Integrating Web 2.0 into an academic library in Tanzania

Edda Tandi Lwoga
Directorate of Library Services,
Muhimbili University of Health and Allied Sciences, Dar es Salaam,
United Republic of Tanzania

Structured Abstract:

Purpose: This paper demonstrates work undertaken by Muhimbili University of Health and Allied Sciences (MUHAS) Library in an effort to integrate web 2.0 technologies in its functions to enhance the quality of its services in Tanzania

Design/methodology/approach - The study conducted an exploratory questionnaire survey to assess user requirements among undergraduate medical students at MUHAS, developed library 2.0 services, conducted training and created awareness.

Findings – The paper shows that web 2.0 technologies can be implemented effectively according to University goals, user's needs, deployment of user friendly tools, and capacity building among librarians and users. Students positively supported the adoption of library 2.0 services at MUHAS. Library 2.0 services improved the quality of MUHAS library services, despite various challenges related to infrastructure, awareness, literacy, inadequate staff, security and ownership of web 2.0 services.

Research limitations/implications - The study findings may not be widely replicated because this article is based on a case study of the integration of web 2.0 technologies into the library functions of MUHAS. This study did not examine the use of library 2.0 applications among library users (such as faculty and students) which could illuminate further the case study

Practical implications - Most academic libraries in Africa have not yet adopted web 2.0 technologies to improve their services. The user preferences, technology adoption, and challenges faced from the present study can help other libraries to plan and integrate their library 2.0 technologies in their services.

Originality/value - MUHAS library offers practical example of how web 2.0 services can be adopted to enhance the quality of academic library services in an African context. This paper is of significance to academic libraries that are still considering their options with regard to the application of web 2.0 technologies.

Keywords: web 2.0, library 2.0, digital library, virtual library, academic library, Africa, Tanzania

Introduction

The advancement of technology, termed as web 2.0 that focuses on user participation and collaboration, has transformed the operation of information services and resource sharing in academic libraries. There has actually been a shift, as Kwanya *et al.,* (2009) put it, "from formal scholarly publishing, to self-publishing, and unpublished materials", which poses a great challenge on information management in academic libraries. In reality, the presence of a web does not guarantee the effective use of library services. Research conducted among web users in Canada, the United Kingdom and the United States shows that the use of library websites had declined from 30% in 2005 to 20% in 2007, while there was a corresponding increase in the use of search engines, e-mail, and blogs across the same time period (De Rosa *et al.,* 2007). Suggestions are that library users may not be aware of the library services and, hence, the libraries need to find ways and means to engage users in their services. Recognizing the need to engage users and harness user-generated content, most libraries are now incorporating web 2.0 or library 2.0 technologies in their services.

Various studies (Chua and Goh, 2010; Harinarayana and Raju, 2010) have shown that the integration of web 2.0 tools into the library environment can improve the quality of library services. Web 2.0 technologies can enhance library services by improving the communication with customers, promoting and marketing services, and imparting information literary skills (Chua and Goh, 2010; Harinarayana and Raju, 2010). The library 2.0 technologies encourage users to participate in the design and implementation of library services through their feedbacks. Library services are continuously updated and re-evaluated according to user needs (Pienaar and Smith, 2008). These technologies are thus important means of engaging users to enhance the quality of library services.

Research, however, indicates that the utilization of web 2.0 technologies in African academic libraries is low. Studies in Sub-Sahara Africa have revealed that most libraries provide information about their services and content on the web, while their counterparts in the developed world are already offering online resources and services by integrating web 2.0 technologies (Muswazi, 2000; Lwoga 2011, 2012; Makori, 2012a). There is, therefore, a need for libraries in the developing world and Africa, in particular, to provide their traditional services more efficiently, and new services through library 2.0 tools to those users who are more comfortable with the new environments of accessing and using information.

The objective of this paper is, therefore, to demonstrate work undertaken by Muhimbili University of Health and Allied Sciences (MUHAS) Library in an effort to integrate web 2.0 technologies in its functions to enhance the quality of its services in Tanzania. The specific objectives were:
1. To assess the utilization of web 2.0 among undergraduate students at MUHAS;
2. To determine the undergraduates students' preferences on the adoption of library 2.0 tools at MUHAS;
3. To develop and implement the web 2.0 technologies at the MUHAS library;
4. To determine challenges of implementing web 2.0 tools at the MUHAS library;

A brief background on web 2.0 and library 2.0 concepts, utilization of web 2.0 among University students, user preferences on library 2.0 services, and the implementation of web 2.0 in a library setting, in the context of developed and developing countries, is also presented.

Web 2.0 and library 2.0
The web 2.0 phrase was coined by Tim O'Reilly in O'Reilly Media in 2004, and it has become a standard technology that is used in the delivery of library services, which is also termed as library 2.0. Web 2.0 is the "network as platform, spanning all connected devices. Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an "architecture of participation," and going beyond the page metaphor of web 1.0 to deliver rich user experience" (O'Reilly, 2005). Web 2.0 comprises a number tools and technologies, ranging from wikis, blogs, and syndication feeds to social and virtual networking. On the other hand, library 2.0 is a "change in interaction between users and libraries in a new culture of participation catalysed by social web technologies" (Holmberg et al., 2009). Library 2.0 enables the libraries to change and provide demand-led services by concentrating on needs of users already using the library and nonusers who the library may reach out to bring into the library.

By using the knowledge management perspective, Kim and Abbas (2010) categorized the library 2.0 functionalities into a continuum ranging from the user-initiated (i.e. folksonomy, tagging, and bookmarking), to wiki, blogs and twitter to library-initiated perspective (i.e. RSS and podcasts) (Kim and Abbas, 2010). Chua and Goh (2010) also categorized library 2.0 in the information science perspective to include the following categories: (i) information acquisition for gathering information from sources external to library (e.g. blogs, wikis); (ii) information dissemination for distributing information by libraries to users (e.g. RSS); (iii) information organization to facilitate representation of content and subsequent search and retrieval (e.g. social tagging); and (iv) Information sharing to enable bilateral flow of information between libraries and their users (e.g. instant messaging, and social networking services) (Chua and Goh, 2010). These classification schemes seem similar. However, the proposed scheme by Chua and Goh (2010) is rooted in the information-intensive services and roles of libraries and it is, therefore, relevant in guiding the application of library 2.0 services in the present study.

Utilization and preferences of the application of library 2.0 services among students
Various scholars have reported varied use of web 2.0 among students. On the one hand, research shows that most students are heavy users of web 2.0 tools (Booth, 2009; Barnet et al., 2010; Ayiah and Kumah, 2011). For instance, Ayiah and Kumah (2011) found that most students (62 percent; n=335) frequently used the social networking sites in Ghana. On the other hand, other studies have demonstrated low use of general web 2.0 tools among students. For instance, research indicates a low level of awareness and use of web 2.0 applications among students in Kuwait (Alajmi, 2011), India (Ram et al., 2011) and USA (Booth, 2009). Indications are that the level of awareness and use of web 2.0 services differ from one location to another, and within groups and persons that exist in these localities. Several factors contribute to this pattern of use of web 2.0 among students, including low levels of awareness, skills, and interest, poor infrastructure, and privacy and quality control mechanism.

The literature further shows that students mainly use social media for social and educational purposes. For instance, a study in UK reported that web 2.0 tools were used for both academic and social purposes. In terms of academic purposes, the sites were used predominantly to find information and to discuss work with friends, although the functionality of the sites themselves often predisposed their use (Barnet et al., 2010). Related findings were observed in Ghana that students mainly used social media for social and research purposes (Ayiah and Kumah, 2011). Booth (2009) also revealed high use of social media for education related activities among students in USA. It is, however, reported in Greece that social media are mainly used for entertainment purposes, such as "fun" or "curiosity" (Garoufallou and Charitopoulou, 2011). In general, studies show that social media are beginning to penetrate University students' educational and personal life. Social media can, therefore, be an important medium for libraries to reach a large number of students since most of them are already using these tools for social and education related activities.

Students also have a positive perception towards implementing web 2.0 tools in a library setting. For instance, a study in Ghana found that students endorsed the linking of a social networking site to the Library's web page to facilitate collaboration between the library and the University community (Ayiah and Kumah, 2011). Similar findings were revealed

by other studies of undergraduates at Kent University (Burhanna *et al.,* 2009) and a study of 349 researchers (Ponte and Simon, 2011). However, studies show that although they are supportive of library 2.0 tools, students have limited knowledge or interest in sharing their knowledge. For instance, a study at Kent State University revealed that students regularly used some popular web 2.0 sites such as facebook and myspace, but many of them demonstrated a limited knowledge of the tools, in terms of creating and posting content on the web 2.0 sites (Burhanna *et al* 2009). Related observations were made in other studies of undergraduate students in USA (Booth, 2009) and Finland (Karna, 2012), and academic staff in South Africa (Penzhorn, 2008). In general, the literature shows that students are aware of social media and use them predominantly for personal and educational purposes. Social media can thus be an important channel through which libraries can reach a large number of students. However, students do not have adequate knowledge or interest to enable them create and share knowledge on social media. It is important, therefore, to consider these factors when implementing web 2.0 technologies in a library setting.

Adoption and utilization of web 2.0 technologies in libraries in developed and developing countries
There has been considerable growth of literature on the implementation of web 2.0 technologies in a library setting (Chew, 2008; Kwanya *et al.,* 2012). Chew (2008) developed a guideline for libraries to start a service on a social media platform, which include: (a) plan (user needs assessment, policy development, and sustainability issues); (b) experiment (try out the services, and look for support from colleagues and online help); (c) check/ review results; (d) implement/ share experiences, and train librarians and users. Equally, Kwanya *et al.* (2012) also recommended the following: develop the requisite standards, policies, strategies and plans; increase the bandwidth; select appropriate web 2.0 tools; train the librarians and users; and encourage linkages with other libraries. For instance, the University of Pretoria Library developed library 2.0 services effectively because it formulated an e-information strategy and technology committee in 2006, and identified users' needs, and developed strategic alliances with other departments at the university that promote the development of web 2.0 with the aim of making optimum use of the new web 2.0 technologies (Pienaar and Smith, 2008; Penzhorn and Pienaar, 2009). Similar strategies were used in the implementation of library 2.0 tools in USA (Cahill, 2009). Other strategies of enhancing use of library 2.0 include: assessment of environment and culture (Sodt and Summey, 2009); collaboration with IT professional; and revision of the library and information studies curriculum to incorporate social media (Banda, 2011). It is clear that technology should be used as a supporting tool to improve library services, and not as the driver. Libraries need to consider all these factors for effective implementation of library 2.0 services. For instance, a study of randomly selected 230 academic library web sites and 184 users, found that RSS and blogs were widely adopted by academic libraries while users mainly utilized the bookmark function (Kim and Abbas, 2010), which shows that user's needs were not considered.
Studies further specify that web 2.0 tools are mainly adopted by the libraries in the developed countries as compared to their counterparts in the developing world. For instance, a study of 120 academic and public libraries' websites showed that libraries in North America lead significantly in all web 2.0 applications compared to their European and Asian counterparts (Chua and Goh, 2010). Likewise, a study by Xu *et al.,* (2009) revealed that 42% of 81 academic library websites in the New York State had adopted one or more Web 2.0 tools. Linh (2008) also reported that at least two-thirds of Australasian university libraries had applied one or more web 2.0 technologies, though the adoption rate was still low. However, not all libraries in developed countries have adopted web 2.0. Other studies indicated low use of web 2.0 technologies in developed countries, such as UK Medical School Libraries (Pacheco *et al.,* 2009) and UK public libraries (Hammong, 2009). The literature suggests that the digital divide still prevails across developed countries, which contributes to varied levels of adoption of library 2.0 technologies.

In the developing world, scholars have revealed that the application of web 2.0 among libraries was generally low, such as in China (Han and Liu, 2010), India (B. and Kumar, 2011), Malaysia (Ayu and Abrizah, 2011) and Pakistan (Qutab and Mahmood, 2009). In Africa, studies show that few university libraries have embraced the application of web 2.0 systems, such as in 15 French speaking countries in western Africa (Samb, 2011), South Africa (Wood, 2009), Tanzania, (Muneja and Abungu, 2012) and Zambia (Banda, 2011). Some African libraries have just recognized the potential of web 2.0 tools, and are beginning to adopt this technology. Kwanya *et al.* (2012) found that several libraries (half of the libraries surveyed) in Kenya have already adopted some of the web 2.0 tools. It is thus important for African libraries to engage in social media, since most librarians are already using these tools more for social networking than for improving library service delivery. Previous studies indicate that librarians are engaged in social media applications, and utilize these tools more for social than professional networking purposes, such as in the southern, central and eastern Africa region (Chisenga and Chande-Mallya, 2012), and Nigeria (Ezeani, 2011; Olasina, 2011).

Research further shows that not all web 2.0 tools and services are used to the same extent, and some services (e.g. RSS) are more popular than others. For instance, a study of 100 top university libraries showed RSS and IM as the most widely used web 2.0 applications in university library web sites, while blogs were ranked second (Harinarayan and Raju, 2010). RSS was the most widely applied technology in other studies of university libraries in Australia (Linh, 2008), New York (Xu *et al.,* 2009), and USA (Kim and Abbas, 2010; Mahmood and Richardson, 2011). IM was also a major tool employed in academic libraries of USA (Liu, 2008; Mahmood and Richardson, 2011), and UK, USA, Canada and Australia (Tripathi and Kumar, 2010). On the other hand, blogs were the most popular web 2.0 tools in another study of academic

and public libraries in North America, Europe and Asia (Chua and Goh, 2010), UK public libraries (Hammong, 2009), and USA (Mahmood and Richardson, 2011; Rogers, 2012). Consequently, Facebook, Twitter, Flickr and YouTube were the most popular social media in Canada (Collins and Quan-haase, 2008). Social networks were also popularly adopted by libraries in USA (Mahmood and Richardson, 2011; Rogers, 2012). In developing countries, a Chinese study revealed that Catalog 2.0 and RSS were the main tools that were used in academic libraries (Han and Liu, 2010). In Africa, Kwanya *et al.* (2012) revealed that facebook was the most popular web 2.0 tool in Kenya's libraries which was followed by Twitter, RSS, SlideShare, YouTube, Flickr and blogs. In Tanzania, facebook was also the main tool adopted by libraries, which was followed by Twitter, blog and Google docs (Muneja and Abungu, 2012). The literature demonstrates that there are differences in the adoption and use of different social media in a library setting across the world. According to Collins and Quan-haase (2008), the interests, demands, needs and practices of a respective institution largely influence the adoption and use of a certain type of social media within that setting.

Although there is huge evidence of libraries in engaging with web 2.0 technologies, a minority of libraries directly interact with users to create and share content through social media. A study in Kenya pointed out that although libraries had a link of twitter (37 percent; n=10) and facebook (52 percent; n=14), only 19 percent (n=5) of the university libraries denoted active usage of facebook and twitter pages for marketing and awareness creation (Oyieke, 2012). Similar findings were reported in Tanzania that social media were mainly used for sharing of resources, promoting library services, and disseminating news and information more than for enhancing discussions and conversations with users (Muneja and Abungu, 2012). Related findings were observed by other social media studies in Malaysia (Ayu and Abrizah, 2011), Canada (Collins and Quan-haase, 2008), and UK (Pacheco *et al.,* 2009). In general, the literature shows that academic libraries are yet to actively promote "participation, interaction and user engagement" aimed at creating and consuming content. In some cases where feedback is sought, but has not been forthcoming, apparently because students are still hesitant to post information in a public arena (Collins and Quan-haase, 2008). Other scholars suggest that the term "participatory library" should be used to reflect the participatory nature of a contemporary library instead of library 2.0 which focuses on the technology component (Nguyen *et al.,* 2012).

There are various barriers that constrain libraries in their efforts to adopt web 2.0, which may be associated with such factors as limited infrastructure and other information-based technologies, lack of library-centred social media policies, lack of funding for training and resources (Collins and Quan-haase, 2008), inadequate knowledge and skills among information professionals, inadequate support from the management (Makori, 2012b), lack of time by librarians to use social media, and lack of interest among librarians who prefer to do things the way they have always been done (Banda, 2011). Other barriers include moral and ethical issues in web 2.0 environments which are related to privacy, confidentiality, safety, harassment, pornography, fraud, and security (Mutula, 2012). It is thus important to consider all these barriers when implementing web 2.0 technologies in a library setting.

There is thus a need for libraries in the developing world and Africa, in particular, to provide their services more efficiently through library 2.0 tools. While there are still debatable issues regarding web 2.0 technologies and some African libraries have not adopted these tools, a new term –web 3.0- is emerging. Some scholars are even thinking that it is the right time for a shift from library 2.0 to library 3.0 (Saw and Todd, 2007). However, are African libraries ready for this change? It is a fact that they are still fragmented.

Methodology
In order to achieve the above study objectives, the research methodology was structured in four phases described below.

Literature review and questionnaire design. Previous studies were reviewed in order to assess the adoption and use of web 2.0 tools to enhance the quality of academic library services in both developed and developing countries. Further, a decision to conduct a survey was made, since the available literature could not provide sufficient information needed for the development of web 2.0 features at the MUHAS library.

An exploratory survey. In the second phase, an exploratory survey was conducted to determine actual user needs and expectations of adopting library 2.0 services at MUHAS. This survey was conducted to a third year and fouth year undergraduate medical students at MUHAS. Although the exploratory survey does not allow for generalisation, it does afford an opportunity to consider services from the user perspective. The convenience sampling technique was used to select a sample of students. This study adopted the questionnaire tools to survey the student's preference on library 2.0 services based on similar studies elsewhere (Booth, 2009; Barnet *et al.,* 2010; Ayiah and Kumah, 2011). Self-administered questionnaires were distributed to 107 students who comprise thirty percent of the total student population. Third year students were 203, while fourth year students were 153, making a total of 356 students. Since, the focus of this study was to conduct an explorative survey, and not necessarily a representative survey, thirty percent of the total population was considered satisfactory. On the whole, a total of 76 students took part in the survey, with a rate of return of 71.2%. The objective of the survey was to establish the following:
- The utilization of web 2.0 technologies among undergraduate students at MUHAS; and

- The undergraduate student's preference on the deployment of web 2.0 tools at MUHAS library;

The survey results were evaluated and, consequently, used for the following research phase.

Development of library 2.0 tools. The third phase involved the development of library 2.0 features based on user needs and literature review. The library deployed the user friendly tools, which were based on the external web 2.0 services to embed the social media services at the library website. The following social media tools were developed: social bookmark and tagging system, library toolbar, blogs, wiki, facebook, twitter, and RSS feeds.

Training to librarians and awareness creation. The library conducted a series of workshops on the management and use of web 2.0 to change the mind sets and improve skills of librarians. This is a continuous process, and a number of in-house workshops are organized every academic year to equip librarians with necessary library 2.0 skills. The library also took the following measures to create awareness of the web 2.0 tools among users: conducted voluntary workshops on information literacy aspects to faculty and students; integrated information literacy (IL) into university curricula where all first year undergraduate students are taught this course starting in the 2011/12 academic year; posted online tutorials on how to access and use library 2.0 services at the library's homepage; created links of all web 2.0 tools at the library's homepage; and informed academic staff about the existence of library 2.0 tools through the university group emails, University notice boards, library user guides and brochures.

Results from the exploratory survey

A total of 76 undergraduate medical students (40 third year and 36 fouth year medical students) responded to the questionnaire at MUHAS. Male respondents accounted for 63.2 percent (n =48), while females accounted for 36.8 percent (n =28). Most respondents were aged between 21 and 25 (78.9 percent: n =60), followed by those respondents with ages 26–30, (21 percent: n=16).

In general, most students were heavy users of web 2.0 tools as acknowledged by 86.5 percent of the students (n=64). The study findings revealed that most students had personal accounts on facebook (72.4 percent; n=55) as shown in Figure 1. Other popular social media on which students had their personal accounts/profile were Google+ (39.5 percent; n=30), and skype (34.2 percent; n=26). Other social media which were also important to students were related to you tube, twitter, yahoo calendar, blogger, linkedin, picasa, and google talk.
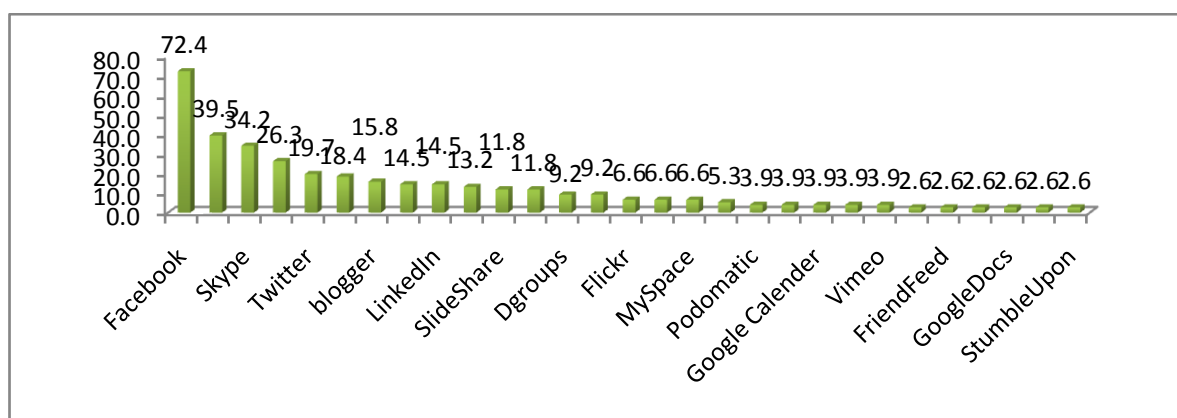

Figure 1: Use of web 2.0 services among undergraduate students

The frequency of using social media applications among students was generally low. Generally, online bookmarks/tags (71.1 percent; n=54), video (56.6 percent; n=43) and photos (53.9 percent; n=41) were being used more regularly than other social media related to content/document development, blogs, twitter, and instant messaging such as Google talk or skype (see Table 1). The study findings also showed that most students never sent out tweets (52 percent; n=26), shared audio files (48.1 percent; n=26), participated in discussion forums (47.1 percent; n=24), and read RSS feeds (40 percent; n=20).

Table 1: Frequency of using social media applications among students

Social media activities	Daily	Weekly	Monthly	Once in a while	Total respondents	Total percentage
Share your videos files with fellow students/ friend	10	15	3	15	54	71.1
Bookmark/tag online information resources	27	16	4	7	43	56.6
Communicate with fellow students/ friends using Google Talk or Skype or other similar tools	6	4	1	2	28	36.8
Share your audio files with fellow students/ friends	7	11	0	10	36	47.4
Discuss assignment with my classmates	7	11	2	16	41	53.9
Share your photos with your fellow students/friends	7	10	6	18	33	43.4

Interact with fellow students/ friends on Facebook or Google+	9	9	2	13	36	47.4
Schedule events using online calendars	6	9	10	11	33	43.4
Share your presentations with your fellow students	7	8	5	13	23	30.3
Collaborate with your fellow students on content/document development	5	7	2	9	22	28.9
Post entries on your blog	6	6	4	6	27	35.5
Read RSS feeds	6	6	9	9	30	39.5
Contribute to discussions in Discussion Forums with my classmates	5	6	3	13	23	30.3
Use it in class during lecture with my lecturer/ professor	8	5	3	7	24	31.6
Send out your tweets	6	5	2	11	13	17.1

The study findings showed that the major purpose of using social media was to keep in touch with friends (81.6 percent; n=62), followed by the purpose to share information amongst each other (69.3 percent; n=52), find information for writing their course works (56 percent; n=42), and get opinions from fellow students (50.7 percent; n=38) as shown in Figure 2.
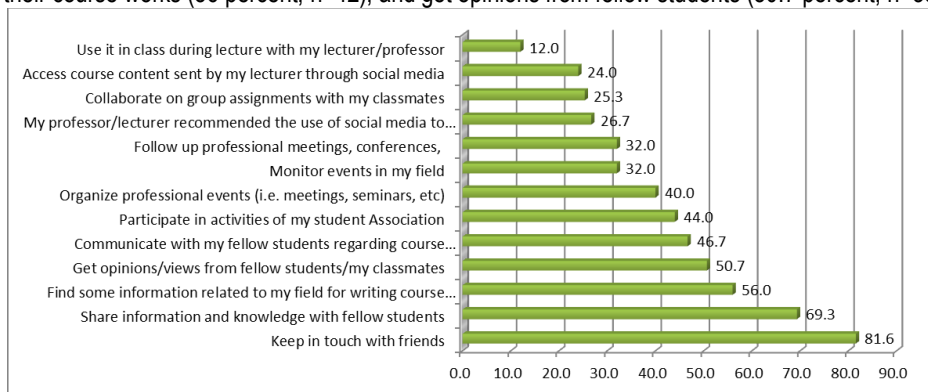

Figure 2: Purpose of using web 2.0 at the library website

Most students (88.4 percent; n=61) also supported the idea of establishing the library 2.0 services. Their major reasons for integrating web 2.0 in the library website were to access general information (57.1 percent; n=44) and find availability of new links to articles, journals and books (41.6 percent; n=32) as shown in figure 3.
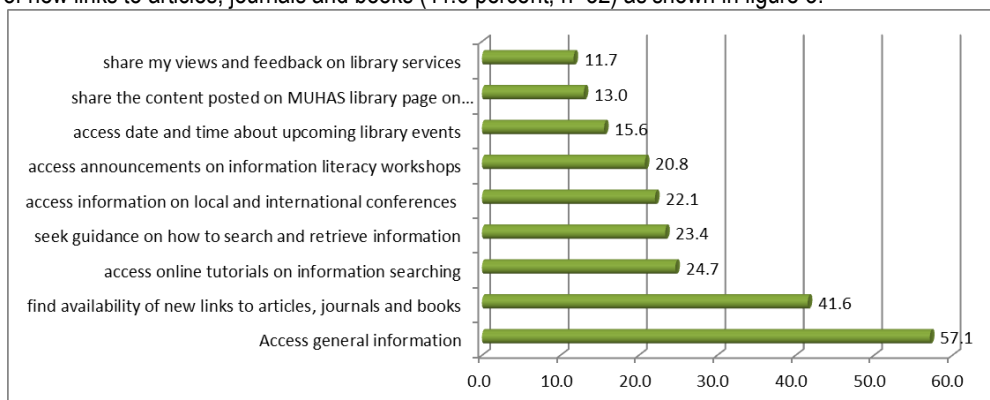

Figure 3: Reasons for extending library services in social media

On the application of library 2.0 services, students mainly preferred the incorporation of search engines for electronic resources into the library website (45.5 percent; n=35). Other important library 2.0 features that students preferred were related to facebook (35.1 percent; n=27), and blog (31.2 percent; n=24) as shown on Figure 4.
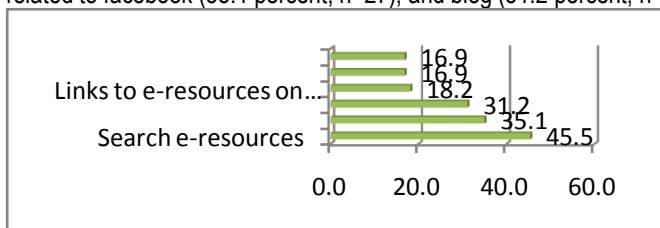

Figure 4: Preference on the adoption of web 2.0 features on library website

6

Discussion of the exploratory study findings
In general, this survey enabled the MUHAS library to understand the use of web 2.0 applications among undergraduate students, and their preferences on the library 2.0 tools. The results of the present study were broadly consistent with preceding studies (Booth, 2009; Barnet *et al.,* 2010; Ayiah and Kumah, 2011) that most students were heavy users of web 2.0 tools. With appropriate marketing strategies, Web 2.0 technologies can generate two way communications between the library and students at MUHAS. This can genuinely make the library service more students driven, more immediate and more responsive to medical student needs. The study findings indicated that most students were already using web 2.0 applications for information sharing (i.e facebook, goggle+, twitter and skype), and information dissemination (e.g. you tube, picasa), and to a lesser extent information acquisition (i.e. blog). Other studies have also identified high use of Facebook, and YouTube, such as in Greece (Garoufallou and Charitopoulou, 2011), UK (Barnet *et al.,* 2010) and USA (Booth, 2009). Equally, about 93.9% of the students selected Facebook as the most visited social networking site in Ghana (Ayiah and Kumah, 2011). These findings mean that the implementation of library 2.0 functionalities at MUHAS should focus on these types of web 2.0 tools for the library 2.0 applications to have a positive impact at the University.

Despite being heavy users, it was evident from the study findings that most students did not use social media regularly. The total number of students who indicated the frequency of using the social media in all the cases was lower than the number that identified with having personal accounts/profile on the application. Most students used library 2.0 applications for information organization (i.e. social bookmarks/tags) and information dissemination (i.e. video and photos) more regularly than other social media related to information acquisition and sharing. Parallel to previous studies, the present study found that students, despite being heavy users, were less sophisticated and expressive in creating and posting content on Web 2.0 than presumed (Booth, 2009; Burhanna *et al.,* 2009). It can be deduced that there is a great need for MUHAS library to create awareness and conduct training on library 2.0 applications to enhance use of these new technologies among users.

In this study, the students' online engagement was mainly related to social and course related activities. These results were also similar to other library 2.0 studies in Africa (Ayiah and Kumah, 2011) and outside Africa (Booth, 2009; Barnet *et al.,* 2010). It is, however, established elsewhere that social networks are mainly used for social purposes (Garoufallou and Charitopoulou, 2011). The present study findings show that the library can effectively use the social media to reach students because most of them are already using this medium for educational purposes. Library services on social media will be appreciated by students because they will be learning as they entertain themselves at the same time.

Similar to preceding studies (Burhanna *et al.,* 2009; Ayiah and Kumah, 2011; Ponte and Simon, 2011), most students positively supported the adoption of library 2.0 services at MUHAS for the purpose of enhancing their educational environment. In the present study, students mainly wanted the library to adopt social media services related to search engines for electronic resources, facebook and blog. Another study in USA also revealed that most students preferred to use downloadable toolbars in firefox and/or Facebook library applications (Booth, 2009). The study findings suggest that the library 2.0 features related to information organization (i.e. the search facility), information sharing (i.e. facebook institutional page) and information acquisition (i.e. blog) are more likely to receive high use among students at MUHAS, than other library 2.0 functionalities.

Development and implementation of library 2.0 technologies at MUHAS Library
MUHAS Library is a leading biomedical and health sciences university library in Tanzania. The library (http://library.muhas.ac.tz) is part of the Muhimbili University of Health and allied Sciences (MUHAS) which became a university in its own right in 2007, having previously been a college of the University of Dar es Salaam. As a public University, MUHAS is mandated to increase its student numbers quite rapidly to meet the country's acute need for more doctors, nurses, pharmacists and dentists. MUHAS has also revised its entire curriculum to make it competency based, and introduced innovative teaching methodology. All these developments require that the library becomes a state of the art centre for knowledge management serving the needs of increasing numbers of students and academic staff. The other health institutions in Tanzania have very inadequate library services and look up to MUHAS to provide their needs electronically. The library currently houses over 50,000 volumes of materials, subscribes to over forty academic databases, and has automated its services, established a digital repository, and provides a wide range of other information and reference services. In order to serve the growing demands and need of increasing numbers of its clients, within and outside the University, the library therefore adopted emerging social and dynamic technologies in order to develop a more responsive range of user-focused services.

The implementation of web 2.0 technologies was also tied to the mission of the library service, which is to improve the quality library services and access to relevant health information and knowledge to support teaching and learning, service, consultancy and research within and outside the University. The library identified benefits and disadvantages of several types of social media tools based on literature review and users' needs. The library adopted web 2.0 services for the purpose of providing access to information, getting feedback from users, interactive and collaborative learning, and promoting library services. The library, therefore, developed the following tools: information organization (social bookmark

and tagging system, downloadable library toolbar, and a search tool embedded in blog); information acquisition (blog, wiki); information dissemination (RSS); and information sharing (social networks).

Social bookmarking and tagging systems
The MUHAS library adopted these tools in order to organize and categorize web-based scholarly literature in the health science discipline and share them as subject guides to faculty and students via the library website. The implementation of social bookmarks at MUHAS library was broadly consistent with previous studies (Click and Petit, 2010), where the MUHAS library used an external web service, known as delicious (http://delicious.com/) to manage library information resources of more than 100 annotated web links. The use of delicious has enabled more efficient access and retrieval of health scholarly literature at the University than spiders and search engines because they do not have the human capability to conceptually identify and evaluate the web page's subject. Further, the library has been able to support its users' needs by creating tags that consist of terminology familiar to faculty and students at the University.

Single-click downloadable library toolbar
The library developed a downloadable library toolbar to allow single click access to a wide range of library collection and enhance use of library services at MUHAS. This toolbar was developed with the help of Conduit (www.conduit.com). The single-click library toolbar contains several products and services provided by the library, which include a link to MUHAS library website, MUHAS emails, MUHAS homepage, google web search, library catalogue, digital library services (institutional repository, latest e-resources, theses, educational resources, CDROMs, and online tutorials on information search techniques), subscribed e-journals (e.g. HINARI, Annual reviews, CABI Direct, Cochrane, Emerald), library blog, and library social networks (twitter and facebook). Similar to prior research (Ram *et al.,* 2011), the MUHAS library expects to increase the frequency of use of different services available through the downloadable library toolbar.

Blogs and mashups
Parallel to previous studies (Ilako and Ikoja-Odongo, 2011), blogs are used at MUHAS for delivering health content through online search tool to search for e-resources at the library website, posting information on training schedule, new information resources at the library, online tutorials on information search techniques, international and local conferences, and other information that may be relevant to faculty and students. The library used an external free service to provide its blog service, known as blogger which is the most common blogging platform used by libraries. The library mashed up its blog with other web 2.0 applications such as google custom search, google maps, googledocs, and social bookmarks. Google custom search was used to develop the online search tool for searching subscribed e-journals and e-books at MUHAS, and it was embedded at the library blog. Google map was used to show the location of the library. Googledocs was used for uploading online tutorials in form of power point presentations, and evaluation forms on the library blog in order to receive users' feedback on the information literacy workshops. A cloud tag and bookmarks from delicious were also integrated into the library blog in order to inform users about the library's new resources. The rapid feedback from users has allowed the library to easily update its blog with new information. Statistics show that the blog has total page views of over 5,490, where it receives an average of 515 hits per month, with most viewers from Tanzania.

However, user participation in library blogs has been very limited in terms of comments made. This situation is due to the fact that most students at MUHAS create and post contents on social media at a low rate, which shows that creation of awareness and training are very important. In addition, comment spam has not been a major problem, because the library uses detection and prevention tools to combat comment spam in its blogs. Another study also showed that comment spams were not a dominant problem in library blogs in USA (Oguz and Holt, 2011). The MUHAS library adopted spam prevention tools that are readily available in the blogger software, which include Turing tests (i.e. CAPTCHA), user registration, and comment moderation or disabling commenting. To further minimize comments spam, the library has allowed the use of OpenID which is an open source single sign-on initiative. The OpenID allows users to use their existing accounts (e.g., Facebook, Google mail) to sign on to various sites without the need to create new accounts (Oguz and Holt, 2011). Thus, users cannot edit the blog, but they can log in by using their existing accounts and make comments on the blog content. In general, the use of blog has improved a number of services at MUHAS, including the promotion of library services, information literacy programme and provision of user-oriented services such as, current awareness services.

RSS feeds
Although RSS feeds were rated low by students, the MUHAS library integrated them on its website, blog and facebook page to instantly update its users on new and useful e-resources or pertinent information being added on the website or blog. The use of RSS feeds has enabled the MUHAS library to improve the provision of user-oriented services, such as the selective information dissemination services, as reported by other studies (Click and Petit, 2010). The library has been able to disseminate annotated links of information resources according to the user's needs via RSS feeds.

Social networks

In this category, facebook seemed to be a good choice to communicate with library users at MUHAS, since most students are already using this tool for social and educational purposes. The MUHAS library facebook page is still being promoted, and has already accumulated 108 members. Like other libraries (Click and Petit, 2010; Ayu and Abrizah, 2011; Phillips, 2011), the MUHAS library used facebook to promote library events (such as information literacy workshops, local and international conferences); and new information resources at the library, where users leave very useful comments about the library. Users cannot edit the facebook page, though they can make comments on the contents. The rapid feedback from users has allowed the library to easily update its facebook page with new information. Further, users use the facebook page to encourage each other to use library services. For instance, one user commented "I already use MUHAS CDROMS. They are really good especially to medical students". According to statistical data, the posts about library events are viewed an average of 150 times a week. In addition, comment spam has not been a major problem, because the library moderates comments on a daily basis. On the whole, the use of facebook has improved a number of services at the library, including the promotion of library services, and provision of user-oriented services such as, current awareness services. Further, the library also established a page on twitter although it was rated low by students. Currently, twitter is not as popular as facebook, but its use is expected to grow as the awareness of library 2.0 services increases at the University.

Wiki
In supporting learning and information literacy activities, the MUHAS library used wiki to provide online training modules and annotated links on various topics, as pointed out by other studies (Click and Petit, 2010). The library wiki was developed by using free hosting services provided by google site. The library wiki provides online training modules in form of power point presentations on various information literacy aspects, including online search strategies, evidence based practice, citation and reference management, and use of web 2.0 technologies. These tutorials are used to educate students and faculty who do not find time to attend library workshops. The library wiki further provides annotated links on online training module on various topics, including voice-annotated PowerPoint presentations, supplemental course materials, Web and podcasts of lectures and seminars, web-based training sessions which utilize web conferencing tools, and integration of web 2.0 applications. Users cannot edit the wiki, though they can create accounts and make comments on the library tutorials and annotated links. However, user participation on library wiki has been very low and, consequently, comment spam has not been a major challenge. The awareness and use of these tools is expected to grow in the near future because the library is currently undertaking an intensive IL programme as explained in the methodology section. In general, wiki has enabled the library to provide online and interactive IL learning programmes to suit user's learning styles.

Information literacy
Web 2.0 tools have an appropriate place in information literacy (IL) programmes of any library. Since IL is important in supporting lifelong learning, the MUHAS library conducts various workshops to faculty and students to ensure that the web 2.0 tools are used to support the University's core functions, including teaching, learning and research. In 2011, the library conducted seven workshops to academic members of staff, and eight workshops to students where a total of 100 academic staff and 60 students were trained. These workshops are used to educate faculty and students on the use of web 2.0 tools for accessing information, as well as for teaching, learning and research purposes. For instance, in one of the workshops, which attracted 35 scientists from 8 health universities and research institutions including MUHAS, most participants (92.9 percent; n=26) reported that the objectives of the web 2.0 workshop were met. Participants felt that all sessions were useful because they improved their knowledge on online searching; preparation of teaching materials through wiki; and using social bookmarks to manage citations and references.

On the other hand, the University has integrated the web 2.0 aspects into the first year undergraduate curricula. The aim of the course is to impart knowledge and skills to students with regard to the use of e-learning system and web 2.0 for collaborative learning, as well as information searching purposes. The library also provides online tutorials on IL aspects and annotated links to online tutorials via its wiki. The integration of web 2.0 into IL programme has enabled the library to be effective in creating and managing course materials, as well as getting feedback from students, and generating students' interest in learning.

Other libraries also use web 2.0 to further demonstrate difficult IL concepts. A study by Luo (2010) showed that web 2.0 technology was used in three levels in IL programmes, which were to organize and manage course-related material for librarians' own purposes; to facilitate the delivery of content to students; and to illustrate IL concepts. However, the second level of web 2.0 use was the most popular among librarians (Luo 2010). The web 2.0 technologies are changing at a rapid rate and, consequently, it is important for librarians to keep up with these developments, and be able to identify tools that are useful in IL programmes.

Challenges of implementing web 2.0 technologies at MUHAS library
Despite the fact that MUHAS has implemented library 2.0 for over a year now, the University still faces a number difficulties, which include: inadequate number of computers and unstable internet connectivity and electricity; inadequate

awareness and internet skills; inadequate financial resources; shortage of trained ICT and library staff; lack of supportive policy/guidelines, authentication, security and ownership of intellectual property of web 2.0 services. Similar to other studies in Africa (Kwanya *et al.,* 2012; Ezeani, 2011), a Tanzanian study also reported the following as the major problems facing libraries in implementing web 2.0: lack of reliable power sources; unstable internet access; lack of technical knowledge on use of web 2.0; users who are not ICT savvy; and low uptake of web 2.0 use by patrons (Muneja and Abungu, 2012).

To improve the situation, the MUHAS library has undertaken the following measures: (a) the university is soliciting funds to increase bandwidth to enhance the use of library 2.0 and other ICT services; (b) the library developed a curriculum on information and learning technologies, which includes web 2.0 aspects and the course is taught to all first year undergraduate students; (c) the library organizes faculty development programmes regularly to enhance faculty's IL skills including use of library 2.0; (d) the university regularly increases the number of technical expertise and librarians and provide them with adequate training to ensure the smooth running of ICTs, including web 2.0 services; (e) the librarians manually monitor the content on facebook and blog comments on a daily basis to ensure that unsuitable content is not published on the sites; and (f) the University ICT policy is currently under review, and the library is also developing a policy on library services that will incorporate web 2.0 and library 2.0 issues.

Conclusions and recommendations

Web 2.0 technologies provide potential benefits to academic libraries, and the role of librarians as facilitators of knowledge sharing, collaboration and communication is becoming significant in the web 2.0 environment. For patrons to communicate and interact with librarians more conveniently and efficiently, the academic library must embrace the medium that patrons are already using, such as social networks and blogs. Following a user needs assessment at MUHAS, the library 2.0 tools were adopted which were related to the use of web 2.0 for information organization, sharing and acquisition. The adoption of library 2.0 tools improved the quality of library services, by providing more interactive and user-oriented reference services; increased access to print and digital resources through a search facility on its blog; enhanced delivery of online and physical IL instructions to suit users learning styles; shared news and promoted library services in relatively less time; and increased user participation and feedback in the delivery of library services. The adoption of these tools showed that web 2.0 technologies can be utilized to enhance the delivery and promotion of library services without undermining their quality. However, the library faced various challenges in implementing web 2.0 technologies, related to infrastructure, awareness, literacy, shortage of trained staff, policy/strategies, authentication, security, robustness and ownership of intellectual property of web 2.0 services. Most academic libraries in Africa have not yet adopted web 2.0 technologies to improve their services. The following recommendations can help other libraries to plan and integrate their library 2.0 technologies in their services**:**

- Libraries should conduct regular studies on users' information needs and seeking behaviours for effective adoption and use of web 2.0 technology;
- Libraries should develop standards and policies for managing library 2.0 tools and its content, and guidelines for managing inappropriate user-generated content;
- Libraries should select tools that are user friendly and tools that require relatively less time to set up and maintain, for the effective management of the tools;
- Libraries should create or redesign job descriptions and organizational structure to effectively run library 2.0 services.
- Librarians should redesign librarianship training curricula to build in skills in such areas as marketing, public relations and ICTs;
- Libraries should create awareness about the existence of library 2.0 features among users through workshops by using train-the trainers technique and peer to peer learning approach, integrate IL aspects into university curricula, and provide online tutorials on the use of library 2.0;
- Librarians should communicate the benefits of web 2.0 tools to the institutional management for the effective deployment of these technologies;
- Libraries should consistently re-evaluate library 2.0 services for the effective management of these tools;
- The government intervention with supply of stable electrical power and release of funds for improving bandwidth are proffered; and
- Universities should also seek for alternative power sources, increase bandwidth and number of computers.

References

Alajmi, M. (2011), "Modeling student perception of web 2.0 technologies adoption in Kuwait", available at: http://digital.library.unt.edu/ark:/67531/metadc67955/ (Accessed 13 July 2012).

Ayiah, E.M., and Kumah, C.H. (2011), "Social networking: a tool to use for effective service delivery to clients by African libraries," in *World Library and Information Congress: 73rd Congress: 77th IFLA General Conference and Assembly*, 1-14, available at: http://conference.ifla.org/ifla77 (Accessed 11 July 2012).

Ayu, a. R.R., and Abrizah, A. (2011) "Do you facebook? usage and applications of facebook page among academic libraries in Malaysia," *The International Information & Library Review*, Vol. 43 No. 4, pp. 239-249.

B., P.B., and Kumar, V. (2011), "Use of web technology in providing information services by south Indian technological universities as displayed on library websites," *Library Hi Tech*, Vol. 29 No. 3, pp. 470-495.

Barnet, L., Collis, E., Narborough, J., Parry, F., Peel, C., Shield, C., Stubbings, R., and Walton, G. (2010), "Use of web 2.0 tools by students at Loughborough University", available at: http://www.lboro.ac.uk/media/wwwlboroacuk/content/library/downloads/surveyresults/Web2.0tools.pdf (Accessed 18 August 2012).

Booth, C. (2009), *Informing innovation: tracking student interest in emerging library technologies at Ohio University*, Association of College & Research Libraries, Chicago.

Burhanna, K.J., Seeholzer, J., and Salem, J.J. (2009), "No natives here: a focus group study of student perceptions of web 2.0 and the academic library," *The Journal of Academic Librarianship*, Vol. 35 No. 6, pp. 523-532.

Cahill, K. (2009), "Building a virtual branch at Vancouver Public Library using web 2.0 tools," *Program: Electronic Library and Information Systems*, Vol. 43 No. 2, pp.140-155.

Chew, I. (2008), "Web 2.0 and library services for young adults : an introduction for librarians", available at: http://www.nlcy.go.kr/symposium/2011/pdf/eng/n9.pdf (Accessed 2 August 2012).

Chisenga, J., and Chande-Mallya, R. (2012), "Social media and professional networking: a case of information professionals in the SCECSAL region," in *SCECSAL XXth Conference from 4-8th June 2012 Nairobi, Kenya*.

Chua, A.Y.K., and Goh, D.H. (2010), "A study of web 2.0 applications in library websites," *Library & Information Science Research*, Vol. 32 No. 3, pp. 203-211.

Click, A., and Petit, J. (2010), "Social networking and web 2.0 in information literacy," *The International Information & Library Review*, Vol. 42 No. 2, pp.137-142.

Collins, G., and Quan-haase, A. (2008), "Social media use by Ontario University libraries: challenges and ethical considerations," in *40th Annual Conference Wilfrid Laurier University/University of Waterloo, Waterloo, Ontario May 31 - June 2, 2012*, available at: http://www.cais-acsi.ca/ (Accessed 26 July 2012).

Ezeani, C.N. (2011), "Network literacy skills of academic librarians for effective services delivery: the case of University of Nigeria library system effective services delivery," *Library Philosophy and Practice*, available at: http://unllib.unl.edu/LPP/ (Accessed 26 July 2012).

Garoufallou, E., and Charitopoulou, V. (2011), "The use and awareness of web 2.0 tools by Greek LIS students," *New Library World*, Vol. 112 No. 11/12, 490-498.

Hammong, S. (2009), "How are public libraries engaging with library 2.0?", available at: http://schammond.files.wordpress.com/2010/04/full-text-how-are-public-libraries-engaging-with-library-2-0.pdf (Accessed 23 August 2012).

Han, Z., and Liu, Y. (2010), "Web 2.0 applications in top Chinese university libraries," *Library Hi Tech*, Vol. 28 No. 1, pp. 41-62.

Harinarayana, N.S., and Raju, N.V. (2010), "Web 2.0 features in university library web sites," *The Electronic Library*, Vol. 28 No. 1, pp. 69-88.

Holmberg, K., Huvila, I., Kronqvist-Berg, M., and Widén-Wulff, G. (2009), "What is library 2.0?", *Journal of Documentation*, Vol. 65 No. 4, pp. 668-681.

Ilako, C., and Ikoja-Odongo, R. (2011), "Creativity and innovations in Ugandan libraries: the case of Makerere University Library," in *World Library and Information Congress: 77th IFLA General Conference and Assembly*, 1-6, available at: http://conference.ifla.org/past/ifla77/97-ilako-en.pdf (Accessed 2 July 2012).

Karna, M. (2012), "Bachelor and master level students' perceptions of using web 2.0 tools for knowledge construction in PBL-context," in *Proceeding of the 4th International Conference on Education and New Learning Technologies Barcelona, Spain. 2-4 July, 2012.*, 1027-1032, available at: http://library.iated.org/view/KARNA2012BAC (accessed 15 August 2012).

Kim, Y.-M., and Abbas, J. (2010) "Adoption of library 2.0 functionalities by academic libraries and users: a knowledge management perspective," *The Journal of Academic Librarianship*, Vol. 36 No. 3, pp. 211-218.

Kwanya, T., Stilwell, C. and Underwood, P. (2012), "The application of web 2 . 0 tools by libraries in Kenya : a reality check," in *SCECSAL XXth Conference from 4-8th June 2012 Nairobi, Kenya*.

Kwanya, T., Stilwell, C., and Underwood, P.G. (2009), "Library 2.0: revolution or evolution ?," Vol. 75 No. 1, pp. 70-75.

Linh, N.C. (2008) "A survey of the application of web 2.0 in Australasian university libraries," *Library Hi Tech*, Vol. 26 No. 4, pp. 630-653.

Liu, S. (2008), "Engaging users: the future of academic library web sites," *College & Research Libraries*, Vol. 69 No. 1, pp. 6-27, available at: http://crl.acrl.org/content/69/1/6.abstract (accessed 25 August 2012).

Luo, L. (2010), "Web 2.0 integration in information literacy instruction: an overview," *The Journal of Academic Librarianship*, Vol. 36 No. 1, pp. 32-40.

Lwoga, E.T. (2011), "Innovation in Library and Information Services in supporting Africa's industrial development", The Second Session of the Committee on Development Information Science Technology (CODIST-II), 02 – 05 May 2011, Addis Ababa, Ethiopia, available: http://repository.uneca.org/codist/sites/default/files/Library respondent paper to keynote speech.doc (accessed 22 July 2012).

Lwoga, E.T. (2012), "Making learning and web 2.0 technologies work for higher learning institutions in Africa," *Campus-Wide Information Systems*, Vol. 29, pp. 90-107.

Mahmood, K., Richardson, J.V. (2011), "Adoption of web 2.0 in US academic libraries: a survey of ARL library websites," *Program: Electronic Library and Information Systems*, Vol. 45 No. 4, pp. 365-375.

Makori, E.O. (2012a), "Bridging the information gap with the patrons in university libraries in Africa: the case for investments in web 2.0 systems," *Library Review*, Vol. 61 No. 1, pp. 30-40, available: /journals.htm?issn=0024-2535&volume=61&issue=1&articleid=17014888&show=html (accessed 18 Aug 2012).

Makori, E.O. (2012b), "Application of web 2 . 0 tools in delivering library services : a case of selected libraries in Tanzania," in *SCECSAL XXth Conference Hosted by KLA on 4th -8th June 2012 in Nairobi, Kenya*, available at: http://scecsal.viel.co.ke/images/c/ce/POTENTIAL_OF_LIBRARY_2.0_IN_PROVISION_OF_INFORMATION_SERVICES_IN_ACADEMIC_LIBRARIES.pdf (Accessed 25 August 2012).

Muneja, P.S., and Abungu, A.K. (2012), "Application of Web 2 . 0 tools in delivering library services : a case of selected libraries in Tanzania," in *SCECSAL XXth Conference from 4-8th June 2012 Nairobi, Kenya*.

Muswazi, P. (2000), "Digital library and information services in Southern Africa," *Information Development*, Vol. 16 No. 2, pp. 75-82, available at: http://idv.sagepub.com/cgi/content/abstract/16/2/75 (accessed 25 August 2012).

Mutula, S.M. (2012), "Ethical and moral aspects of social media: implications for sub Saharan Africa," in *SCECSAL XXth Conference from 4-8th June 2012 Nairobi, Kenya*.

Nguyen, L., Partridge, H., and Edwards, S. (2012), "Towards an understanding of the participatory library," *Library Hi Tech*, Vol. 30, pp. 335-346.

Oguz, F., and Holt, M. (2011), "Library blogs and user participation : a survey about comment spam in library blogs," Vol. 29 No. 1, pp. 173-188.

Olasina, G. (2011), "The use of web 2.0 tools and social networking sites by librarians, information professionals, and other professionals in workplaces in Nigeria, Gbola Olasina," *PNLA Quarterly*, Vol. 75 No. 3, pp. 1-40, available at: http://unllib.unl.edu/LPP/PNLA Quarterly/olasina75-3.htm (accessed 18 August 2012).

Oyieke, L.I. (2012), "Leveraging university libraries through web 2 .0: implications for academic librarians and the scholarly online communities in Kenya," in *SCECSAL XXth Conference from 4-8th June 2012 Nairobi, Kenya*.

O'Reilly, T. (2005), "Web 2.0: Compact Definition? ", available at: http://radar.oreilly.com/2005/10/web-20-compact-definition.html (Accessed 1 August 2012).

Pacheco, J., Kuhn, I., and Grant, V. (2009), "Librarians use of web 2.0 in UK medical schools: outcomes of a national survey," Vol. 6, available at: http://www.dspace.cam.ac.uk/handle/1810/226115 (Accessed August 18, 2012).

Penzhorn, C. (2008), "In support of social scholarship: the role of the academic library", available at: http://www.ais.up.ac.za/digi/docs/penzhorn_paper.pdf (Accessed 1 August 2012).

Penzhorn, C., and Pienaar, H. (2009), "The use of social networking tools for innovative service delivery at the University of Pretoria Library," *Innovation*, Vol. 38, pp. 66-77.

Phillips, N.K. (2011) "Academic library use of facebook: building relationships with students," *The Journal of Academic Librarianship*, Vol. 37 No. 6, pp. 512-522.

Pienaar, H., and Smith, I. (2008), "Development of a library 2.0 service model for an African library," *Library Hi Tech News*, Vol. 25 No. 5, pp. 7-10, available at: /journals.htm?issn=0741-9058&volume=25&issue=5&articleid=1738012&show=html (accessed 15 August 2012).

Ponte, D., and Simon, J. (2011), "Scholarly communication 2.0: exploring researchers' opinions on web 2.0 for scientific knowledge creation, evaluation and dissemination," *Serials Review*, Vol. 37 No. 3, pp. 149-156.

Qutab, S., and Mahmood, K. (2009) "Library web sites in Pakistan: an analysis of content," *Program: Electronic Library and Information Systems*, Vol. 43 No. 4, pp. 430-445.

Ram, S., K, J.P.A., Kataria, S. (2011), "Responding to user's expectation in the library: innovative web 2.0 applications at JUIT Library: a case study," *Program: Electronic Library and Information Systems*, Vol. 45 No. 4, pp. 452-469.

Rogers, C.R. (2012), "Social media, libraries, and web 2.0 : how American libraries are using new tools for public relations and to attract new users", available at: http://www.statelibrary.sc.gov/docs/pr/201202_com_social_media_survey_dec_2011.pdf (accessed 20 June 2012).

De Rosa, C., Cantrell, J., Havens, A., Hawk, J., and Jenkins, L. (2007), "Sharing, Privacy and Trust in Our Networked World", available at: http://www.oclc.org/reports/pdfs/sharing.pdf (Accessed 20 June 2012).

Samb, A.A. (2011), "Web 2.0 tools and the marketing of libraries: the case of Africa," in Gupta, D. and Savard, R., eds., *Marketing Libraries in a Web 2.0 World*, Walter de Gruyter GmbH: Berlin, available at: http://brainshare.zxq.net/libraryscience/Marketing Libraries in a Web 2.0 World %2528IFLA Publications%2529.pdf (Accessed 20 July 2012).

Saw, G., and Todd, H. (2007), "Library 3.0: where art our skills," in *World Library and Information Congress: 73rd IFLA General Conference and Council 19-23 August 2007, Durban, South Africa*, available at: http://works.bepress.com/cgi/viewcontent.cgi?article=1005&context=grace_saw1 (Accessed 21 July 2012).

Tripathi, M., and Kumar, S. (2010), "Use of web 2.0 tools in academic libraries: a reconnaissance of the international landscape," *The International Information & Library Review*, Vol. 42 No. 3, pp. 195-207.

Wood, M. (2009), "Academic library websites in South Africa," *Innovation*, Vol. 39, pp. 43-57.