cannot self–archive.

It should also be noted that achieving open access via archiving assumes the availability of a stable Internet connection since generally articles to be deposited must be uploaded to the digital repository or archive via an Internet connection. *Without* Internet connectivity or a *"good"* (fast and reliable) Internet connection or even a *reliable* electricity supply, the deposit of papers by authors into archives may be difficult.

Developing countries

As is well–known, the term "developing country" applies to most African, Latin American, Caribbean, and Asian countries, as well as some countries in the Middle East and Eastern Europe. What is not often well–known is that the definition of a developing country is generally based on that country's annual per capita income. Indeed, developing countries are most often defined following the World Bank classification (World Bank, 2006). A country's classification as a developing country is therefore not often based on the availability of skilled human resources and expertise or ICT readiness. Although a country's income level should be a good indicator of its development status, this is not always the case since a characteristic of developing countries is sometimes an inability to translate economic wealth into development. According to the World Bank (2006), the developing country's annual per capita income can range from:

- US$825 or less (low income)
- US$826–US$3,255 (lower middle income) to
- US$3,256 (upper middle income).

This is quite a broad range of income levels. Although developing countries are often presented as a homogeneous group with similar problems and similar resources and capacities, there are some differences including the levels of human development, ICT readiness and priority areas for government funding (Oorganization of American States, 1997). Indeed, an institution in the Caribbean trying to grapple with the well–known "digital divide" problem (Chinn and Fairlie, 2004) sometimes encounters unique difficulties from a similar institution in India or in Africa with the same problem. Still, all researchers in developing countries certainly have one thing in common: they struggle with limited resources to conduct, support and disseminate their research. The realities of open access publishing at a university in the middle income developing country of Trinidad and Tobago are now presented.

The University of the West Indies (UWI)

The University of the West Indies (UWI) was first established at Mona, Jamaica, in 1948, as a college with a special relationship with the University of London to serve the British territories in the Caribbean area. In 1962, the University was granted its own Charter under the Great Seal of the British Realm and thus became empowered to grant its own degrees. There are now three UWI Campuses, in three different West Indian islands:

- Mona in Jamaica;
- Cave Hill in Barbados; and,
- St. Augustine in Trinidad and Tobago.

At the St. Augustine Campus there are five faculties, namely, Engineering, Humanities and Education, Science and Agriculture, Social Sciences and Medical Sciences. The Medical Sciences Faculty is located separately from the main campus in St. Augustine and has its own library. The composition of the academic staff at UWI St. Augustine is as shown in Figure 1.

Figure 1: Academic staff at the University of the West Indies (St. Augustine).

In addition 14,100 students are presently enrolled at UWI of which 2,823 (~ 20 percent) are graduate students (Tewarie, 2006a). Close to 2,200 of these graduate students are enrolled in taught programmes (Tewarie, 2006b). Thus UWI is a research level university comparable to those that are members of the Association of Research Libraries (ARL) of North America [5].

Like researchers at universities worldwide, UWI researchers, including many senior administrative staff members, are required to "publish or perish". Indeed, the performance criteria used by the University's Appointments Committee for making decisions on retention, promotion and tenure for academic staff is listed as: research, publication, teaching, contribution to University life, public service, and scholarly and professional activity.

Experience of UWI researchers

As mentioned earlier, there are documented benefits to a researcher in enabling or facilitating open access to his research results. There are also problems associated with achieving OA via the "gold road" of publishing these articles in an open access journal and/or the "green road" of self–archiving in some form of digital repository or archive. These problems include:

- Researchers' lack of awareness of an OA publishing option;
- Inadequate funding and support available for:
  - Page charges/research costs; and,
  - institutional repositories
- Poor ICT infrastructure/Internet connectivity.

The UWI researchers' experience with open access publishing encompasses all of these issues.

Knowledge of open access publishing

An exploratory study was carried out on the academic staff of the Faculty of Engineering at the UWI in March 2005 to determine their awareness of OA publishing. The Faculty of Engineering was chosen since members of this faculty are considered, within the UWI, to be on the "cutting edge" of technological advancements and so would probably represent the "best case" in terms of knowledge of emerging scholarly communication issues like OA publishing. This study therefore was a preliminary exercise to simply garner general information on the faculty members' knowledge of OA and was not intended to be a formal scientific study.

A simple questionnaire was emailed to the 112 academic staff members of the Faculty of Engineering to poll their knowledge of OA journals and archives. Seventy–nine academic staff members responded (*i.e.* a response rate of approximately 70 percent). Eighteen staff members were aware of open access journals (18/79 or 23 percent); just six (6/79 or 8 percent) were aware of digital archives/repositories. Only two staff members had actually published a paper in an OA journal and none had self–archived their papers.

Eighteen staff members (23%) were aware of open access journals; just six (8%) were aware of digital archives/repositories.

Pelizzari (2003) reports for the Social Sciences sector at Brescia University in Italy that 44 percent were aware of OA initiatives with 4 percent actually depositing a paper in an archive. The Joint Information Systems Committee/Open Society Institute (JISC/OSI) (2004) study of journal authors from mainly developed countries (U.S. and Europe) reports that about two–thirds (67 percent) of those who never published in an OA journal were aware of OA concepts but that around 70 percent of authors were unaware of repositories or archives. Not surprisingly, UWI researchers' knowledge of OA (23 percent) is low in comparison. This is supported by Bandara (2005) who also found limited knowledge among academics and graduate students regarding the OA concept when implementing an electronic theses and dissertation project at another campus of the UWI, Mona in Jamaica.

Anecdotal evidence suggests that this lack of awareness of OA journals and archives extends to promotion committees: a lecturer was told off the cuff by a member of one such committee that little was thought of his publication since the committee heard that he had paid for it to be published. In reality, the lecturer concerned had paid "page charges" for one article upon its acceptance for publication in an OA journal. To those who are uninformed, publishing in OA journals is often equated to "vanity publishing". OA journals are also generally not the most highly ranked journals in their fields and so promotion committees are not very impressed by publication in these journals. Furthermore, in universities with colonial traditions and legacies like the UWI, there is still some hesitancy to recognize publication in electronic–only journals. The free availability of these journals via the World Wide Web does not help to alleviate the scepticism since free is often equated with "poor quality" and expensive with "high quality". It is clear that the success of OA initiatives in any institution rests heavily on authors and researchers knowledge of and willingness to support the initiatives (Mackie, 2004).

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Access to scholarly literature

Despite the relatively low awareness of OA in a major faculty of the UWI, there is some awareness of OA publishing among academic librarians and a few faculty members in other UWI departments and campuses. One noteworthy example is the Faculty of Medical Sciences (FMS) at the St. Augustine Campus where an aggressive outreach campaign to biomedical faculty members on OA publishing was implemented since 2003 (Greenidge, 2005). An institutional membership to BioMed Central [6] was also initiated in that same year which allowed biomedical researchers at all campuses of the UWI to publish articles in BMC journals without paying author–side fees.

The Main Library of UWI St. Augustine has further facilitated access to OA journals through two mechanisms:

- hyperlinks to academic and research databases like the *Directory of Open Access Journals* and the Public Library of Science (at http://www.mainlib.uwi.tt/ersearchtools/onlinedatabaseupload/showindexresult.cfm?indexstart=ALL); and,
- a listing of e–journals (including open access journals) at http://www.mainlib.uwi.tt/ersearchtools/ejournalsupload/showjournalresult.cfm?journalstart=ALL.

Interestingly, many researchers at the UWI happily discover OA articles when using popular search engines like Google and are unaware that their free access was due to OA initiatives. Praise is heaped instead on the search engine Google!

Despite the general lack of awareness of OA journals on the campus, a few at the UWI are spearheading the publication of OA journals.

- The Main Library has launched the *Caribbean Library Journal* as an OA journal and has issued an invitation for authors to submit articles (at http://www.mainlib.uwi.tt/Clj/call4papers.htm);
- The Centre for Gender and Development Studies of the UWI has also issued a call for papers for the OA journal *Caribbean Review of Gender Studies* with its first issue expected in July 2006 (see http://www.mainlib.uwi.tt/newsitems/CRGS_CallForPapersOct2005.doc); and,
- The UWI Distance Education Centre (UWIDEC) (http://dec.uwi.edu/prospective/why.php), in collaboration with the Cape Peninsula University of Technology in South

Africa, are publishers of the *International Journal of Education and Development using Information and Communication Technology* (IJEDICT, at http://ijedict.dec.uwi.edu/index.php).

Self–archiving

Authors can self–archive their work and so make it freely available in:

- Personal Web pages;
- Subject repositories or archives; and,
- Institutional archives

At the UWI, because of limited server capacity, the majority of staff members are not allocated *any* server space for personal Web pages. The server capacity problem is so grave that each member of staff has been allocated a maximum of 50 MB of space for e–mail!

Free hosting services are not commonly used by the UWI researchers because of a lack of knowledge and know–how. Even if these Web hosting services were used, it would certainly not be the best method of archiving research papers and facilitating open access because of the usually ephemeral nature of such Web sites (Koehler, 2004).

Cognisant of the UWI researchers' difficulties with self–archiving, the UWI Main library has commenced work on the creation of an institutional repository (IR). The initial impetus for the implementation of an IR at the UWI, St. Augustine was a need to expose the unique Caribbean resources housed in its West Indian collection to the world via digitization (Soodeen, 2005). The UWI St. Augustine decided to use DSpace to implement its IR. The software was "acquired" in 2004 and was installed first on a test server in early 2005. By June/July 2005 it was also "installed" on a production server. The installation is still ongoing since it involves a steep learning curve for the staff of the Systems Unit of the Campus Libraries in charge of technical implementation. Knowledge and skills in software applications like Linux, Apache, Tomcat, and Java programming are required and this is not readily available. Due the limited human resource capacity of the UWI Campus libraries, work on the IR implementation has been done by student assistants. However, due to the high turnover of these assistants, the IR implementation process has been discontinuous. Thus, progress on implementation of the repository has been unfortunately slow because of a lack of resources (human, financial and technical). Like most developing countries which do not have in place a well–developed IT infrastructure and highly skilled IT personnel, the UWI Campus Libraries has indeed found that the true "cost" of setting up and maintaining an IR is high.

There are also concerns among the UWI researchers about copyright and other licensing permissions [7]. It is generally believed by them that depositing any version of an article submitted to a journal anywhere else is not "allowed" or is illegal. This misconception can only be corrected by education and outreach on OA generally and the related copyright issues (Harnad, 1999).

Therefore, without an IR in place at the UWI together with a general lack of awareness of the existence of subject repositories and concerns about copyright, self–archiving is practically non–existent on the Campus.

Information and Communication Technology (ICT) infrastructure/Internet connectivity

It is often a much overlooked fact that access to articles in OA journals and archives requires a reliable and fast Internet connection since many articles are available solely as PDF files. There are though exceptions to this with journals like *First Monday*, *Ariadne* (at http://www.ariadne.ac.uk/) and the *International Journal of Education and Development using ICT* (*IJEDICT* at http://ijedict.dec.uwi.edu/) making articles available in easy–to–load HTML format. Internet access is also sometimes subject to the vagaries of other infrastructural elements in Trinidad and Tobago. For example, Trinidad and Tobago has an electricity supply, which although much improved, still can be unreliable (Regulated Industries Commission, 2005; Atwal, 2003). As a consequence of this, the UWI's Main Library found it necessary to recently install a stand–by electricity generator. Additionally, ownership of computers and access to the Internet is low when compared to more developed countries (see Table 2).

Table 2: Telecommunications infrastructure for Internet access — Comparison of Trinidad and Tobago to selected countries for 2002.
Source: United Nations Statistics Division — Millennium Indicators (ITU estimates) from http://unstats.un.org/unsd/mi/mi_series_list.asp (rounded to the nearest whole number).

Country	Telephone lines & cellular subscribers/100 population	Personal computers/100 population	Internet users/100 population
Trinidad and Tobago	53	8	11

United Kingdom	143	41	42
United States	114	66	55
Singapore	126	62	50
Sweden	163	62	57
Venezuela	37	6	5
Brazil	42	8	8
Chile	66	12	27
China	33	3	6
Guyana	19	3	14
India	5	1	2
Nigeria	2	1	0

Open access to scholarly articles thus becomes very difficult for a researcher in a developing country when basic infrastructure — like good Internet connections, computers and a reliable electricity supply — is absent. The UWI, St. Augustine has a network of over 2,000 computers with more than 50 (LAN) edge switches, wireless capabilities and a Campus Area Network (CAN) that is one of the largest in Trinidad and Tobago with minimum connectivity quoted as 100Mbps [8]. Yet, the perceived/experienced bandwidth is inadequate for the number and type of users on campus. It is not unusual at peak times during the day for PDF files, in particular, to be very difficult to download on the UWI Campus. Similar experiences are reported in other developing countries (Arunachalam, 1999; Pasch and Miranda–Murilo, 2004) .This is just one well–known manifestation of the "digital divide" problem (Chinn and Fairlie, 2004).

Funding

Lack of adequate funding is a root cause for many of the problems experienced by developing country institutions (Arunachalam, 1999; Papin–Ramcharan and Dawe, 2006a). Funding for libraries determines the extent to which the library can satisfy the needs of researchers to access the scholarly literature. Funding of research costs may impact on the quality of research and also the ability of a researcher to disseminate research results because of relatively high "page charges".

Library funding

The UWI Main Library's budgetary allocation for library materials is presently 1.8 million U.S. dollars (2005/2006 academic year). The budget allocated for library materials increases by approximately 5 percent annually to allow for inflation. However a significant expansion in enrollment from about 8,000 students in 2001 (budget US$1.4 million) to over 13,000 in 2005 without a corresponding increase in the budget for acquiring library materials has resulted in a net decrease (~30 percent) in the amount spent per student at UWI (Papin–Ramcharan and Dawe, 2006b). Clearly libraries in developing countries such as Trinidad and Tobago are unable to offer access to the wealth of information resources often taken for granted by those in more developed countries. Table 3 illustrates this by comparing the mean expenditure figures for the purchase of library materials for libraries in the U.S. (members of the Association of Research Libraries) to that for the Main Library at UWI St. Augustine for the year 2002. Whereas the mean expenditure for monographs at ARL libraries is 95 percent more than that at the UWI Main Library, it is about 420 percent more for serials! Thus, when one considers access to the source most needed for research, that is journal articles, UWI researchers are seriously disadvantaged in comparison to the researcher with access to ARL libraries. The availability of OA journals and the existence of OA archives indeed help to alleviate this disparity in access to research articles.

Table 3: 2002 expenditure on materials —
Association of Research Libraries (ARL) Mean vs UWI Main.

Sources: ARL descriptive statistics For academic libraries available at http://www.arl.org/stats/arlstat/ddoc.html and http://fisher.lib.virginia.edu/arl/index.html; UWI Main Library internal budget information.

Library	Total library materials expenditure/student (US$)	Monographs expenditure/student (US$)	Serials expenditure/student (US$)

ARL (mean)	481.1	129.4	295.0
UWI Main Library St. Augustine	151.4	66.3	57.0

Research and publication funding

There are very few opportunities for the funding of research from grants or from other agencies in developing countries (Moreno–Borchart, 2004). This is in contrast to universities in the developed world where most submitted papers are the result of research that has been paid for by a funding body. For example, the Engineering and Physical Sciences Research Council (EPSRC) in the U.K. is the Government's leading funding agency for research and training in engineering and the physical sciences and is known to have a line item for page charges. There are similar research funding bodies in the U S. — the National Science Foundation (NSF) and the National Institutes of Health (NIH). Both explicitly state that page charges are allowable costs from grants (National Institutes of Health, 2003; National Science Foundation, 2005). For researchers in the developed world, the payment of page charges causes little concern due to ready funds from grants or sponsors. As a result publishing in OA journals is readily embraced. On the other hand, the researcher in the developing world can only access research funding from their poorly funded institutions or from their personal resources.

The UWI tries to assist its researchers with publication costs via its Research and Publication Fund which can be used for funding publication in journals and for covering other associated research costs. The Research and Publication Grant was recently increased to a maximum of US$400 per researcher per year after lobbying by faculty members about the high page charges often associated with publication in many journals. It is reported that for those OA publishers that impose page charges, these can range from US$500 to about US$1,750 per article (King, 2004). When these high costs are juxtaposed against the US$400 Research and Publication Grant at the UWI and the lack of other available funding avenues then the difficulty of the developing country researcher becomes clear.

It is often stated that most journals would waive the payment of page charges by authors experiencing economic hardship like researchers in developing countries. The reality is that the researcher in a developing country who is unable to pay page charges is not really on equal footing with his grant–rich, well–funded counterparts in the more developed world. For example, researchers at the UWI have encountered journals that state explicitly that there might be delays in publication if authors are unable to pay the page charges (Papin–Ramcharan and Dawe, 2006b).

Most of our researchers at the UWI, St. Augustine report feelings of embarrassment at having to contemplate making a request to a journal to waive the page charges because of financial need. They prefer to avoid the situation altogether by continuing to submit their articles to the traditional "subscriber pays" journal.

Interestingly, we have discovered that some journals have a stated policy where authors from certain listed developing countries are not obliged to pay such charges [9]. These journals remove the obligation for the economically disadvantaged author to request the waiver of page charges by automatically waiving the author charges once his/her affiliation indicates that they are from a developing country.

Discussion and conclusions

Advocacy of OA publishing should involve not only discussions on its benefits but it should also involve studies on how any barriers to OA can be removed. Although there are the obvious benefits to developing country researchers of free access to the scholarly literature, there are many hindrances to such researchers fully benefiting from this largesse. Limited technological infrastructure restricts researchers' access to the free information. Page charges certainly deter the less well–funded researcher from publishing in many journals that impose such charges including some OA journals. Some argue that there is now a large number of OA journals that do not impose page charges. Yet when one searches for such journals in one's narrow subject speciality, the list of such journals is found to be very short. It is often stated that page charges should not be of concern to the developing country researcher since many journals waive page charges for the economically disadvantaged author. What is not realized is that such authors are normally required to make a request for the waiver of the charges placing researchers in an embarrassing position. Schemes therefore, should be implemented where page charges are automatically waived for deserving authors without requiring them to make requests.

Additionally, lack of awareness of OA and its benefits, ensures that authors cannot avail themselves of OA–related opportunities. The drive to educate the UWI campus about OA was started by the librarians of the Faculty of Medical Sciences who expect to engage in more widespread outreach programmes (Drayton–Andrews and Lewis, 2005). A presentation on OA at one professional forum on the campus has also spread the message. The UWI Campus Libraries has placed OA and the study of new forms of

scholarly communication on its research agenda. Indeed, a formal study on OA at the UWI is already in the planning stages by the Campus Libraries. We are confident that this will result in support for OA becoming widespread at the UWI. An understanding that following the "Green" and "Gold" roads to open access increases significantly the impact and visibility of the University's research will follow naturally from knowledge of open access. Work published in open access journals should be recognized for promotion and tenure as is the case for any other peer–reviewed publication.

The expansion of schemes by publishers and others to encourage the dissemination of research by developing country authors through OA initiatives is worthy of emulation. Sponsoring the participation of these researchers in the OA knowledge community as has been done by the Open Society Institute (http://www.soros.org/) needs to be expanded.

More direct technical assistance needs to be given to the institutions of developing countries to help set up and market IRs. The slow start to the UWI's IR would also be transformed if University administrators become convinced that IRs can increase the UWI's visibility and research impact. An additional benefit would be the use of IRs as a key component of the UWI's and indeed any university's long–term strategy to ensure the preservation of their scholarly output and institutional memory.

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Notes

1. These institutional subscriptions are largely made by libraries.

2. See http://www.soros.org/openaccess/read.shtml.

3. *E.g.* the journals *First Monday* at http://www.firstmonday.org/idea.html and *Ariadne* at http://www.ariadne.ac.uk/.

4. Crow, 2002, pp. 27–28.

5. http://www.arl.org/members.html.

6. BMC at http://www.biomedcentral.com/.

7. http://www.sherpa.ac.uk/romeo.php.

8. University of the West Indies, 2004, p. 11.

9. http://stroke.ahajournals.org/misc/ifora.shtml.

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